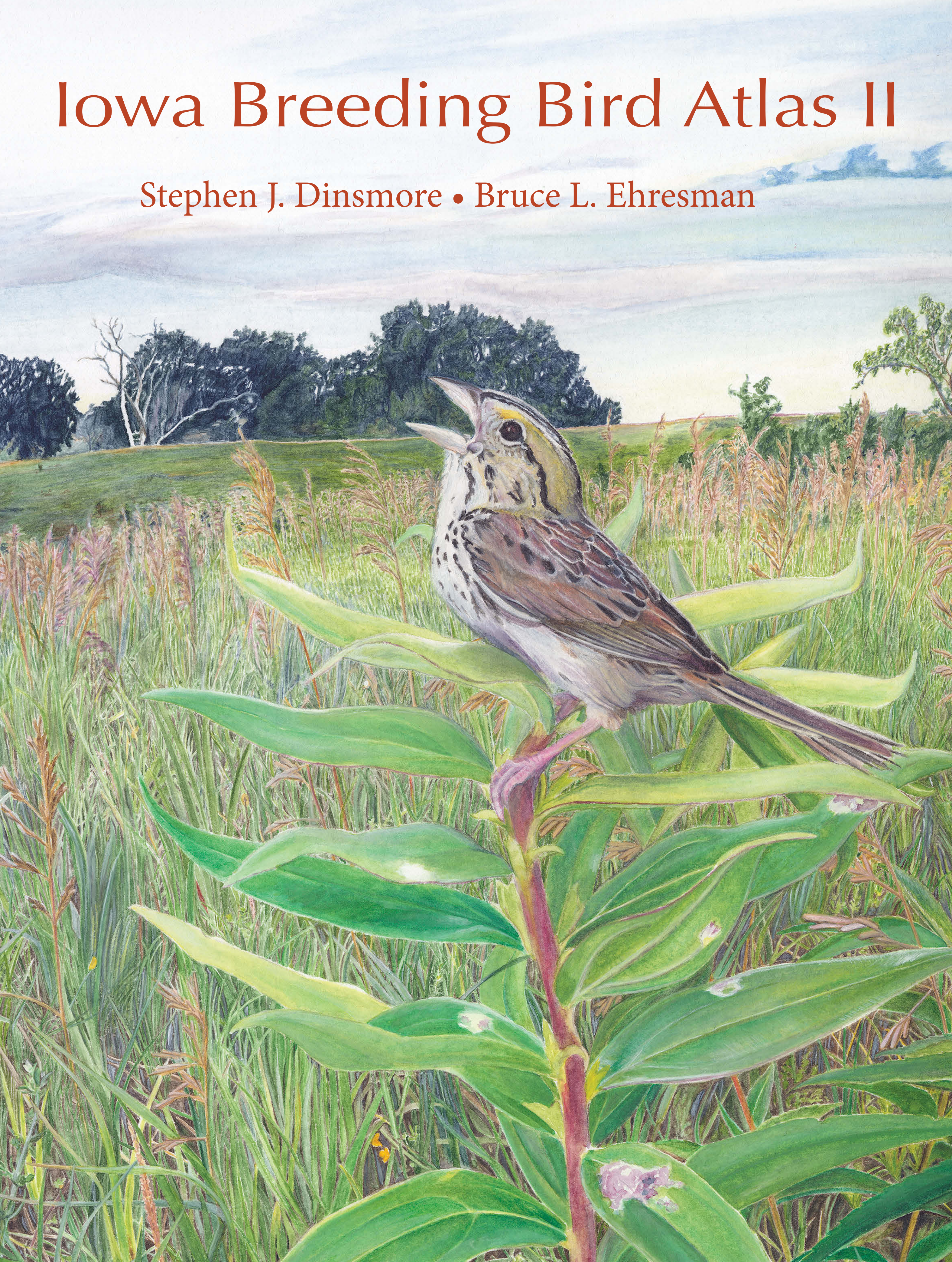
Iowa Breeding Bird Atlas II

Stephen J. Dinsmore • Bruce L. Ehresman



Iowa Breeding Bird Atlas II

Iowa Breeding Bird Atlas II

Stephen J. Dinsmore

Bruce L. Ehresman

with Douglas C. Harr, Christopher J. Caster, Jacob T. Gilliam,
Rex R. Johnson, Shane S. Patterson, Karen E. Kinkead, and Ann M. Johnson

Editors: Ann M. Johnson and Kayleen A. Niyo

Published by the Iowa Ornithologists' Union

Ames, IA

Artwork by Christopher J. Caster

Website: https://iowabba2.org/

Design and Layout: Douglas E. Chapman

Frontispiece Photo: Recently fledged Eastern Kingbird, Photo by Paul Roisen

Cedar Waxwings
Photo: Wolfgang Oesterreich

Preferred citation: Dinsmore, S. J., B. L. Ehresman, D. C. Harr, C. J. Caster, J. T. Gilliam, R. Johnson, S. S. Patterson, K. E. Kinkead, and A. M. Johnson. 2020. Iowa Breeding Bird Atlas II (Editors: A. M. Johnson and K. A. Niyo). Iowa Ornithologists' Union, Ames, IA.

Contents

Acknowledgements

The second Breeding Bird Atlas (BBA II) was accomplished through a partnership between the Iowa Ornithologists' Union (IOU) and the Iowa Department of Natural Resources (DNR). Throughout the life of the project, the DNR employed a project coordinator and several surveyors through AmeriCorps. This allowed more complete coverage than volunteers could accomplish, especially in areas of the state with few birders. The IOU provided publication funding with a commitment of general dollars and the auction of species sponsorships. Each entity was represented on the BBA II Steering Committee that set the methodology, provided oversight throughout, and undertook responsibility for completing this document. As always, the heart of the project was the many volunteers who completed more than 10,000 hours of surveying.

Data management was shared by committee members Karen Kinkead of the DNR and Ann Johnson of the IOU. Using ArcGIS Karen produced block and habitat maps for use by surveyors as well as the maps comparing BBA I and BBA II results. Ann created a BBA II application on the IOU website for data input by surveyors and coordinators that provided a real-time feedback loop of progress over time, which was instrumental in setting focus for maximum coverage.

More detail is available on our corresponding website—https://iowabba2.org/.

BBA II STEERING COMMITTEE

Stephen J. Dinsmore, Chair

Christopher Caster

Bruce Ehresman

Jay Gilliam

Douglas Harr

Ann Johnson

Karen Kinkead

Karen Viste-Sparkman

BBA II COORDINATORS

Nicki Nagl, 2007–2008

Billy Reiter-Marolf, 2009–2010

Shane Patterson, 2011–2012

SURVEYORS (*indicates committee members and paid staff)

Danny Akers
Matt Allen
Pam Allen
Reid Allen
Ray Amundson
Sammy Andersen
Wyatt Andersen
Bob Anderson
Scott Anderson
Eloise Armstrong
Eugene Armstrong
Emily Guldan
Aaron Haines
Joyce Haines
Al Hancock
*Adam Hanisch
Norman Hansen
Patty Hansen
Peter Hansen
Greg Hanson
*Tyler Harms
*Douglas Harr
Jerry Probst
Mark Proescholdt
Kara Pusateri
Lisa Ralls
*Natalie Randall
Mark Rappaich
*Katy Reeder
Terri Reese
Ryan Rehmeier
Larry Reis
Jan Reiter

Carol Baker
Dave Baker
Derek Bakken
*Jamie Balk
*Michael Barrett
Tyler Bass
Ross Baxter
Barbara Beaumont
Dena Belcher
Kyle Belcher
Ellen Bell
Jennifer Belyeu
Sandy Belz
Jeff Bergman
Neil Bernstein
Carol Berrier
Larry Best
Stacy Beyer
John Bissell
Sarah Bissell
Carol Blair
Dianne Blankenship
Bob Blenderman
Elizabeth Blessington
Kayla Blocker
Bill Bolton
Bill Bossman
Mark Bowman
*Kristen Bredemeier
*Aaron Brees
Ernie Brees
Diane Brockett
Ed Brogie
Mark Brogie
Bill Brown
Don Brown
Mark Brown
*Wayne Buchholtz
Renee Buck
Barry Buschelman
Katie Cantu
Dawn Carstensen
Rachel Hau Anderson
Candace Havely
Mike Havlik
Gary Heineman
Sally Henry
Paul Hertzel
Howard Higley Jr
Jaclyn Hill
Luke Hodges
*Dave Hoffman
Mark Hoffman
Morgan Holderman
Janet Hollis
Rick Hollis
Bill Horine
Torre Hovick
*Daryl Howell
Lois Hughes
Ken Hunt
Bill Huser
Merle Ihne
Beth Jahr
Doug Janke
*Ann Johnson
Andy Johnson
Bill Johnson
Breck Johnson
Chuck Johnson
Dennis Johnson
Eric Johnson
Thomas Johnson
Mike Johnston
Mike Jones
Chris Jorgensen
Karl Jungbluth
Kim Karwal
Andrew Kellner
Troy Kelsay
Kim Kemna
Matt Kenne
*Karen Kinkead
Jessica Kirkland
*Billy Reiter-Marolf
Tara Reiter-Marolf
Frank Rickerl
Zac Ripperger
*Randy Robinson
Jeff Roe
Carol Rogers
Anna Roisen
Paul Roisen
Scott Rolfes
Thomas Rosburg
Ben Rowold
Linda Rudolph
Maria Rundquist
Melba Rundquist
Rex Rundquist
Travis Russell
John Rutenbeck
Margreet Ryan
Michelle Sabatini
*Claudette Sandoval-Green
*Michael Sawyers
Kit Sayles
Richard Sayles
Michael Schaeffer
William Scheible
*Tom Schilke
Pat Schlarbaum
Leo Schlunz
*Scott Schmidt
Lee Schoenewe
Nancy Schoenewe
Mary Schultz
Robert Schwartz
David Sebben
Anne Shaner
Stephanie Shepherd
Brian Short
*Rachel Simmons
Jim Sinclair
Annalise Skrade
Daniel Skrade

Dennis Carter
Ashley Casey
*Christopher Caster
Ben Caster
Bob Cecil
John Cecil
Willow Cigrand
Del Clausen
Jim Coffey
Betsy Combs
Ross Conover
Kurt Cornilsen
Peggy Corrio
Amy Crouch
Ray Cummins
Vern Cummins
Gene Dale
Larry Dau
Mike Daughton
Erin Day
Marianne Decker
Gerald Denning
*Stephen Dinsmore
James Dinsmore
Lena Dinsmore
Karen Disbrow
Trish Ditsworth
*Matt Dollison
Dan Dorrance
Elaine Doubek
Roger Doubek
Allison Drees
Warren Dunkle
Jim Durbin
*Jenni Dyar
Jordan Dyar
Keith Dyche
Maria Dzul
David Eastman
Suzanne Eastman
Jerry Ebsen
Chris Edwards
Dennis Kirschbaum
Aaron Kline
Darwin Koenig
Cathy Konrad
Kathy Koskovich
Kyle Kossel
*Kristin Kuennen
Dan Kuennen
Carl Kurtz
Linda Kurtz
Dave Kutz
Austin Lambert
*Corey Lange
Jonathan Lautenbach
Joseph Lautenbach
Tom Lawson
Stephen Leese
Reid Leichty
Chuck LeMaster
Susan Lemaster
*Ronald Lindblom
Ken Lowder
Loren Lown
*Tucker Lutter
Anna MacDonald
Russell Madden
Mark Madsen
Joe Marolf
Marlene Marolf
Lynn Marsh
Craig Marshall
James Mason
Gina McAndrews
Charles McCoy
Jamie McCoy
Jason McCurdy
Joseph McGovern
Ramona McGurk
Bruce McKee
Cathy McMullen
Veronica Mecko
Carol Mefford
Paul Skrade
Nancy Slife
Ty Smedes
*Nick Smith
Christy Smith
Kay Snopek
Dawn Snyder
Doug Somers
Lydia Somers
Sharon Somers
Anthony Sotelo
Stuart Sparkman
Lee Speaker
Terri Stanton
Ed Steck
Mike Stephens
Amber Stevens
Mary Beth Stevenson
Jeremy Stoll
Tommy Stone
John Strain
Jon Stravers
Steve Stucker
Willie Suchy
JoAn Sunde
Russell Tabbert
Barb Tagami
Libbey Taylor
Janet Telleen
Jeff Telleen
Brandon Templeton
Ed Thelen
Cecille Thompson
Dennis Thompson
Bob Thorbrogger
Jason Thraen
Daniel Tiemeier
Joseph Tollari
Mike Tompkins
Rachel Townsend
Richard Trieff
Robert Van Ersvelde

Paul Egeland
*Bruce Ehresman
Amy Ehresman
Dan Ehresman
Elise Ehresman
Marlene Ehresman
Bill Eimermann
Charlene Elyea
Bery Engebretsen
Monita Engstler
Gary Erbes
Violet Erbes
John Erickson
Dennis Ertz
*Vince Evelsizer
Pat Everly
Brian Fankhauser
Kristin Fankhauser
Russell Fields
Carolyn Fischer
Dave Fisher
Pat Fisher
Evelyn Follensbee
Cody Fox
Ed Fox
Kit Fox
Ted Francis
Tony Franken
Brad Freidhof
*Paul Frese
Garrison Frese
Justus Frese
Bill Fribley
Peter Fritzell
Forrest Fromm
Chuck Fuller
Jim Fuller
Emily Gamm
Bruce Gardner
Liz Garst
Steve Gastfield
*Jay Gilliam
Andy Miller
Scott Moats
Tom Moon
Francis Moore
Jim Moreland
Mary Jane Moses
Jim Murdock
Kevin Murphy
Chris Murray
Jean Murray
Tom Murray
*Nichole Nagl
Shauni Nagl
Lyle Neher
Brenda Nelson
Jim Nelson
*Jacob Newton
Bob Nickolson
Phyliss Nickolson
*Bridget Nixon
Mary Noble
Bob Norris
Jan Null
Josh Obrecht
Wolfgang Oesterreich
Bill Ohde
Michele Olson
Kevin Ostmo
Josh Otten
Nancy Overcott
Milt Owen
Lynn Pakala
Rosemary Partridge
*Katy Patterson
*Shane Patterson
Natalie Patterson
Olivia Patterson
Miriam Patton
Sharon Perkins
Mary Lou Petersen
Gerry Peterson
Randy Peterson
Joel Vinson
*Karen Viste-Sparkman
Jen Vogel
Steve Volkmer-Jones
Jerry Von Ehwegen
Todd Von Ehwegen
Bill Vust
Gracie Wagoner
Phil Walsh
Bob Walton
Sandy Walton
Lowell Washburn
Rose Weigel
Tina Weiland
Trina Weiland
Jim Welch
Sheila Wemark
Ben West
Matt Wetrich
Christine White
JoAnn Whitmore
Edie Whitten
Carly Wickham
Pete Wickham
Bob Wiederaenders
Nita Wiederaenders
David Wiederholt
Roseann Wiederholt
Holly Wilkens
Joe Wilkinson
Paul Willis
Harley Winfrey
Carol Winter
Kirsten Winter
Tony Winter
Gretel Winterwod
Charles Winterwood
Danielle Wirth
Don Wirth
Robert Wood
Billie Woolison
Amy Yoakum

Anna Golightly
Rita Goranson
Cheri Grauer
Cory Gregory
Mike Griffin
Cheryl Groom
Marianne Groves
Maggie Pettersen
Pam Pfautsch
Kelly Poole
Donna Popp
Sheryl Poths
Bruce Potter
Kincey Potter
Stacie Young
Bill Zales
Dotty Zales
Hank Zaletel
*Guy Zenner
*Walt Zuurdeeg

Least Tern on nest
Photo: Stephen J. Dinsmore

About the Authors

Stephen J. Dinsmore is a Professor of wildlife ecology and Interim Chair of the Department of Natural Resource Ecology and Management at Iowa State University. He received a B.S. in Fisheries and Wildlife Biology from Iowa State University (1990), an M.S. in Zoology (minor in Statistics) from North Carolina State University (1994), and a Ph.D. in Fishery and Wildlife Biology from Colorado State University (2001). He is a lifelong birder who has visited all seven continents and written extensively about birds in Iowa and elsewhere. He especially enjoys looking for and finding rare birds, studying the seasonal and spatial distributions of birds, and learning the latest about bird taxonomy and identification. His professional interests are avian ecology, population biology, capture-recapture analysis, and monitoring animal populations. His research program at Iowa State University emphasizes studies of avian population biology including a long-term project on Mountain Plovers. His teaching responsibilities include an undergraduate course in ornithology, a graduate course in avian ecology, and study abroad courses to Antarctica, Costa Rica, Madagascar, and Tanzania.

Bruce L. Ehresman is a retired Avian Ecologist from Iowa DNR's Wildlife Diversity Program, of which he is a founding member. His professional wildlife career spanned nearly 41 years, during most of which he held a Master bird banding permit. He has B.S. and M.S. degrees in Animal Ecology from Iowa State University. Interest in birds began as a child on the farm, and birding skills were better developed in the 1980s during Iowa's first Breeding Bird Atlas. He was strongly influenced by Fran Hamerstrom's philosophy of "birding with a purpose," and feels fortunate to have been involved with many restoration programs for species and their habitats, especially for Wild Turkey, Barn Owl, Bald Eagle, American Kestrel, Peregrine Falcon, Osprey, Greater Prairie-Chicken, and Trumpeter Swan.

Douglas C. Harr (B.S. and M.S., South Dakota State University) was a full Instructor at SDSU's Dept. of Wildlife & Fisheries Sciences in 1970, teaching laboratory ornithology and ichthyology. In 1972 he became a Wildlife Management Biologist for the Iowa Conservation Commission (now Iowa DNR) in northwest Iowa. Doug transferred to become an Iowa DNR Wildlife Diversity Biologist in 2001, then was promoted to Wildlife Diversity Program State Coordinator from 2002 until retiring in 2010. He has served as Iowa Coordinator for the federal USGS Breeding Bird Survey, is past president of The Wildlife Society's Iowa chapter, current president of Iowa Audubon, and has been a member of the Iowa Ornithologists' Union since 1978, currently serving on the IOU Records Committee. Doug began enthusiastic birding at his rural Minnesota home at age nine. His primary retirement hobby continues to be birding and bird photography.

Christopher J. Caster (B.S. and D.D.S., University of Iowa) got his love of the outdoors, as well as the inspiration to draw, from his father John. He enjoys birding for the places it takes him and the adventure of pelagic birding most of all. Recent years have kept him close to home with his wife Terry, son Benjamin, and daughter Emma. He has been an IOU member since 1986 and has served on the Projects Committee. He has been the Iowa Regional Editor for the Christmas Bird Count for seventeen years. He is a past president of the Iowa City Bird Club and regularly leads club field trips.

Jacob T. Gilliam (B.S., Drake University) is a Protein Biochemist and conducts research leading to the discovery of novel proteins for agricultural uses. His fascination with nature and nature photography began at an early age and eventually led to his initiation into birding in the early-1990s when he became a member of the IOU. He has served on the IOU Board of Directors, the Records Committee, and he created and then chaired the Projects Committee. He favors pelagic trips for birds and other sea life and his favorite place to go birding is Alaska. He continues birding when possible, but his interests and focus have recently expanded into odonates and butterflies.

Rex R. Johnson (Ball State University, Iowa State University M.S. in Animal Ecology, and South Dakota State University Ph.D. in Wildlife Biology) spent his early formative years prowling the prairies, woods, and wetlands of Iowa, and now spends time pondering the decline of most of the species that gave him joy as a child. Rex worked for 20 years with the U.S. Fish and Wildlife Service as a migratory bird biologist and supervisor and for two years with the

South Dakota Grassland Coalition as its Executive Director. While with the Service, he helped pioneer the use of landscape-scale modeling and spatial analysis and helped launch a set of conservation planning principles now commonly known as strategic habitat conservation. In his final invited presentation among more than a hundred as a professional, he explored the question "Why does a modern Midwestern grassland seem to sustain so little wildlife compared to the grasslands of 50 years ago and what must have been the productive potential of these same grasslands in the mid-19th Century?" Rex is presently retired and looking for his next great life adventure; he has always considered Iowa his true home.

Shane S. Patterson has been captivated by the natural world as far back as he can remember. His lifelong interests crystallized on a sunny spring morning when he watched his parents systematically identify birds just outside the kitchen window. Ever since then, he has found himself constantly categorizing the sights and sounds of nature. Shane went on to study environmental biology (B.S.) at Eastern Illinois University and wildlife ecology (M.S.) at Iowa State University. He has worked for multiple wildlife agencies in the public and private sectors, and he teaches environmental science at the collegiate level. From coast to coast and beyond North America, his activities for work, family, and leisure have fulfilled his innate desire to explore. But his favorite memories are made alongside his kids, Natalie and Olivia, whose natural enthusiasm and inquisitiveness have enabled him to revisit the steps that first shaped his fondness for the outdoors. You may encounter Shane and his family wandering parks in Ames or in places far away. And perhaps one day you will cross paths with him on the next Iowa Breeding Bird Atlas.

Karen E. Kinkead is the Wildlife Diversity Program Coordinator for the Iowa Department of Natural Resources. She received a B.S. in Biology from Virginia Tech (1995), an M.S. in Zoology (minor in Forest Resources) from Clemson University (1997), and a Ph.D. in Zoology from Clemson University (2004). She came to Iowa in 2004 and helped create Iowa's Multiple Species Inventory and Monitoring Program while at Iowa State University and was hired by the Iowa DNR in 2006 as a Biologist in the Wildlife Diversity Program. Always fascinated by the things she could catch (frogs, salamanders, turtles), birds have not been a primary focus—her eyesight is not good enough for identifying fast moving critters. With her background in research methods and Iowa habitat mapping, she facilitated the block designs and logistics to complete this Breeding Bird Atlas II.

Ann M. Johnson retired from a long career with the State of Iowa as a Management Analyst. Although her B.A. is in sociology, she has had an intense interest in the natural world since childhood, primarily birds but of late also dragonflies. She was nurtured in this interest in those early days by her grandmother in Wisconsin and an uncle who introduced her to the Iowa Ornithologists' Union. She has been an active member of the IOU since 1961 and has most recently served long stints as the Iowa Records Committee Secretary and chair of the IOU Publications Committee. In 2006 she helped develop the odonate protocols for Iowa's Multiple Species Inventory and Monitoring Program and later served as a consultant for surveyors. When not tied to her computer as a natural history website developer, including the sites for the Iowa Ornithologists' Union, she can be found birding all over the country and occasionally beyond.

Through the Eyes of the BBA II Coordinators

Nichole Nagl Baxter, 2007–2008

When I started as coordinator for the Iowa Breeding Bird Atlas II, I did not realize the enormity of the project. I was a novice birder, still honing my skills, listening to bird call CDs, and learning about the birds that could be found in Iowa. Birding had grown into one of my favorite hobbies as I visited different parts of Iowa and learned relationships between certain types of habitats and what birds were found where and when.

After I was hired as the first Breeding Bird Atlas Coordinator in 2007, I attended my first committee meeting, where I learned about my responsibilities. Outreach was my primary responsibility along with development of materials associated with the project. I participated in the development stages of the project, including selection of the blocks. Half of the blocks were placed based on a systematic grid method. The rest of the blocks were randomly selected based upon habitat type. Because I was a novice birder, I was elected to perform this task. This eliminated any bias that a more experienced birder may have had in the placement of these random blocks. I think this process worked very well for us.

After blocks were determined, my primary goal as coordinator was to publicize and promote interest in the project, and recruit as many volunteers as I could. The project developed an excellent partnership with the Iowa Ornithologists' Union, and this provided me with a great starting point in my outreach efforts. During the two years as coordinator, I was able to visit with most groups in Iowa, an accomplishment that makes me proud. I attended public events throughout the state, such as Bald Eagle Days, and brought materials to hand out to interested birders and the general public. In the second year of the project, we launched Blockbusting weekends where volunteers would meet in a certain part of Iowa and spend the weekend, or any time they had available and try to "atlas" as many blocks in that area as possible. This became a great organized effort as the years went on and contributed quite a few hours to the project.

When talking to the public and to other birders, I tried to express the importance of the project, and why we, as citizens of Iowa and the natural world, should be concerned about the welfare of breeding birds and their habitat in our state. I knew that volunteers are the heart of any Breeding Bird Atlas project, and I wanted to be sure they had all the tools and support they needed, especially in the beginning years. As I recruited more volunteers, I tried to correspond with them frequently to promote participation in the project. I posted reminders and encouragement on the Iowa Ornithologists' Union listserv and sent personal emails. This allowed me to connect with many birders throughout the state that might not have heard my message through presentations. I created newsletters that included updates of progress in the project, and also articles and personal accounts from volunteers themselves to generate interest and excitement in the project.

Nicole Nagl
Photo: IDNR

Another great form of outreach developed early in the project was the Iowa Breeding Bird Atlas II website created by Ann Johnson, committee member and member of the Iowa Ornithologists' Union. We were blessed to have someone who could develop the website and make it interactive for volunteers to enter their own data and follow live progress of the project. It became an extraordinary tool to our volunteers and for the committee to assess project progress. Without the website, I know most of my time would have been spent entering volunteer data, but instead I was able to spend my time on outreach. A huge THANK YOU should go to Ann and her amazing technical abilities. I do not believe the project would have been successful without it.

Even though I felt like I had contacted a lot of groups and birders, not everyone I talked to participated in the project. As much as I did, looking back, I wish I would have done more outreach earlier in the process and perhaps gotten a larger volunteer base from the beginning. I started with bird groups but could have extended the invitation to other conservation groups throughout the state, such as county conservation boards. As many of us know, partnerships can be a great source for outreach and other resources. Contacting colleges and universities with wildlife management or ornithology courses could have potentially been a great source of volunteers, as well. As the project progressed, I believe these avenues were visited, but maybe it would have been more beneficial in the earlier years of the project.

My advice for future Breeding Bird Atlas projects and future coordinators is this: Do your research about Breeding Bird Atlas projects in other states. Find out about different methodology of how blocks were chosen and how surveys were done. Find out what worked and what did not and determine what will be the best route for your state or area based on your potential volunteer base. Do not be afraid to call past or current coordinators or contributors of previous projects in your state or in others. They will be your greatest resources. Start planning and developing the project at least one year before the official start date. This will allow you to be organized and have the tools you need to recruit volunteers from the very beginning. And finally, have fun. Helping volunteers realize that they can do something they enjoy, like birding, and contribute to a statewide project was a great selling point. Letting them know that their name could be published in a book one day was a bonus. That statement alone usually perked some interest.

I am extremely proud to say that I was a part of the Iowa Breeding Bird Atlas II, not only as a coordinator for the first two years, but as a volunteer myself. Even though I was not as involved during the final years of the project due to other commitments, I am proud of my contribution. I am amazed at the dedication and long hours some of our volunteers contributed to benefit the project. It shows how much this project means to birders within the state, and how important it is to ensure our feathered friends are protected. I hope this project becomes a great resource to future projects and researchers and provides a platform to those wanting to protect wildlife who cannot speak for themselves.

Billy Reiter-Marolf, 2009–2010

Taking part in Iowa's Breeding Bird Atlas II was an absolute blast! I am immensely thankful to have had the opportunity, as an AmeriCorps member, to interact with birders and bird groups from all over the state. We were birding with a purpose and this book is a nice reward for our labor of love. I am also thankful to have seen many wonderful parts of the state and enjoyed a wide variety of experiences with Iowa's nesting birds. I still relish memories of nesting Black-billed Magpies in Plymouth County, territorial Prothonotary Warblers in Allamakee County, incubating and brooding Trumpeter Swans and Bald Eagles in several counties, and multitudes of Bobolinks and Henslow's Sparrows singing throughout Iowa's tallgrass prairies. I will never forget finding a White-eyed Vireo attending young southeast of Ottumwa right after spotting a Mississippi Kite perched in the city park. And I will always remember that one block in Ringgold County where I spotted five Northern Mockingbirds and four Loggerhead Shrikes all within a span of 10 minutes.

I see Iowa differently now than before I was a BBA volunter coordinator. I used to be discouraged by the largely agricultural landscape and the lack of what I considered quality habitat. I guess that is to be expected from someone who spent most of their childhood in Wyoming, but as my atlassing hours accumulated I learned something that experienced birders have known all along. Iowa is a great state for birding and is peppered with an abundance of hidden habitat gems. I am sure other atlassers feel the same way. In addition to being impressed by the habitat blocks, I was even more surprised by the number of nesting species one could find in a "boring old" corn-and-beans block. I remember routinely getting 40 or more species by just exploring the roadside ditches, scoping the riparian corridors, pishing along hedgerows, examining farmhouses and outbuildings, and checking under bridges and along creek beds. These areas are not what one would consider amazing habitat, but for many nesting species, such as Eastern Phoebe, Barn Swallow, Red-winged Blackbird, Dickcissel, and Bell's Vireo, they were exactly right.

Billy Reiter-Marolf
Photo: IDNR

I could go on and on about my experiences atlassing in the field, but some of my favorite memories during this BBA occurred when I was interacting with other people. It was a joy to visit the many bird clubs around Iowa, give talks, and go atlassing with local experts on blockbusting weekends. I presented nearly 50 BBA talks and organized eight blockbusting weekends during my two-year tenure. From these experiences, I learned a great deal about what works and what does not when it comes to generating volunteer support. Before each of these events I would usually try to atlas some local blocks near where I was speaking to create some excitement about local nesting-bird behavior. It was easy during the nesting season, but if the talk occurred in the fall or winter, I could still look for used nests from the previous season and talk about how to ID and find several of those. It also helped to mention local records of interest from the current or previous seasons.

The most successful outreach typically came from larger bird groups that were already actively involved in regular birding field trips. In these cases, it was easy to incorporate the BBA into their regular schedule of talks, which helped drum up support for our atlassing efforts from May to August. While many of these bird groups do not meet in the summer months, several of them were still very diligent in spreading the word when a blockbusting event was coming to their area. These weekend-long blockbusting events (held during May, June, and July) targeted a specific area of the state to focus our atlassing efforts and proved to be a fruitful way of quickly collecting a large amount of data for a particular concentration of blocks. I found these events to be most successful when a coordinator from the local bird club was recruited to help generate volunteers. Most of these events yielded several participants while a few had lower participation, probably because those events were held in less populated parts of the state or occurred on a weekend that conflicted with many other summer activities. Another great way to encourage participation was through the BBA newsletter, *The Iowa Nester*. It was a great forum to highlight some preliminary results, discuss atlassing strategies and techniques, as well as give volunteers an outlet to share their BBA experiences.

My advice to future BBA volunteer coordinators would be to make communication your highest priority. As a coordinator you are the face of the project, and volunteer investment not only depends on their love of birds, but also on your enthusiasm and willingness to listen and learn, as well as to teach. Parts of the state where I saw the most improvement were generally where I had the most one-on-one contact with volunteers. I also learned that in many cases showing people how to atlas in the field was much more beneficial than just explaining it in a talk. It helped clear up any confusion about different nesting behaviors and it also helped people understand how easy it was to incorporate atlassing into their normal birding activities. In most cases I also learned a few new things about birds from these interactions with others. Taking the time to get to know your volunteers is time well spent. Another important tool that made this BBA successful was the BBA website, where each participant could upload and view their own records, as well as view distribution maps for each species and compare the BBA I results to BBA II results. The website made it easier for almost everyone involved to keep track of data and watch live progress. If folks had any difficulties entering data, I would give them either a tutorial or if they had problems with computer or internet access, I would offer to enter their data for them. These kinds of steps help ensure volunteer participation and investment.

If I could do it all again, I totally would. This experience was one that I will never forget. In fact, if any other state is starting a BBA soon please give me a call; I would love to participate in another one! My gratitude goes out to all the volunteers I met, some of which I still occasionally see in the field or at an Iowa Ornithologists' Union meeting. I am also thankful to the Iowa Department of Natural Resources Wildlife Diversity Program, the BBA Committee, and AmeriCorps for giving me the opportunity of take part in this very important project. I am so thrilled to finally see our efforts in print and I hope that this information will help us better manage the habitat in our state to ensure that future generations can enjoy the nesting birds that we have grown to love. Great job, atlassers!

Shane Patterson, 2011–2012

Taking the first steps. Prior to my role as volunteer coordinator, I watched with great interest as the previous coordinators (Nicky and Billy), along with the BBA Steering Committee and countless volunteers, made Iowa BBA II a successful endeavor from the start. I thank all of you for setting the tone and making my job more rewarding.

Learning from the best. By taking part in Iowa BBA II, we followed the footsteps of those who blazed trails on the first Iowa BBA. It was our duty to uphold their standards. Likewise, I had the honor of studying alongside two of the state's foremost atlassers: Steve Dinsmore and Bruce Ehresman. Their expertise and competitive spirit compelled me to intensify my own efforts—and to encourage others to do the same.

Reuniting and making new connections. While visiting bird clubs across the state, I interacted with longtime birders and met people who were taking their first flight into the world of atlassing. As the final year progressed, it was rewarding to see beginners and veterans alike contribute to a scientific enterprise. Many of us who collaborated on the atlas continue to work together on conservation projects to this day.

Exploring Iowa's wild places. Concealed in Iowa's seemingly endless sea of croplands and suburbia are a surprising number of natural gems. One of the best ways to investigate them is by atlassing. I will not forget prowling through head-high vegetation in sunlit prairies and marshes, navigating ravines and creeks deep within majestic oak-hickory forests, and traversing scenic ridges above meandering rivers and canyons. Forever etched in my mind are the sights and sounds of these special places.

Looking everywhere. Atlassing takes us to areas we might not otherwise consider for scientific queries. Some of Iowa's more remarkable atlas records occurred in residential areas, roadsides through corn-soybean country, and even industrial parks, thus underscoring the idea that noteworthy birds can be found almost anywhere.

Birding when we normally wouldn't. As birders, we understandably emphasize certain locations during the height of bird migration. That is when we find the greatest diversity and numbers of birds. On Iowa BBA II, we continued to investigate the entire landscape between migratory peaks. Not only did we learn about our favorite places more completely, but we also advanced a deeper understanding of birds nesting statewide.

Letting nature come to us. Atlassing necessitates patience and persistence. By stepping back and carefully documenting avian behavior, we are witnessing wildlife in a more natural context. And this was definitely true on the Iowa BBA II. Most of my favorite sightings materialized when I was embracing an unhurried approach and allowing the birds to set the pace.

Shane Patterson
Photo: IDNR

Returning to our roots. Whether during childhood or later in life, many of us were ushered into birding by watching birds in our own neighborhoods. As such, we developed atlas skills before we had ever heard of atlassing. During Iowa BBA II, we recaptured those foundational methods and applied them to a broader, scientific context. From glancing out our kitchen window before dinner to scoping a distant shoreline on a field trip, we were perpetuating our traditions—and providing vital bird data in the process.

Going back again. We have all visited an out-of-the-way location and said, “I’ll come back some day.” But then we never do. Fortunately, the road trips and hiking expeditions on Iowa BBA II reacquainted us with places we had not seen in years. We found out firsthand how bird communities had changed over time. And we showed ourselves that with the right inspiration, we can indeed go back and build upon those indelible first impressions.

Watching it all come together. Witnessing the atlas database grow across the years, especially down the home stretch, was a distinctly intriguing activity. Many of us checked daily to see what others were finding. Inevitably, as the color-coded pins multiplied across the species maps, we compared our cumulative results to those of Iowa BBA I. In this way, the achievements of the past were living on through the efforts of the present.

Taking the atlas with us. Once you have dedicated yourself to atlassing, you can’t get it out of your head. Seeing bird behavior and instantly contemplating the BBA codes that signify key stages in a bird’s life history will always be with me because of the atlas. And I am thankful for this. I am continually reinforcing what I’ve learned and recalling the moments which shaped my knowledge.

Envisioning the next chapter. After reflecting on the memories of Iowa BBA II, our thoughts drift to a potential third Iowa Breeding Bird Atlas. Whatever the future holds, it will be interesting to see how much bird populations (and our own communities) have changed since we last canvassed the state. But I am looking forward to finding out. And I hope to see you all there!

1 Introduction

This Iowa Breeding Bird Atlas II (BBA II) is intended to provide a comprehensive look at the distribution and breeding evidence for Iowa's breeding birds and document changes since the first atlas effort. These data were gathered during a five-year period and so represent a snapshot in time. This publication summarizes atlas findings through individual species accounts that also include basic information on each species' status in Iowa along with their habitat, breeding dates, basic nesting information, and population changes as measured by the federal Breeding Bird Survey (Ziolkowski et al. 2010, U.S. Geological Survey 2020). Comparisons are also made to recent atlas efforts in surrounding states in an attempt to provide a regional context to Iowa's findings.

Breeding Bird Atlas projects began in the United States in the 1970s as an effort to better document the birds breeding at the state or provincial (and sometimes more local) level (Laughlin et al. 1982). The idea for an atlas of breeding birds originated in England in the 1960s (Laughlin et al. 1982, Davis 1997). The first published North American atlas was a two-county effort in Maryland (Klimkiewicz and Solem 1978), a harbinger of the future. This led to a flurry of atlas activity in the late 1980s and early 1990s, which provided first atlas projects for >30 states (Davis 1997). To date there have been >75 atlases in North America (~60 in the United States and 15 in Canada; Beck et al. 2018). It is common practice for such efforts to be repeated periodically (every ~20 years) so that changes in breeding bird distributions can be better documented. Many states including Iowa have now completed two atlas efforts.

The current Iowa effort (hereafter BBA II) was designed to follow Iowa's first breeding bird atlas effort from 1985–1990 (hereafter BBA I). The period of time between the two atlases saw many changes in Iowa's habitats with corresponding changes in some breeding bird communities. Examples include the increase in grassland habitat in southern Iowa as a result of the Conservation Reserve Program, increased wetland restoration efforts particularly in the Des Moines Lobe landform, the maturing of many forested habitats, and a decrease in edge habitat in many agricultural regions as a result of increased farming efficiency. Each of these habitat alterations resulted in changes in the local breeding birds.

BBA II also benefited from similar efforts in many states bordering Iowa, which allow comparisons across state boundaries. In addition to the publication of Iowa's BBA I in 1996 (Jackson et al. 1996), there have been completed atlas projects as follows:

Illinois (1986–1991; Kleen et al. 2004)
Missouri (1986–1992; Jacobs and Wilson 1997)
Minnesota (2009–2013; Pfannmuller et al. 2017)
Nebraska (1984–1989 [Mollhoff 2001] and 2006–2010 [Mollhoff 2016])
South Dakota (1988–1993 [Peterson 1995] and 2008–2012 [South Dakota Game, Fish and Parks 2020])
Wisconsin (1995–2000 [Cutright et al. 2006] and 2015–2019 [Wisconsin Society for Ornithology 2020])

Collectively, these efforts provide greater regional context to Iowa's findings.

The Iowa BBA II effort followed generally established procedures for conducting a breeding bird atlas (Beck et al. 2018). This effort was guided by a Steering Committee (Stephen J. Dinsmore, chair; Christopher Caster, Bruce L. Ehresman, Jacob Gilliam, Douglas C. Harr, Ann M. Johnson, Karen E. Kinkead, and Karen Viste-Sparkman) and three BBA Coordinators (Nicki Nagl [2007–2008], Billy Reiter-Marolf [2009–2010], and Shane Patterson [2011–2012]) who selected sampling blocks, determined levels of breeding evidence, designed a field data form, set block coverage standards, vetted all records, and helped with fundraising. Below are key details about each of these elements of this project.

Block Selection

The process of selecting sampling blocks began in Fall 2007 during discussions by the Steering Committee. The BBA II project used the same spatial resolution for blocks as defined in BBA I. Block establishment took advantage of Iowa's original township-range land survey. The 99 counties are divided into townships (most are 36 mi^2), each of which (usually) was broken down into 1 mi^2 sections. An atlas block was 3x3 miles (9 mi^2), except along the state borders where townships were irregular in shape, or in a few places where townships were established that were smaller than 36 mi^2. This block size works well in Iowa because an excellent secondary roads system provides access at 1-mile intervals for most of the state. These roads also allowed an observer to see into private land and offered a clear boundary for most blocks.

Iowa is primarily an agricultural state with one of the lowest percentages of its land in public ownership in the United States. This means that a block selection scheme that is random will include mostly row-crop agriculture and may miss many of the more localized habitats that are important to Iowa's breeding birds. For example, Geographic Information System (GIS) tools show that open water, wetlands, and wet forest each comprise <1% of Iowa's surface while deciduous forest is <8% and grasslands are ~18%. The solution to this problem in BBA I was to use a two-part block selection scheme that included (a) "grid" blocks from a systematic sample that included a 3x3 mile block in the southeastern corner of every other township (n = 522 blocks), and (b) "priority" blocks that were selected nonrandomly to represent unique or specialized habitats statewide (n = 339 blocks). These "priority" blocks were mostly centered on publicly owned lands and were not constrained to the township restrictions of "grid" blocks. There was a minimum of one priority block per county.

The Steering Committee for BBA II ultimately decided to alter the block selection strategy used in BBA I for several reasons. The committee chose to designate two types of blocks for BBA II: "Grid Blocks" and "Habitat Blocks." Based on our experience with BBA I, we decided that a reasonable goal was to cover ~800 BBA blocks during the second atlas effort. We also agreed that it was important to have both block types equally represented in the final effort. The grid blocks were placed first in a systematic grid similar to that used in BBA I. Because of the need for a balanced sample of grid and habitat blocks, we ended up with 395 grid blocks in BBA II. A few of these blocks included public land, but most were on private land and dominated by row-crop agriculture.

Once the grid blocks were placed we moved to the selection process for habitat blocks. The process for selecting these blocks was more complex and the committee stressed the importance of randomization so that the process could be repeated in any future atlas efforts. The process for selecting habitat blocks was thus completed, and agreed upon by committee members, prior to actually selecting any habitat blocks.

Ruby-throated Hummingbird on nest
Photo: Bob Norris

The habitat block selection process included these ordered steps:

1. Habitat blocks had to contain publicly owned land and they were stratified into northern and southern Iowa (the dividing line was Interstate 80). This resulted in an even split of the 396 habitat blocks between northern and southern Iowa.
2. We used the most recent (2002) Iowa landcover database to define publicly-owned lands in Iowa (Kollasch 2004). Importantly, this database often subdivides large properties (e.g., the U.S. Army Corps of Engineers reservoirs) based on differing management entities (e.g., U.S. Army Corps of Engineers [USACOE], State of Iowa, etc.).
3. A publicly owned property had to be ≥40 contiguous acres of habitat to be considered for block selection. Thus, many smaller sites were excluded at this step in the process. We did this to ensure that a habitat block had a decent-sized parcel of public land for access to the selected habitat.
4. Next, we stratified the sample on the basis of five primary habitat types in the GIS database that we deemed important to breeding birds. The GIS database calculated that the percentage of each of the five habitat types in publicly-owned lands was as follows: (a) wet forest/bottomlands (2.9%), (b) wetlands (7.3%), (c) grasslands (25.1%), (d) open water (26.9%), and (e) deciduous forest (37.9%). The 396 habitat sites were drawn by rotating through the habitat types from smallest to largest percentage to be sure all habitats were represented. Once all the blocks were selected for a particular habitat type it was no longer included in the rotation. Note that many blocks contain more than one of these habitat types, but was selected for just one of them.
5. Based on steps 1–4, the total number of sites selected by habitat type was 12 wet forest/bottomlands, 28 wetlands, 100 grasslands, 106 open water, and 150 deciduous forest. Note that the sites within each habitat type were evenly split between northern and southern Iowa.
6. The block selection process outlined above has several important caveats as follows:
    a. Each public property was analyzed with GIS information and weighted by the acreage of each of the above habitats contained therein. Consequently, a large area with numerous types of habitats had a much higher probability of being drawn than a single 40-acre deciduous forest. The important concept was covering critical habitats, not particular properties.
    b. There was no set minimum or maximum number of blocks per publicly owned property, except those imposed by the overall size of the property.
    c. The first randomly selected block for a property was centered on the property; all subsequent blocks selected for that property (if any) were placed on the remaining habitat if available.
    d. In a few cases a habitat block overlapped with a previously selected grid block. When this occurred, the habitat block was moved only if it was possible to sample the same habitat type. If this was not possible another block was selected.
    e. Habitat blocks were sometimes selected along the state's boundary. On a case by case basis we either (i) moved the block so that it was entirely in Iowa, or (ii) truncated one edge of the block to keep it entirely in Iowa. At least half of the desired block area (9 mi^2) had to remain in Iowa, or the block was excluded and another drawn.
    f. All block placement using these rules was done by someone unfamiliar with Iowa's birds to keep the process as objective as possible.

With a solid scientific methodology and committee agreement, the habitat blocks were created and combined with grid blocks to create the sites to visit during BBA II (Figure 2.1). Not surprisingly, the clustering is very similar to the clustering of protected lands. When this same randomization is applied in another 20 years, there should be comparable data to paint an accurate picture of what is happening to the bird life across the state. We already know what happens to grassland species when a particular piece of land is plowed for corn production or even mowed. The bigger picture will tell us how a species is faring within the habitat still available. Combined with other studies of habitat change over time, we should be able to detect changes in breeding distribution.

Block Habitat Maps

We also created in early 2008 a simple habitat map for each BBA II block. These maps were accessed through the online atlas portal and consisted of a downloadable color image of each block showing major habitat classes. We used the 2002 Iowa landcover raster dataset that illustrated seventeen habitat types as follows: open water, wetland, bottomland forest, coniferous forest, deciduous forest, ungrazed grassland, grazed grassland, planted grasslands, alfalfa/hay, corn, soybeans, other row crop, roads, commercial/industrial, residential, barren, and clouds/shadow/no data (interrupting the classification [rare]; Kollasch 2004). These maps were intended to help atlassers identify the location of habitat types while surveying a block.

Levels of Breeding Evidence

We used the same levels of breeding evidence as were used in BBA I (Jackson et al. 1996). This is an ordered progression of increasing evidence from an *observed* status (no breeding evidence) through a series of *possible* and *probable* levels up to the *confirmed* level (Table 2.1). This publication uses the highest level of breeding evidence for each species and block in our summaries.

Safe Breeding Dates

The Steering Committee revised the list of safe breeding dates that was used during BBA I (Jackson et al. 1996). The list included all known Iowa breeding birds and listed the primary nesting habitat and approximate early and late breeding dates for each (see https://iowabba2.org/BBA_Dates_Habitats.pdf). These dates encompassed most or all of the nesting season for each species and were intended to help atlassers distinguish between a migrant and a breeding individual. Definitive breeding evidence outside these dates, however, was acceptable. This probably had the greatest impact on decisions between recording a species as observed or possible.

Field Card

We developed a one-page field card for use in collecting BBA data as part of this project. The card was most appropriate for a single block visit (multiple visits to the same block could be recorded) and included a full species list, columns to record the highest breeding evidence for each species, and space for detailed notes.

Coverage Standards

As with BBA I, we again faced the challenge of variable block coverage across Iowa. During BBA I the solution was to extend data collection for one year (the 1990 field season was added) and revise the coverage goals to reflect lower than expected field effort. We modified this strategy during BBA II because the online data entry portal allowed us to rapidly assess where effort was needed. We used annual block-busting weekends and hired field technicians to focus atlas efforts on areas with poor coverage. A block was considered complete if it had ≥10 hours of effort or 60 species recorded.

Quality Control and Data Processing

The Steering Committee oversaw vetting all records submitted as part of BBA II. The committee reviewed all *confirmed* reports outside the safe breeding dates, carefully reviewed species that were rare breeders or had not been previously recorded as breeding in Iowa, and performed other tasks as needed.

Fundraising

During the BBA II project the Steering Committee was able to raise funds to support both the data collection and publication aspects of the project. We received grant support from the U.S. Fish and Wildlife Service (Agreement #301818G112) and the Iowa Department of Natural Resources (Wildlife Diversity Program License Plate Fund) to hire technicians for blocks in areas with little to no volunteer coverage. In the final year of the project we used an online auction for sponsorship of the individual species accounts. Ultimately, most species received a sponsor and this generated a total of $5,120 to go toward off-setting the publication cost of this book.

Table 2.1. Levels of evidence and breeding codes used during the Iowa Breeding Bird Atlas II (BBA II), 2008–2012

Observed	
OB-O	Species (male or female) observed in block during breeding season, but no evidence of breeding observed
Possible	
PO-H	Species (male or female) observed in suitable nesting habitat during its breeding season
PO-X	Less than 7 singing males present in suitable nesting habitat during the breeding season
Probable	
PR-P	Pair observed in suitable nesting habitat during its breeding season
PR-T	Permanent territory presumed through defense (e.g., chasing of other birds, or song or display at the same location on at least 2 occasions a week or more apart)
PR-C	Courtship behavior or copulation observed
PR-N	Visiting of probable nest site
PR-A	Agitated behavior or anxiety calls from adult(s)
PR-B	Nest building by wrens or excavation of holes by woodpeckers (nest construction by other species falls under the Confirmed-NB category)
PR-M	7 or more males singing in suitable nesting habitat during the breeding season
Confirmed	
CO-NB	Nest-building by all species except wrens and woodpeckers
CO-PE	Physiological evidence of breeding: brood patch or egg in oviduct (based on bird in hand)
CO-DD	Distraction display or feigning by adult
CO-UN	Used nest or eggshells found (caution must be used to carefully identify them)
CO-FL	Recently fledged young incapable of sustained flight[1], or downy young restricted to natal area by dependence on adults or limited mobility
CO-ON	Occupied nest: adults entering or leaving nest or adult incubation or brooding
CO-AY	Attending young: adult carrying fecal sac or food for young
CO-NE	Nest with egg(s)[1]
CO-NY	Nest with young seen or heard[1]

[1]Presence of cowbird eggs or young is confirmation for both the cowbird and host species.

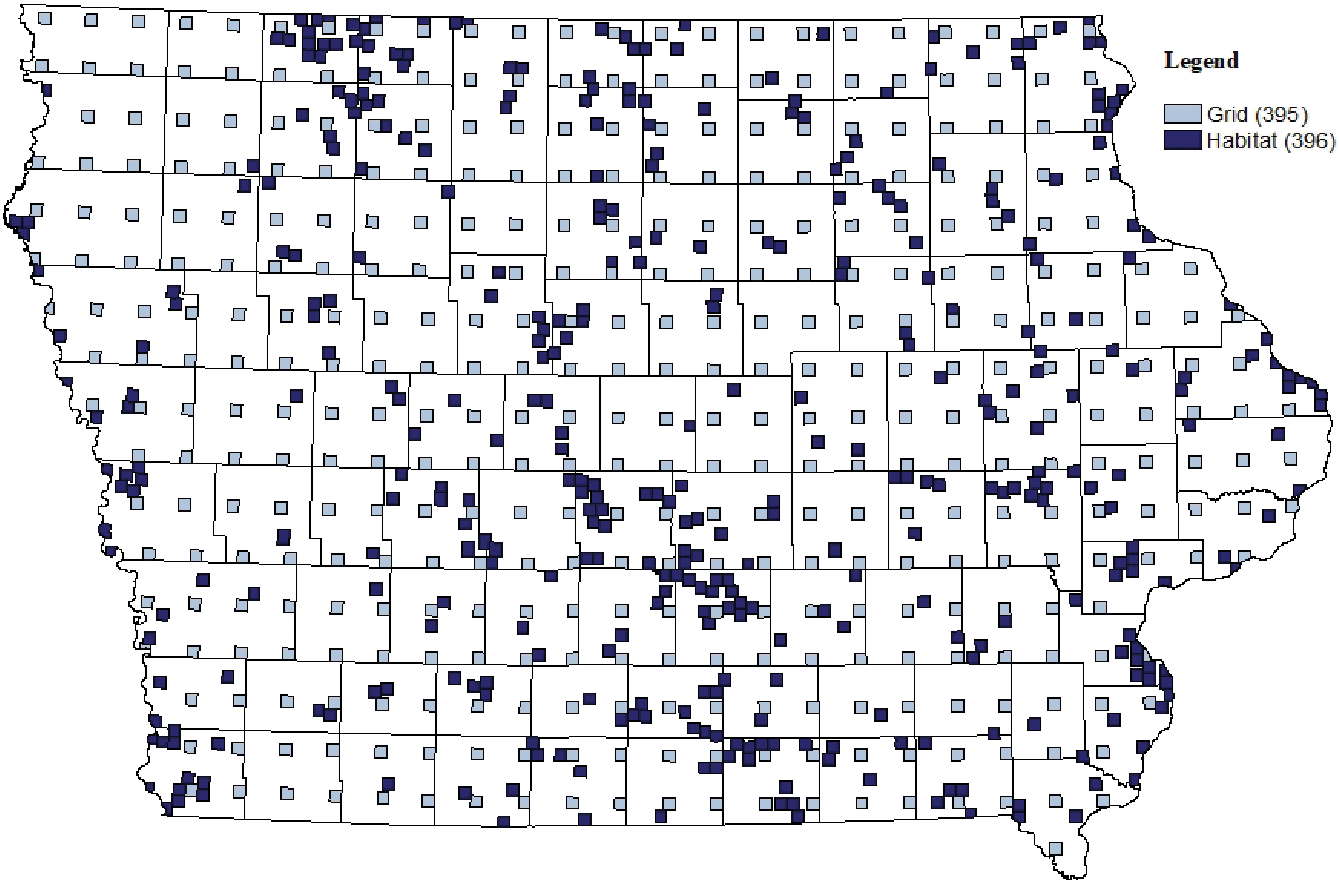


Figure 2.1. Map showing the location of all 791 blocks that were sampled during BBA II, 2008–2012.

Blockbusting in northwestern Iowa
Photo: Paul Roisen

3 Iowa's Physical Environment and Landforms

Land and Climate – Karen E. Kinkead and Stephen J. Dinsmore

Iowa is located near the center of the United States and experiences a temperate climate. The state encompasses 145,744 km^2 (56,272 mi^2) and is bounded to the east by the Mississippi River and to the west by the Missouri and Big Sioux rivers. Minnesota borders Iowa to the north and Missouri to the south. A more complete description of the land and climate during BBA I was provided by Jackson et al. (1996) and our intent here is to provide more detailed information about the climate and habitat conditions during BBA II.

Temperature and precipitation data during BBA II varied annually and illustrate a period that was slightly warmer and wetter than the long-term averages (Table 3.1). The climate in Iowa has been slowly warming. The mean annual temperature since 1895 was 47.5˚F through the end of BBA I (1985–1990) and 47.6˚F through 2012. The average annual temperature during BBA II (2008–2012) was approximately 48.2˚F, which is significantly warmer (Iowa Department of Agriculture and Land Stewardship 2020, National Oceanographic and Atmospheric Administration 2020). By the end of BBA I (1985–1990), the average annual precipitation for Iowa since 1895 was 80.5 cm (31.7 inches). By the end of 2012, Iowa was experiencing slightly wetter conditions and that average had risen to 82.0 cm (32.3 inches). The average annual precipitation during BBA II (2008–2012) was approximately 94 cm (37 inches; Iowa Department of Agriculture and Land Stewardship 2020, National Oceanographic and Atmospheric Administration 2020). Notably, the first three years of the atlas were wetter than normal while the last two were moderate drought years (Table 3.1).

The vegetation and land use patterns in Iowa are complex and include many changes since settlement. Our intent here for BBA II is to update the descriptions in Jackson et al. (1996) by making use of geographic information system (GIS) technology that was not available in the 1990s. Using the 2009 High Resolution Landcover of Iowa raster dataset (Iowa Department of Natural Resources 2017), we calculated the area and percent of all breeding bird atlas blocks in each of fifteen habitat classes, combined those into broader habitat classes (e.g., water and wetland into "Water," grass_1 and grass_2 into "Grass"), and then recalculated the area and percent separately for grid and habitat blocks (Table 3.2). In each calculation there was a small amount of the landscape that could not be classified, most often because the underlying habitat type was obscured by clouds or reflection. This simple comparison illustrates that there were important habitat differences between the grid and habitat blocks, as expected from our method of selecting blocks. As expected, grid blocks had a greater percentage of their area in grass and crops than did habitat blocks. The high grass number includes some agricultural lands as well as pasture. Also, as Iowa was historically mostly grass habitats, there are more grasslands across the state than the other habitat classes (wetlands and forests) thanks to USDA Farm Bill Programs for private lands. Conversely, grid blocks had less forest, shrub, and wetland cover than did habitat blocks. Recall that our block stratification scheme was designed to select habitat blocks in part based on these more specialized habitats. Finally, the area covered by structures, roads, and bare soil did not differ appreciably between grid and habitat blocks.

Table 3.1. Annual temperature and precipitation during Iowa's second Breeding Bird Atlas, 2008–2012

Year	Temperature (°F)	Precipitation (inches)
2008	45.8	43.8
2009	46.6	40.1
2010	48.1	45.1
2011	48.3	32.3
2012	51.9	26.5
Average[1]	48.1	37.6

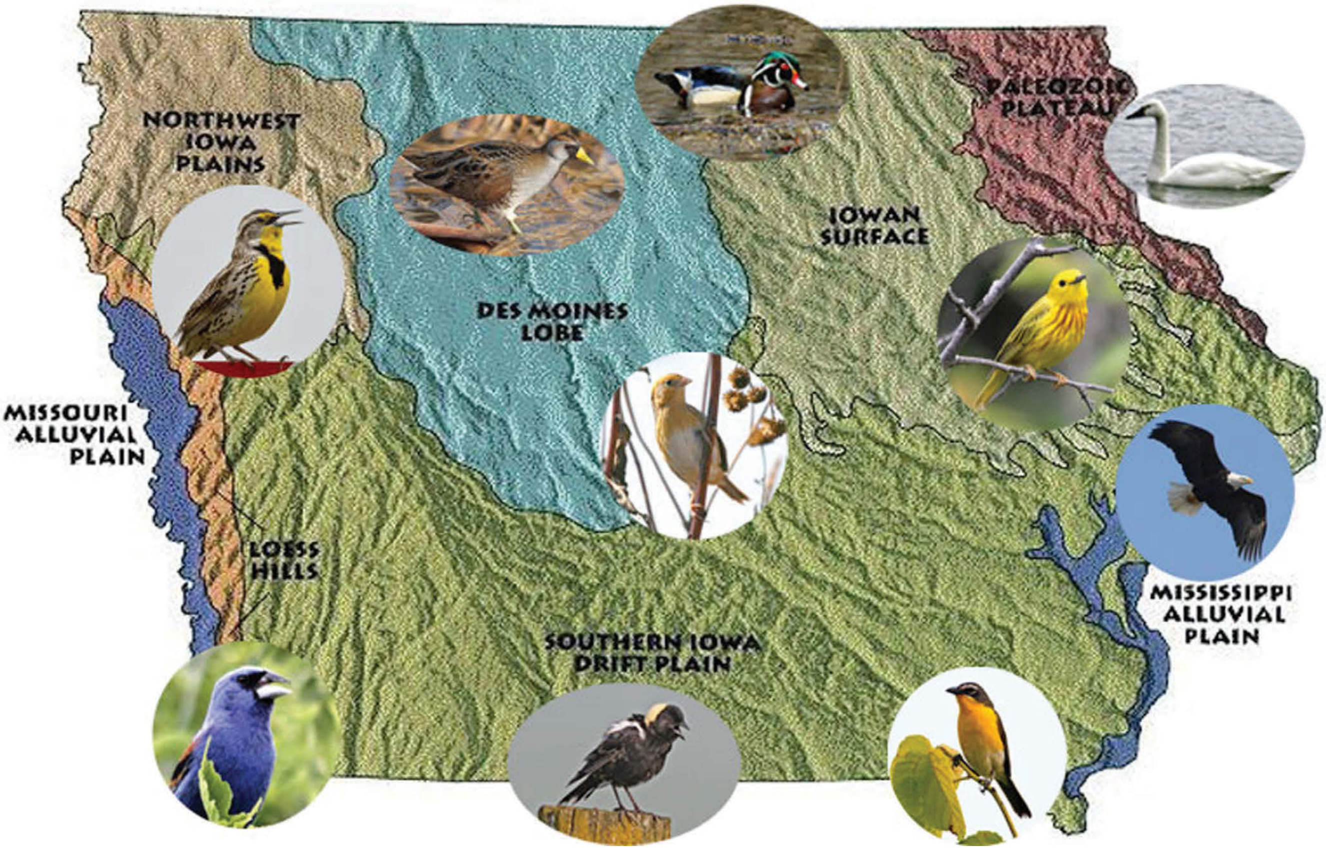
[1]These totals are from Iowa Department of Agriculture and Land Stewardship data for this period and differ slightly from the same totals reported by the National Oceanographic and Atmospheric Administration.

Table 3.2. Area (ha) and percent of breeding bird atlas blocks in each of seven habitat classes, calculated for all blocks and then separately for grid and habitat blocks

Habitat class	All blocks		Grid blocks		Habitat blocks	
	Area (ha)	Percent	Area (ha)	Percent	Area (ha)	Percent
Wetland/Water	34,745	1.91	10,267	1.24	24,478	2.78
Forest	492,657	27.09	192,476	20.98	300,180	33.31
Shrub	75,748	4.17	25,827	2.82	49,921	5.54
Grass	682,493	37.53	400,770	43.69	281,723	31.26
Crop	416,854	22.92	250,925	27.35	165,929	18.41
Bare soil	5,829	0.32	3,219	0.35	2,610	0.29
Structures/Roads	44,271	2.43	22,518	2.45	21,753	2.41
Unclassified	65,986	3.63	11,379	1.24	54,607	6.06

Iowa's Landforms – Stephen J. Dinsmore

Iowa contains diverse terrestrial and aquatic habitats that help shape the breeding bird community. Many habitat patterns differ at local spatial scales, but some are evident at much larger scales. There are many ways to characterize large-scale habitat patterns, but one that is useful in Iowa involves the use of landforms (Prior 1991, Iowa Department of Natural Resources 2015). One of the primary drivers shaping these landforms is their glacial history. The movement of glaciers affects the topography, distribution of water, and, ultimately, the associated plant and animal communities. In Iowa there are eight landforms by most definitions, although sometimes more are defined (Prior 1991). These landforms differ greatly in size, topography, and the breeding bird community. Below, we briefly characterize the topography and habitats in each landform along with the associated breeding bird community. The descriptions are brief and greater detail can be found in Prior (1991). The breeding bird community description is also brief with an emphasis on species that are unique or show a strong preference for that landform.



Northwest Iowa Plains – Douglas C. Harr

Parts, or all, of eleven northwestern Iowa counties comprise a landform referred to as the Northwest Iowa Plains. This region's age and erosional scouring patterns have left the landscape broadly rolling, with its eastern half somewhat resembling the Iowan surface of eastern Iowa. The Northwest Iowa Plains' western half is underlain by deposits that predate the Illinoian glacial epoch, while the eastern half is underlain by Wisconsinan glacial till deposited prior to advance of the Des Moines Lobe. Loess (wind-blown silt) deposits are nearly continuous over the entire landscape, ranging from 1 m depths in the east to more than 4 m in the west. Along the Big Sioux River, which forms the Iowa boundary of this region, hills are steep enough to sometimes be locally referred to as the "Little Loess Hills," merging into the larger, classic Loess Hills just to the south in Plymouth County. In the region's far northwestern corner of Lyon County may be found Sioux quartzite, exposed at the surface in Gitchie Manitou State Preserve and on surrounding private lands. This formation is among the earth's oldest exposed bedrock, part of an ancient ocean coastal headland and subsequent collapsed mountain range.

Waterman Prairie, O'Brien County
Photo: Douglas C. Harr

Once completely dominated by tallgrass prairie, and some midgrass prairie along its far western edge, the Northwest Iowa Plains landscape is Iowa's highest, generally ranging from 427 to 488 m in altitude. It is also the coldest, driest (66 cm average annual precipitation), and most treeless, similar to higher plains of the nearby Dakotas. Like the Des Moines Lobe and much of Iowa, most of this region is intensely cultivated for row crops, although steeper areas near the Big Sioux River retain considerable pastureland, remnant native prairie, and some oak-cedar stands. Such mix of cover types plus extreme northwest location result in habitats featuring some western plains flora and fauna, along with species more typical of the rest of Iowa.

Dry grasslands and hills in the western third of this landscape, including the Big Sioux River bottomlands and some wooded areas, host nesting Upland Sandpipers, Western Kingbirds, Blue Grosbeaks, Western Meadowlarks, and Loggerhead Shrikes. Rare or accidental species sometimes nesting here are Spotted Towhees, Black-billed Magpies, and Burrowing Owls. The eastern two-thirds of this landscape, more dominated by row-crop agriculture, hosts frequent nesters such as Gray Partridge, Horned Larks, and Savannah Sparrows.

Des Moines Lobe – Stephen J. Dinsmore

The Des Moines Lobe, also called the Prairie Pothole region of Iowa, is characterized by a gently rolling terrain with depressional wetlands (potholes) and a few deeper natural lakes. This is also the most recently glaciated region in Iowa and was shaped by glaciers 12,000–14,000 years ago (Prior 1991); it extends into portions of several surrounding states. Glacial activity consisted of several surges of glaciers southward from the Wisconsinan ice sheet south to Des Moines; the maximum extents of each surge are defined by morainal ridges throughout the lobe.

The region's abundant shallow wetlands provide important nesting habitat for many of Iowa's wetland birds. It is perhaps best known as Iowa's "duck factory," a reference to the prevalence of breeding waterfowl relative to other parts of Iowa. Canada Goose, Mallard, and Blue-winged Teal are the most numerous nesting waterfowl; Gadwall, Northern Shoveler, Redhead, and Ruddy Duck are regular in smaller numbers and several other species nest occasionally. Pied-billed Grebe, American and Least bitterns, Virginia Rail, and American Coot are regular breeders on shallow wetlands with emergent vegetation.

Glacial esker prairie at Grover's Lake,
Dickinson County
Photo: Douglas C. Harr

These same wetlands also host marsh passerines that include Marsh Wren, Swamp Sparrow, Yellow-headed Blackbird, and Great-tailed Grackle. Red-necked Grebe, Sandhill Crane, and perhaps Wilson's Phalarope are wetland species that are currently expanding as breeders in this region. The forested edges of wetlands host breeding Black-billed Cuckoo, Willow Flycatcher, Warbling Vireo, and Yellow Warbler while grassland areas host breeding Northern Harrier, Sedge Wren, and Clay-colored, Savannah, and Grasshopper sparrows.

Iowan Surface – Bruce L. Ehresman

Sandwiched between the Paleozoic Plateau and Des Moines Lobe, the Iowan surface is an area of gently rolling topography, some of it littered with giant exposed boulders (glacial erratics) left over from the melting of the Wisconsinan glaciers. The overall land surface is best described as slightly inclined to gently rolling with long slopes, low relief, and open views to the horizon; and the hillslopes of this landform are multi-leveled or stepped surfaces (Prior 1991). Typically, well-drained, its two major rivers, the Wapsipinicon and the Cedar, flow from northwest to southeast, contributing to the overall alignment of hills and valleys in the same direction. Especially associated with the Wapsipinicon River are areas of poor drainage, including bogs. In the southern third of this region, slopes become steeper, especially adjacent to the large river valleys. Conspicuous elongate ridges and isolated elliptical shaped hills, known as *paha*, are characteristic features in this southern portion, as well.

Wapsi River BCA, Chickasaw County
Photo: Bruce L. Ehresman

A wide assortment of sediments provides the soil of this region. While various thickness of Pre-Illinoian glacial till is dominant, loess is also present, as is thin loam and sediments of mixed sizes. Typically, there is a concentration of pebbles and cobbles in a narrow zone between the till and its loess or loam soil cover. Loess, along with wind-blown sand, forms the top layer of the *paha* hills and ridges. Prairie was the dominant historic vegetative land-cover, with savannas and woodland in areas where fire had less access, like the top of *paha* ridges and bordering river valleys. Today row crops dominate this region, with some grassland and a bit of native prairie remaining, especially in areas with rock outcroppings or an abundance of exposed glacial boulders.

Several of the most important bird nesting areas and bird migration corridors of this region are part of the Wapsi River Bird Conservation Area (BCA), which extends from the southern border of Chickasaw County through portions of Bremer, Black Hawk, and Buchanan counties. Sweet Marsh Wildlife Area and the Wapsipinicon River Greenbelt are core areas of bird diversity and abundance in this BCA, and some of the largest breeding populations of Sandhill Cranes, as well Iowa Endangered Red-shouldered Hawks can be found in the marshes and bottomland forests of this area. All Iowa's woodpeckers, vireos, thrushes, and sparrows nest in this region, as do all Iowa's nesting flycatchers (except perhaps Alder). Breeding Bird Atlas data indicate that 14 of Iowa's warbler species nest within the Iowan Surface.

Paleozoic Plateau – Bruce L. Ehresman

The rugged, deeply carved landscape of the Paleozoic Plateau, in northeastern Iowa, differs from the rest of the state. Its uniqueness includes an abundance of rock outcroppings, few glacial deposits, many deep, narrow valleys that contain fast-flowing cool water streams, and the highest percentage of woodland land cover than is found in any other Iowa landform. This remarkable high-relief landscape has resulted from erosion through layers of rock formed during the Paleozoic era. The bedrock dominant terrain provides habitat for unusually diverse plants and animals alike, many of which are typically found in more northerly and cooler climates. Because this bedrock often occurs at or near the surface, the result is carved valleys lined with rocky bluffs, the deepest of which line the Mississippi River and rise straight up for several hundred feet. Such rugged topography was historically resistant to the spread of prairie fires and resulted in the largest contiguous woodland patches in Iowa; which is still true today. The steepness of the topography limits the amount of cultivation for row crop agriculture, and most intense farming occurs on the plateaus of the ridge-tops and in the wider river valleys. The open ridges that were once covered with prairie are now mostly pastures and hayfields, helping support the dairy and beef cattle industry.

Because of both the large contiguous forest landcover and the older growth of many of the public land forests, this area of the state provides nesting habitafor most of Iowa's breeding population of Cerulean Warblers. Other large forest dependent birds, found nesting here in good numbers, include Red-shouldered Hawk, Broad-winged Hawk, Wood Thrush, Blue-winged Warbler, Kentucky Warbler, Ovenbird, and Acadian Flycatcher. More northerly nesting species found here include Winter Wren and Veery. Perhaps the most unique species and the one most dependent on steep river bluffs for nest sites, is the Peregrine Falcon. Most of the confirmed nesting records in the state

Yellow River State Forest, Allamakee County
Photo: Douglas C. Harr

for Yellow-bellied Sapsucker occur in this landform, as well. While this area of the state is better known for its forest birds, good numbers of grassland birds, including Henslow's, Field, and Savannah sparrows were also documented nesting in this region. Including migrants, at least 258 species of birds have been documented in this unique landform of the state.

Southern Iowa Drift Plain – Stephen J.Dinsmore

The Southern Iowa Drift Plain is the largest of Iowa's landforms and encompasses much of the southern half of the state. This region is shaped by older glacial activity than the Des Moines Lobe, sometimes by hundreds of thousands of years (Prior 1991). The region is typified by well-connected drainage systems separated by rolling hills and ridgetops (Prior 1991). There is also an obvious east-west transition from highly dissected and deeply cut by streams in the east to a flatter, less dissected terrain in the west. South-central and southeastern Iowa have large areas of forest and grassland cover while western regions are more dominated by row-crop agriculture.

Stephen's State Forest 1000 Acres BCA,
Monroe County
Photo: Pat Schlarbaum

This region includes all or parts of thirteen Bird Conservation Areas, most targeting a mix of forest and grassland habitat types. Forested areas host nesting Wild Turkey, Chuck-wills-widow, Eastern Whip-poor-will, Acadian Flycatcher, Yellow-throated Vireo, Wood Thrush, Ovenbird, Kentucky Warbler, Northern Parula, and Summer and Scarlet tanagers. Scrubby areas are home to nesting Black-billed Cuckoo, Willow Flycatcher, Loggerhead Shrike, White-eyed and Bell's vireos, Northern Mockingbird, Yellow-breasted Chat, and Field Sparrow. Nesting birds of the extensive grasslands include Upland Sandpiper, Sedge Wren, Grasshopper and Henslow's sparrows, Bobolink, and Eastern Meadowlark in addition to a reintroduced population of the Greater Prairie-Chicken, the only one in Iowa. Two species, Red-shouldered Hawk and Pileated Woodpecker, have undergone dramatic increases and a westward expansion in this region presumably in concert with the ageing of forest areas.

Mississippi Alluvial Plain – Bruce L. Ehresman

The Mississippi Alluvial Plain sits beside the eastern edge of the Southern Iowa Drift Plain and represents the broad lowlands of the Mississippi River. It was formed from glacial meltwater from tens to hundreds of thousands of years ago, when rivers carved valleys and partially filled them with layered deposits of gravel, sand, silt, and clay. Parts of this region, like Big Sand Mounds Nature Preserve in Louisa County, contain areas of deep sandy deposits that were created by flowing streams and strong blowing winds.

While the Mississippi River forms the east boundary, lower portions of the Cedar and Iowa rivers are the two main watersheds that flow through this region and continue to influence landscape water levels and vegetation. While this region historically primarily was floodplain forest, the local hydrology has been severely changed through drainage of inland tributaries and wetlands and by the establishment of the lock-and-dam system of the Mississippi River. Row-crop agriculture is now predominant on most of the floodplain. Wooded areas remaining are largely confined to corridors adjacent to streams and rivers and on upland areas, such as those containing sedimentary rock outcroppings that remain from a much earlier period of time. Especially in the sandy uplands, a few native prairie remnants (like Shield Prairie) survive in this region, as well.

Fortunately, many sizable publicly-owned wetland complexes are in place along all three rivers. Port Louisa National Wildlife Refuge, Lake Odessa, Wiese Slough, Cone Marsh, Red Cedar Wildlife Area, Saulsbury Bridge Recreation Area, and Blackhawk Bottoms

Cedar Bottoms, Swamp White Oak Preserve, Muscatine County
Photo: Douglas C. Harr

all are good examples of areas that provide excellent bird habitat. Rarer bottomland forest and riparian corridor birds that nest here include Red-shouldered Hawk, Yellow-crowned Night-Heron, Black-billed Cuckoo, and Brown Creeper; and some of the highest nesting densities of Bald Eagle in the state occur in these bottomlands. All Iowa nesting woodpeckers and vireos occur here, and the vast majority of Eurasian Tree Sparrows that nest in the state are found in this region. There also exists a growing population of Blue Grosbeaks and Sandhill Cranes. Especially in northern portions of this region, American Bittern, Least Bittern, King Rail, Virginia Rail, Sora, and Common Gallinule all are found during the nesting season.

Loess Hills WMA, Monona County
Photo: Douglas C. Harr

Loess Hills – Bruce L. Ehresman

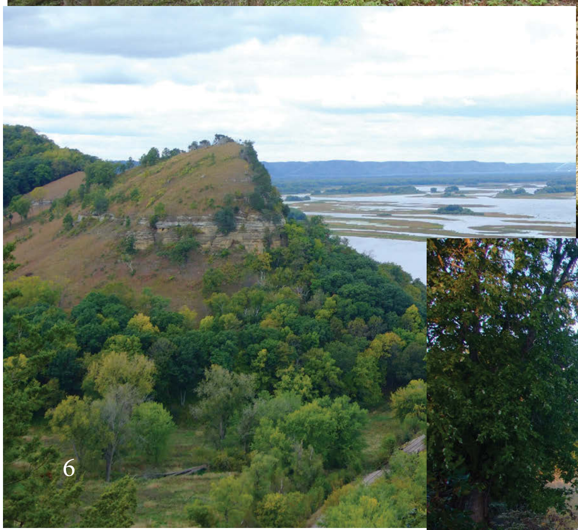
Parallel to the Missouri Alluvial Plain, along Iowa's western border, is the Loess Hills, unquestionably the most unique landform of this state. Created by wind-blown loess from the Missouri River floodplain, deposits ranging from 18 to 90 meters in depth form steep, prominent ridges, which rise abruptly above the floodplain to the west. The bluffs and ridges of these hills of loess extend eastward for distances of three to twenty miles. Viewed from above, the landscape has a corrugated appearance of alternating waves and troughs, and the hills are generally sharp-featured, with narrow-crested ridges that are intersected with side-spurs and steep side-slopes. While the western boundary is typically very abrupt, the eastern boundary is not well defined, with the hills gradually merging with the rolling landscape of the Southern Iowa Drift Plain. The hills' silt deposits are loosely compacted and porous, light-weight, and very cohesive when dry; characteristics that enable loess to maintain nearly vertical slopes when deeply eroded or cut through with equipment to create roadways. Steeper slopes often have a terraced or step-like appearance. Historically, the northern portion of this region was nearly completely covered by short-grass prairie, with a mix of prairie, bur oaks, and cedars more prevalent in the southern reaches. Today, primarily from a lack of fire, savanna and woodland cover a much higher percentage of the Loess Hills, especially on moister northerly and east-facing slopes. While the steepness of the Loess Hills has typically made row-crop agriculture difficult, within the last decade tens of thousands of acres of pastures, prairies, and hayfields have been converted to now raise corn and soybeans.

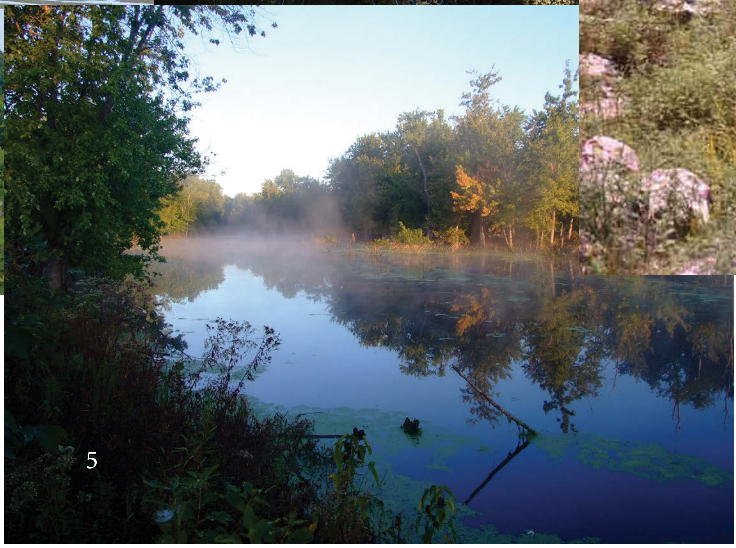
Broken Kettle Bird Conservation Area (BCA), Loess Hills Bird Conservation Area, and Lower Loess Hills Bird Conservation Area together include nearly 81,000 hectares of the Loess Hills region. Represented within these three BCAs is some of the very best existing bird habitat, including The Nature Conservancy's Broken Kettle Grasslands, Loess Hills Wildlife Area, Loess Hills Forest, Lewis and Clark State Park, and Waubonsie State Park. Declining grassland nesting birds that can be found here include Northern Bobwhite, Bell's Vireo, Field Sparrow, Grasshopper Sparrow, Dickcissel, Bobolink, and both meadowlark species. Savanna species, including Iowa's Endangered Barn Owl, Red-headed Woodpecker, Baltimore Oriole, and Orchard Oriole all nest here. As woodland is increasing, more woodland nesting birds are found in this region, such as Yellow-bellied Sapsucker, Acadian Flycatcher, Wood Thrush, Blue-winged Warbler, Louisiana Waterthrush, Kentucky Warbler, and Yellow-breasted Chat. Both Blue Grosbeak and Western Kingbird are common in this particular region. Loess Hills is one of the most important remaining strongholds for nesting Eastern Whip-poor-wills and Chuck-will's-widow. It especially is well known for its spectacular raptor migrations, and no other place in the state has documented more migrating raptors than Hitchcock Nature Center (Pottawattamie County), where more than 11,000 raptors of 20+ species are recorded each fall.

Missouri Alluvial Plain – Stephen J. Dinsmore

Missouri River Alluvial Plain,
Monona County
Photo: Douglas C. Harr

This Missouri Alluvial Floodplain landform is characterized by low relief and periodic disturbance from flooding and forms the southwestern two thirds of Iowa's border. Like its eastern counterpart, the Mississippi Alluvial Floodplain, it was formed from glacial meltwater when rivers carved valleys and partially filled them with layered deposits of gravel, sand, silt, and clay. The region also has a striking eastern border in the Loess Hills, which was created by wind-blown soil (loess) from the Missouri River floodplain. A characteristic of this region is that Missouri River spring floods often inundate low areas, causing soil erosion and deposition, resulting in a channel that historically meandered throughout the floodplain. Channelization has shortened the river, increased the speed of water flow, and greatly reduced oxbow and backwater habitats. Much of the floodplain is row-crop agriculture, although numerous shallow wetlands exist. Nonetheless, this remains a unique landform with respect to its birdlife. Historically, sandbars on the Missouri River hosted breeding Piping Plover and Least Tern, and both species continue as rare breeders. Floodplain forests are dominated by cottonwood and typical breeding species include Yellow-billed Cuckoo, Red-headed Woodpecker, Eastern Wood-Pewee, Warbling Vireo, House Wren, Yellow Warbler, Eastern Towhee, and Orchard Oriole. The intensive row-crop agriculture between the river and the base of the Loess Hills hosts breeding Upland Sandpiper, Western Kingbird, Bell's Vireo, Cliff Swallow, Lark Sparrow, Blue Grosbeak, and Dickcissel. The few remaining wetlands have nesting waterfowl, Least Bittern, Marsh Wren, and Yellow-headed Blackbird.





1. Ledges State Park, Boone County
2. Broken Kettle Grasslands, TNC
3. Mines of Spain SRA
4. Gitchie Manitou SPr, quartzite
5. Port Louisa NWR, backwaters
6. Capoli Bluff, near Lansing

Photo Credits:
1. Douglas E. Chapman
2–6. Douglas C. Harr

4 Results— *Stephen J. Dinsmore*

This chapter is a general summary of the effort and species data generated during Iowa's second Breeding Bird Atlas project. This is meant to be an overview of the project; greater detail can be found in the individual species accounts.

Block Data

From 2008 to 2012 a total of 436 observers spent 10,644 hours during 7,465 visits for BBA II. During BBA II, all 791 blocks received some coverage with just 40 partially complete blocks (most were grid blocks) and 751 completed blocks. This compares to 152 noncovered blocks, 98 partially completed blocks, and 611 completed blocks during BBA I. Compared to BBA I we also had one less year of coverage and approximately 4,000 fewer hours of survey effort. With the advent of the Internet, however, we were able to focus annual atlas efforts more efficiently and minimize excessive coverage (>20 hours) for high interest sites (Figure 4.1). Effort was below expectations during the first three years, so the Steering Committee in 2010 began focusing field efforts in poorly surveyed parts of the state. This included sponsoring block-busting weekends and hiring trained atlassers to visit these areas in 2011 and 2012. As a result, atlas effort increased toward the end of the project (Table 4.1). This fell short of the target of 20 hours per block (a total of 15,820 hours) but was still better than during BBA I. The average block had 74 species and 13.5 hours of effort during BBA II, compared to 74 species and 17 hours of effort in BBA I.

Species Data

BBA II documented the presence of 196 species of birds in Iowa during the breeding seasons of the five-year survey period (2008–2012). This evidence was based on 151,614 individual records that were submitted by all atlas participants combined. The list of species found during the BBA II project included 166 *confirmed* breeders, 16 *probable* breeders, 12 *possible* breeders, two *observed* without breeding evidence, and a few species that were reported but not considered realistic breeders in Iowa (Table 4.2). The BBA II resulted in the addition of one species (Alder Flycatcher) to the list of Iowa breeding birds. The number of species per block was variable, although most blocks contained between 60 and 90 species with very few blocks recording >100 species (Figure 4.2).

The results of BBA II revealed that Iowa's breeding bird community has experienced significant changes in the 20+ years since the first atlas. The individual species accounts (Chapter 5) provide considerable detail on these changes on a species by species basis. Some of the patterns encompass groups of birds and are worth highlighting here by mentioning some successes (Table 4.3).

Wetland birds showed mixed patterns despite the increased wetland restoration efforts in the Des Moines Lobe region. Canada Goose solidified its breeding distribution statewide while Hooded Merganser continues to increase away from eastern Iowa and the wetlands of north-central and northwestern Iowa. Great Blue Heron was also detected more frequently with colonies now occurring statewide. Among the secretive marsh birds, Pied-billed Grebe, both bitterns, and Virginia Rail increased and are now more widely distributed on wetlands in the Des Moines Lobe. Forster's Tern may have disappeared as a breeding bird, although Black Tern still persists in several locales. Marsh passerines like Marsh Wren, Swamp Sparrow, and Great-tailed Grackle all increased; the Yellow-headed Blackbird may have contracted its range to the Des Moines Lobe.

Among grassland birds both Sedge Wren and Henslow's Sparrow saw huge increases as a result of grassland restoration efforts. Bobolink showed a similar pattern, especially in northern Iowa.

Among forest birds, the Red-shouldered Hawk and Pileated Woodpecker showed significant westward expansions, especially into south-central Iowa. Wood Thrush consolidated its breeding range, mainly in eastern and central Iowa. The southeastern warblers were mostly unchanged, except Kentucky Warbler, which increased in south-central Iowa. Among the nonnative species, Eurasian Collared-Dove is now widespread statewide whereas Eurasian Tree Sparrow has solidified its southeastern Iowa range; neither species was reported during the first atlas effort.

Regional Comparison

So, how does Iowa compare to its neighboring states in terms of the breeding bird community (Table 4.4)? For this comparison, we are fortunate to have atlas efforts in all surrounding states, including two efforts each in Nebraska, South

Dakota, and Wisconsin. Not surprisingly, Iowa has a comparatively small breeding bird community, the second smallest among the surrounding states. This is largely a function of geography. Our neighbors to the north (Minnesota and Wisconsin) contain extensive boreal forest, have more diverse wetlands, and yet they still contain most/all the habitats that are also found in Iowa. Consequently, they each have ~60 more confirmed breeding species than Iowa. The two states to our west (Nebraska and South Dakota) span the 100th meridian, encompass more diverse grasslands and western ponderosa pine forests, and include a subset of western species that does not typically occur in Iowa. These two states thus average 25–50 more breeding birds than are found in Iowa. Illinois is most similar to Iowa in terms of habitats and longitude and thus has a similar number of confirmed breeding birds. Missouri has the smallest breeding bird community of the states bordering Iowa. Both Illinois and Missouri benefit from a subset of typically southeastern species that breed in the southern portions of both states, including the Ozarks.

Table 4.1. Atlas effort (in hours) by year for Iowa's BBA II, 2008–2012

Year	Hours of effort
2008	1,621
2009	1,913
2010	1,697
2011	1,819
2012	3,594
Total	10,644

Table 4.2. Comparison of the breeding status of birds detected during the first and second breeding bird atlas efforts in Iowa. Note that during both efforts there were a small nyumber of species that were excluded because there was little chance they could breed in Iowa (e.g., Arctic nesting species)

Breeding status	BBA I	BBA II
Confirmed	158	166
Probable	16	16
Possible	10	12
Observed	15	2
Total	199	196

Eastern Towhee fledgling
Photo: Larry Dau

Table 4.3. A brief summary of BBA II success stories as suggested by increases (% change since BBA I) in both the number of blocks recorded and the percentage of reports that were confirmed or probable breeding status.

Species	% blocks recorded	% confirmed or probable
Grassland species		
Sedge Wren	52.8	42.6
Henslow's Sparrow	27.3	12.5
Bobolink	15.4	16.7
Grasshopper Sparrow	7.8	2.0
Upland Sandpiper	3.0	2.6
Wetland species		
Pied-billed Grebe	10.9	6.4
Sandhill Crane	6.7	5.4
Virginia Rail	5.5	4.4
American Bittern	4.7	1.3
Least Bittern	1.9	1.1
Forest species		
Pileated Woodpecker	13.4	12.5
Wood Thrush	8.7	12.1
Red-shouldered Hawk	8.4	4.9
Broad-winged Hawk	6.2	4.9
Kentucky Warbler	2.3	2.4

Table 4.4. A regional comparison of breeding bird atlas project results by state in terms of levels of breeding confirmation

State	Total	Confirmed	Probable	Possible	Ob-served
Illinois	216	172	15	10	19
Iowa (BBA I)	199	158	16	10	15
Iowa (BBA II)	196	166	16	12	2
Missouri	181	149	8	7	17
Minnesota	249	231	10	3	5
Nebraska[1]	211	183	14	9	5
Nebraska[2]	229	204	18	4	3
South Dakota[3]		212	7		
South Dakota[4]	252	239	10	3	3
Wisconsin[5]	237	226	9	2	
Wisconsin[6,7]	243	226	7	4	6

[1]The first atlas effort from 1984–1989.
[2]The second atlas effort from 2006–2010.
[3]The first atlas effort from 1988–1993.
[4]The second atlas effort from 2008–2012.
[5]The first atlas effort from 1995–2000.
[6]The second atlas effort from 2015–2019.
[7]Numbers are preliminary and subject to change as data vetting is on-going (N. Anich pers. comm.).

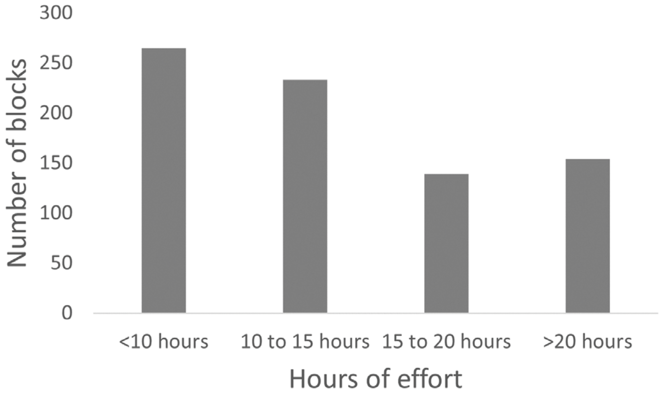


Figure 4.1. Distribution of the amount of effort (hours) spent surveying breeding bird atlas blocks during the second Iowa Breeding Bird Atlas, 2008–2012.

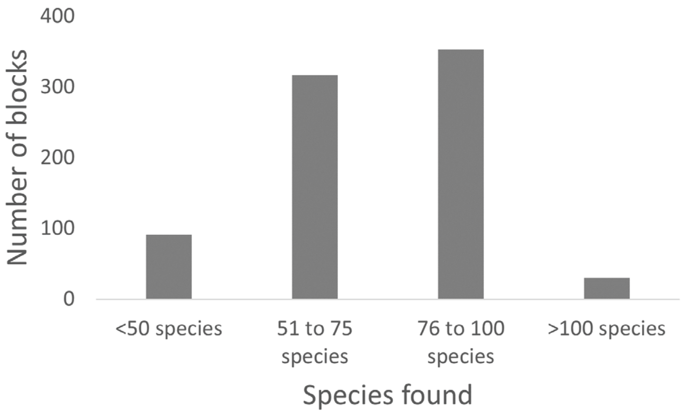


Figure 4.2. Distribution of the number of species found in breeding bird atlas blocks during the second Iowa Breeding Bird Atlas, 2008–2012.

5 Species Accounts

The bulk of this book consists of individual two page accounts for each of the 196 species encountered during this BBA II effort. Here we briefly list the types of information presented in each account.

Common and Latin names are in accordance with the Check-list of North American Birds (Chesser et al. 2020) and recent supplements.

A representative photograph with a credit to the photographer is provided.

A summary of breeding information for Iowa includes:

- A brief description of the breeding habitat;
- Breeding dates found during this effort (using only Confirmed and Probable statuses);
- A brief description of the nest type;
- Basic information on expected clutch size, incubation period length, and fledging period;
- The species' general status in Iowa; and
- The Breeding Bird Survey (BBS) linear trend for Iowa including the trend estimate (slope of the line) and 95% confidence interval. We use the terms Increasing (confidence interval >0.0), Stable (confidence interval includes 0.0), and Decreasing (confidence interval <0.0) to characterize this trend. Trends are for the period 1966 through 2012 and the graph plots the annual BBS indices during this time period. In a few cases the data were too sparse to estimate an Iowa trend, so we used the Central U.S. regional trend. For a few species there were too few data to estimate a trend with either dataset (U.S. Geological Survey 2020). Importantly, there are a few species where the Iowa trend differs from the Central U.S. trend.

A detailed summary of the primary trends in Iowa since the first Breeding Bird Atlas (BBA I) is provided. This section also highlights important patterns detected during BBA II and often includes references to key published literature on the species.

The author(s) of the species account is in the footer of page one of the account.

A brief visual summary of findings from BBA I includes levels of breeding evidence for grid, priority, and all blocks (in a table) and the statewide distribution of breeding evidence (in a pie chart and a small map).

A brief visual summary of findings from BBA II includes levels of breeding evidence for grid, priority, and all blocks (in a table) and the statewide distribution of breeding evidence (in a pie chart and a larger map).

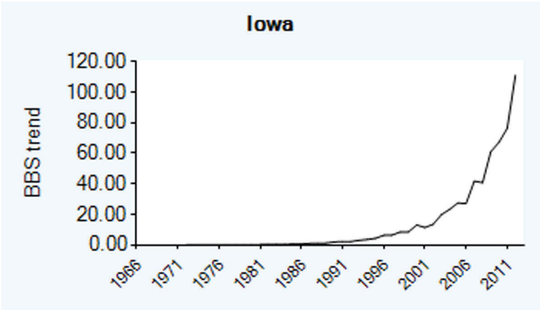
Sponsorship for the species is in the footer of page two of the account.

© Billy Reiter-Marolf

Habitat	Wetlands
Breeding Dates	4 Mar (PR)–18 Aug (PR)
Nest Type	Large ground depression lined with plant material, feathers, and down; readily uses nest platforms
Clutch Size	5–6 (rarely 2–11)
Incubation	25–30 days
Fledging	ca. 9 weeks
Status	Fairly common breeding bird
BBS Trend	Increasing (trend = 20.9, 95% CI is 18.3, 28.8) [Iowa]

Patterns since BBA I

The Canada Goose is one of the most familiar waterfowl in Iowa and is also a conservation success story. This is one of the best-studied waterfowl species, and populations have been introduced and re-established throughout North America, which has resulted in a genetic mixing of former subspecies and created new challenges for their management in many urban areas (Mowbray et al. 2020). In Iowa, there are several subspecies that are migrants only: only the Giant Canada Goose (*Branta canadensis maxima*) breeds. This subspecies was nearly extirpated in the early 1900s, but a small population survived in Rochester, Minnesota (Rusch et al. 1995). They persisted as a breeding bird in Iowa during the early settlement period but had disappeared by about 1910 and were subsequently reintroduced throughout Iowa beginning in 1964 (Bishop 1978). The species rapidly established as a breeding bird and by the 1990s it bred statewide (Zenner and LaGrange 1991). This species was so successful that many are now resident in Iowa year-round, and this success has created conflicts with humans including nuisance issues in urban areas and agricultural damage (Dennis et al. 2000). The USGS North American Breeding Bird Survey (BBS) data suggest strong increases in goose numbers in Iowa (Sauer et al. 2012) and nationally (Sauer et al. 2017).



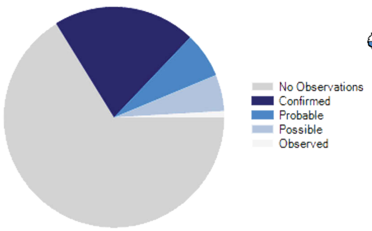
The Canada Goose was among the most widely reported waterbirds during both atlas projects. It was found in 642 (81.2%) blocks during the second Breeding Bird Atlas (BBA II), up significantly from 291 (33.8%) blocks during the first BBA (BBA I) (Jackson et al. 1996). The percentage of confirmed reports also increased from 61.9% during BBA I to 69.9% during BBA II. Nesting birds and broods are ubiquitous at occupied wetlands. During both atlas efforts, >80% of all reports were in the probable and confirmed categories. This species was distributed statewide during BBA I, but with obvious gaps in northeastern, southwestern, and parts of northwestern Iowa. These gaps had largely disappeared by the end of BBA II. During both atlas efforts, this species was more often found in habitat and priority blocks than in grid blocks, probably because the former is more likely to contain wetland habitats preferred for nesting. Almost any water body in the state is suitable nesting habitat for this species.

The Canada Goose has no special conservation designation in Iowa or nationally. This goose is an increasingly popular target for hunting and is the most harvested goose species in North America with >2 million taken annually (Mowbray et al. 2020). It was also the subject of market hunting in the late 1800s and early 1900s, when it was one of the most sought-after species (J. J. Dinsmore 1994). This species is still hunted in Iowa, where it ranked first among waterfowl in 2017 and 2018 with an estimated annual harvest of >45,000 birds; more were harvested than for any single duck species (Raftovich et al. 2019). Although this species is still increasing, there are several conservation concerns including ingestion of spent lead shot, subsistence harvest in Canada, and possibly exposure to pesticides; habitat is not thought to be a limiting factor at present (Mowbray et al. 2020). Despite these concerns, the Canada Goose is a remarkably adaptable species that is now well established as a familiar breeding bird statewide.

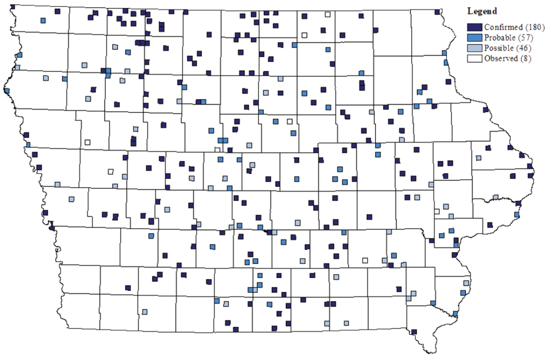
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	1	7	8
Possible	18	28	46
Probable	19	38	57
Confirmed	56	124	180
Conf & Prob	14.40%	40.60%	27.50%

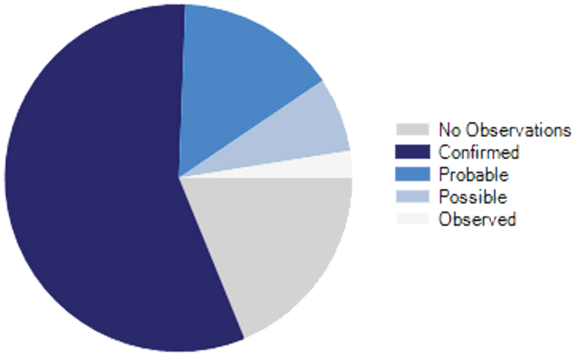
BBA I Results



BBA I



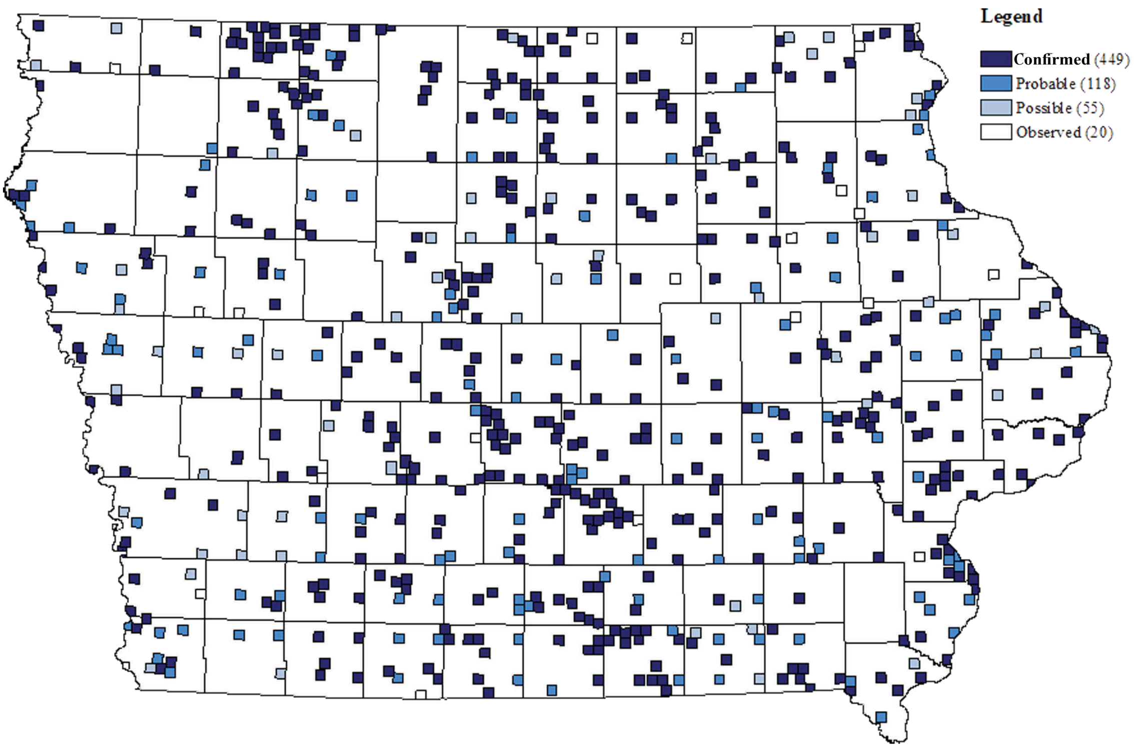
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	14	7	21
Possible	38	17	55
Probable	66	52	118
Confirmed	149	301	450
Conf & Prob	41.20%	88.50%	66.00%

BBA II

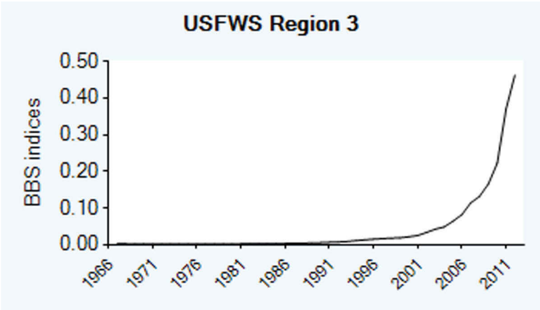


Trumpeter Swan *Cygnus buccinator*

© Kip Ladage

Habitat	Wetlands with emergent vegetation, especially the largest wetlands
Breeding Dates	1 Apr (CO)–21 Aug (CO)
Nest Type	Large mound of plant material, often on a muskrat hut, center lined with down and feathers
Clutch Size	5 (rarely 2–9)
Incubation	33 days
Fledging	90–122 days
Status	Uncommon and increasing resident and breeder
BBS Trend	No Trend Available

Patterns since BBA I



The Trumpeter Swan is native to Iowa but was extirpated as a breeding bird sometime in the 1880s and has only recently been reintroduced. This is the largest native North American waterfowl species, and the population in the Lower 48 States once dipped to fewer than 100 individuals before conservation efforts fueled its recovery (Mitchell and Eichholz 2020). Trumpeter Swans were thought to occur in Iowa prior to settlement, but the extent of their occurrence is poorly documented. The last historical record from Iowa was in 1897 (Anderson 1907) and the only firm nesting record was near Belmond in Hancock County in 1883 (Kent and Dinsmore 1996). It remained absent from Iowa until a group of nine adults from a Minnesota release appeared in Tama County on 12 December 1984 (Silcock 1985). Iowa initiated a reintroduction program in 1993 and the first successful nesting occurred in Dubuque County in 1998 (Iowa Department of Natural Resources 2020b). This is one of the most successful reintroductions of any bird to Iowa with >75 breeding pairs now established. Despite the success, the reintroduction has been slowed by high swan mortalities due to lead poisoning, collisions with powerlines, and illegal shooting (Iowa Department of Natural Resources 2020b). Many Iowa swans are year-round residents, although neck collar tracking revealed dispersal to Arkansas, Colorado, Tennessee, Texas, and Virginia (The Trumpeter Swan Society 2015). The wintering population was up to nearly 600 individuals by 2014 (The Trumpeter Swan Society 2015), and now numbers >1,500. The BBS data are insufficient to estimate a trend for Iowa, but this species is increasing regionally (Sauer et al. 2017).

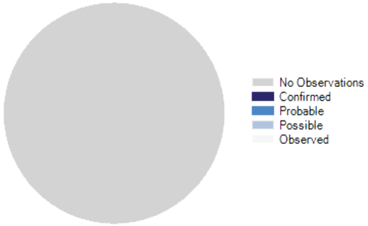
The Trumpeter Swan has expanded its range in Iowa dramatically in the last two decades. It was found in 77 (9.7%) blocks during BBA II but was unreported during BBA I (Jackson et al. 1996). During BBA II there were 47 confirmed reports throughout Iowa, although they were concentrated in the Prairie Pothole Region and in east-central Iowa, perhaps artifacts of reintroduction programs. It was mostly absent from the southern one-third and the far northwestern corner of Iowa. The high confirmation rate (61%) is indicative of the ease of detecting these large birds, and their lengthy nesting cycle. Records classified as observed or possible probably include some nonbreeding birds in search of new wetlands to colonize. Most reports (82%) were from habitat blocks, although they also occurred in some grid blocks.

The Trumpeter Swan is a Species of Greatest Conservation Need in Iowa (Iowa Department of Natural Resources 2015) but has no special conservation designation nationally. Swans are not currently hunted in Iowa, although a few are taken in the western United States incidental to legal hunting for the Tundra Swan (Drewien et al. 1999). Conservation concerns include disturbance to nest and roost sites from birdwatching and other activities (Morton et al. 2016), ingestion of spent lead shot (Wilson et al. 1998), and in some areas the degradation of breeding and wintering habitat (Mitchell and Eichholz 2020). The Trumpeter Swan recovery in Iowa has been a huge success story, and we can look forward to continued expansion into unoccupied parts of the state. The species should continue to increase because of good local production and dispersal, and many apparently suitable wetlands remain unoccupied.

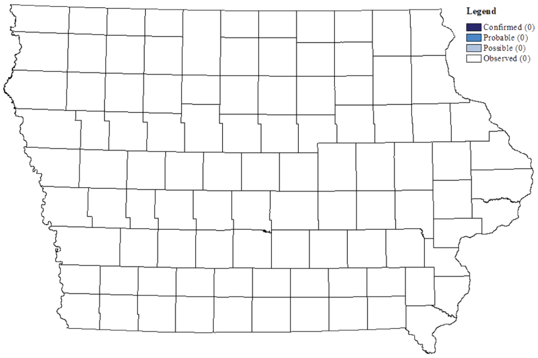
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	0	0	0
Probable	0	0	0
Confirmed	0	0	0
Conf & Prob	0.00%	0.00%	0.00%

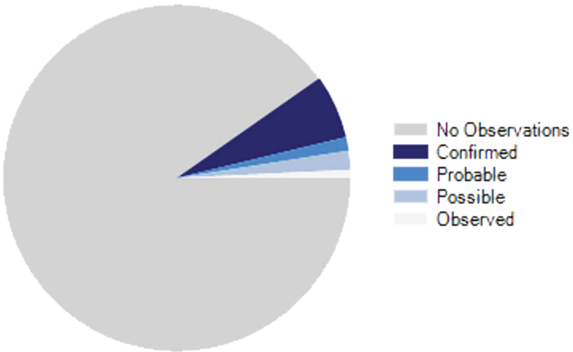
BBA I Results



BBA I



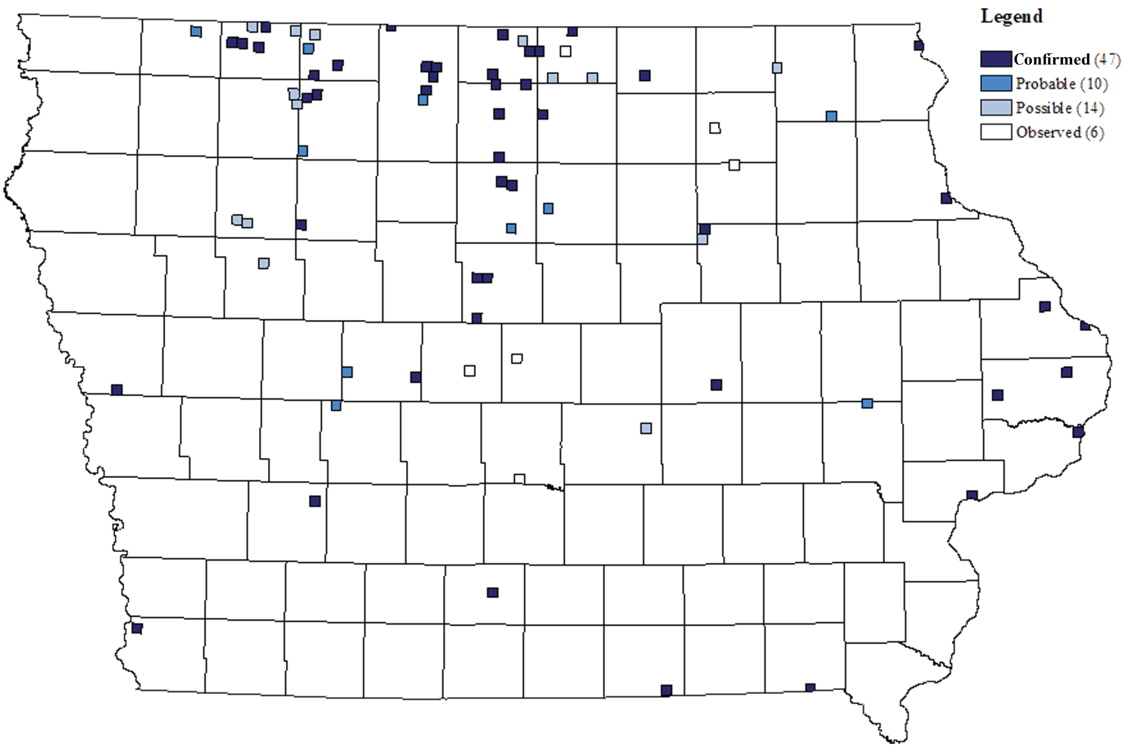
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	2	4	6
Possible	3	11	14
Probable	2	8	10
Confirmed	7	40	47
Conf & Prob	1.70%	12.00%	6.60%

BBA II



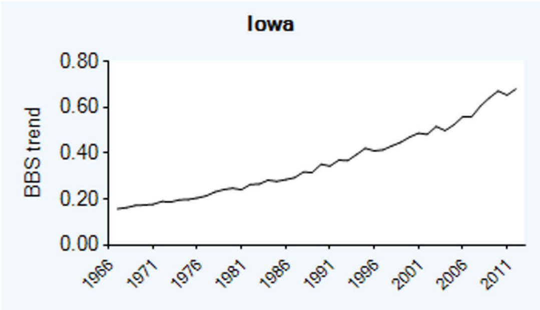
Sponsored by ISU Trumpeter Swan Restoration Committee

Wood Duck *Aix sponsa*

© James Scheib

Habitat	Wetlands
Breeding Dates	22 Mar (PR)–30 Aug (CO)
Nest Type	Cavity, usually over or near water, lined only with down; readily uses nest boxes
Clutch Size	8–10 eggs (rarely 6–15)
Incubation	28–32 days
Fledging	56–70 days
Status	Fairly common migrant and breeder
BBS Trend	Increasing (trend = 4.9, 95% CI is 2.7, 7.6) [Iowa]

Patterns since BBA I



The Wood Duck is a fairly common breeding bird in a wide range of aquatic habitats throughout Iowa. This species is well known for the male's stunning breeding plumage, and for its remarkable recovery with the aid of artificial nest boxes in the mid-1900s (Hepp and Belrose 2020). It is the most successful of North America's cavity-nesting ducks and was able to rapidly recover from population lows in the early 1900s due to nest boxes, improved breeding habitat due to the recovery of beaver, and restrictive harvests (Hepp and Belrose 2020). Historically this was a fairly common duck in forested wetlands of eastern Iowa (Anderson 1907, DuMont 1933). Populations rapidly declined through the 1930s due to over-hunting (Kent and Dinsmore 1996) and they were rare by mid-century. Expanded nest box programs and harvest restrictions allowed populations to recover rapidly so that it was one of the three most common breeding Iowa waterfowl by the early 1980s (J. J. Dinsmore et al. 1984). The BBS data suggest a steady increase in Iowa (Sauer et al. 2012) and regionally (Sauer et al. 2017).

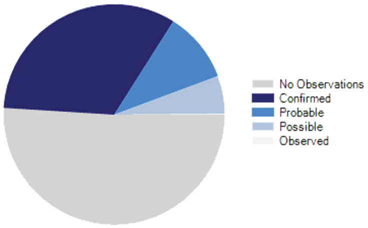
The Wood Duck had a similar statewide distribution in both atlas projects. This species was detected on 588 (74%) blocks during BBA II efforts, up significantly from the 422 (49%) blocks during BBA I. The distribution pattern during BBA II was statewide with no large range gaps; it was scarcest in patchy regions of intensive row-crop agriculture in west-central and northwestern Iowa. The pattern of distribution was similar to what was found in BBA I with notable concentrations along major river corridors in both efforts (Jackson et al. 1996). The relatively high confirmation rate (61%) during BBA II, and a similar rate (67%) during BBA I, are probably indicative of the ease of seeing broods of this species during the fledgling period. This species was detected most often in priority/habitat blocks, although it was also well represented in other blocks, perhaps because of its ability to use almost any water body for nesting.

The Wood Duck is a hunted species and lacks any state or national conservation designation. It is a hunted species in Iowa although most of the harvest occurs in the southeastern United States. They were subjected to market hunting until the early 1900s (J. J. Dinsmore 1994), which was partly responsible for their decline. The Iowa harvest in 2017 and 2018 was estimated at approximately 20,000 individuals annually, ranking it the top five most commonly taken ducks (Raftovich et al. 2019). There is some concern about illegal harvest during September teal hunting seasons, although the losses in Iowa were minimal (Raftovich et al. 2019). This species is a success story in part because of the widespread efforts to supplement natural cavities used for nesting with artificial nest boxes (Nichols and Johnson 1990). A particularly good example from Iowa is the successful program at Union Slough National Wildlife Refuge in Kossuth County where many hundreds of Wood Ducks were produced yearly (Fleskes et al. 1990). But the overall impact of nest boxes on population growth is poorly understood. Conservation measures include eliminating stream channelization, reducing drainage of forested wetlands, and controlling wetland water levels to enhance food resources (Bellrose and Holm 1994). Luckily, the Wood Duck has been a success story for Iowa, and it is likely this species will continue to thrive in our diverse wetlands.

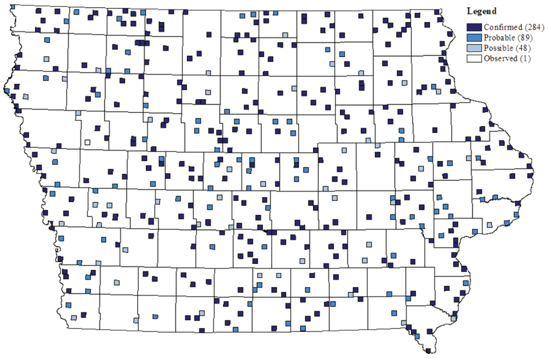
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	1	1
Possible	28	20	48
Probable	35	54	89
Confirmed	87	197	284
Conf & Prob	23.40%	62.90%	43.30%

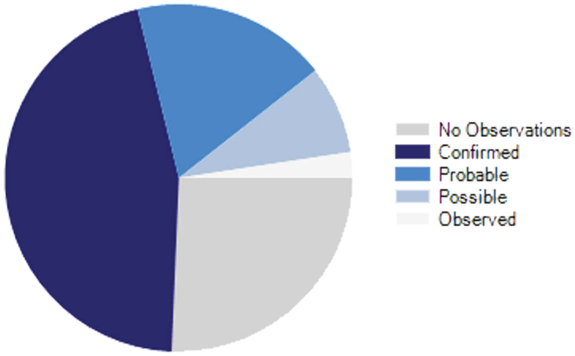
BBA I Results



BBA I



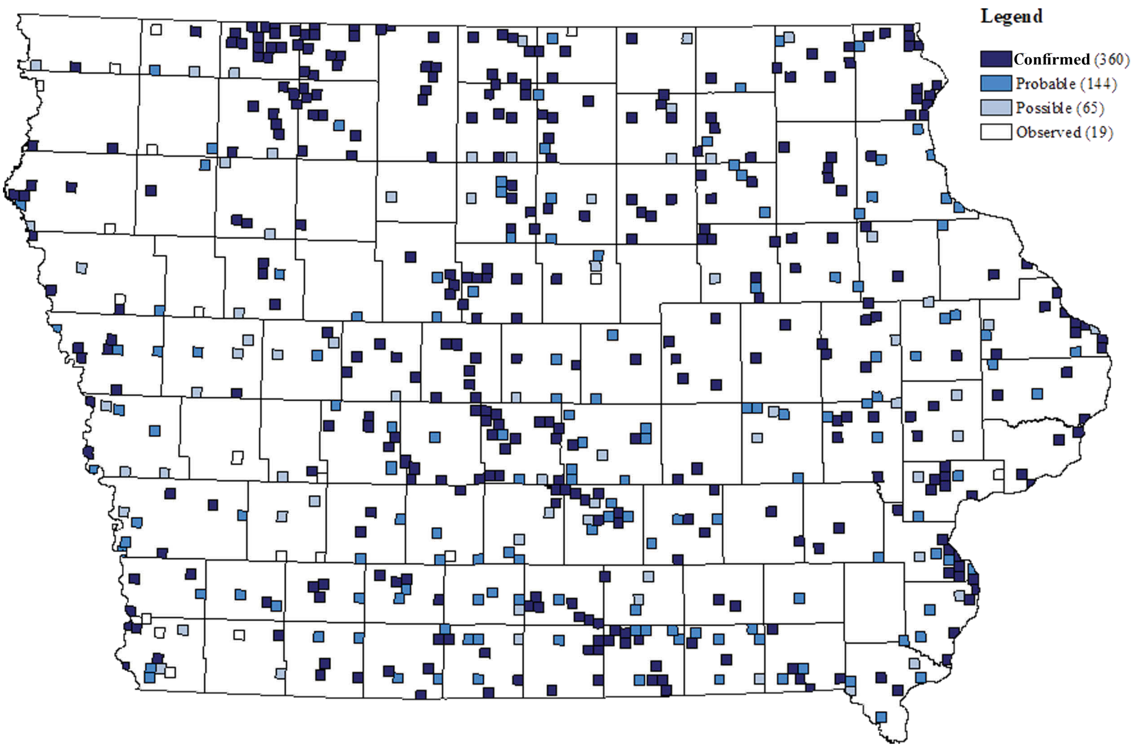
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	12	7	19
Possible	39	26	65
Probable	65	80	145
Confirmed	103	259	362
Conf & Prob	32.20%	85.00%	58.90%

BBA II



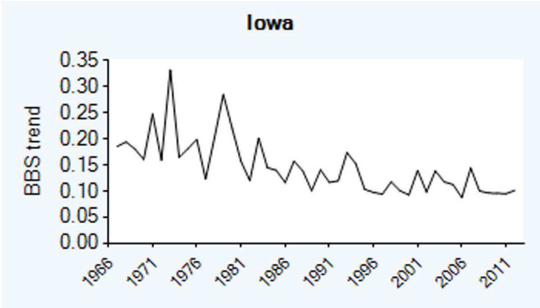
In Memory of Ding Darling (Kirsten Winter)

© Jim Mason

Habitat	Prefers edges of small, shallow wetlands with emergent vegetation
Breeding Dates	1 May (PR)–19 Aug (CO)
Nest Type	Small depression on the ground lined with plant material and down
Clutch Size	8–12 eggs (rarely 6–16)
Incubation	23–24 days
Fledging	35–49 days
Status	Common migrant, uncommon summer resident and breeder
BBS Trend	Stable (trend = −1.0, 95% CI is −5.5, 3.4) [Iowa]

Patterns since BBA I

The Blue-winged Teal is an uncommon breeding bird of Iowa's Prairie Pothole region, with numbers varying annually (Jackson et al. 1996). It was considered the most common breeding waterfowl species through the early 1900s (Anderson 1907, DuMont 1933) and as recently as the 1980s (J. J. Dinsmore et al. 1984) and 1990s (Jackson et al. 1996, Kent and Dinsmore 1996), but now probably ranks third behind the Mallard and Wood Duck. It is a classic breeding bird of prairie wetlands, and numbers fluctuate in response to wetland conditions with declines during drought conditions and increases during wet periods (Rohwer et al. 2020). Upland grassland nesting cover is especially important, and this species responds negatively to burning, grazing, and mowing (Martz 1967), all of which are used in Iowa. The southern edge of this species' breeding range includes Iowa. The BBS data suggest a stable trend in Iowa (Sauer et al. 2012) and a declining regional trend (Sauer et al. 2017).



Blue-winged Teal had a similar pattern of occurrence during both atlas projects. They were found in 264 (33.4%) blocks during BBA II, a modest increase from 182 (21.1%) blocks during BBA I. The confirmation rate was nearly identical (~30%) during both efforts. Not surprisingly, most confirmed reports were from priority/habitat blocks, which is where wetlands preferred by this species are located. Such reports were also concentrated in the Prairie Pothole Region, although there were widely scattered reports from throughout Iowa. Interestingly, there were numerous confirmed reports from the Missouri/Big Sioux rivers in western Iowa during BBA I, but just one confirmation from this area during BBA II. The dense cluster of confirmed reports in north-central and northwestern Iowa during BBA II is perhaps reflective of recent wetland restoration efforts.

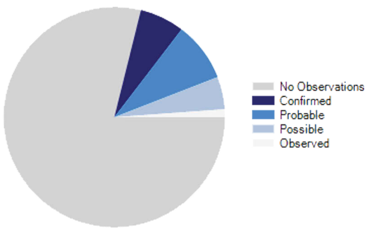
The Blue-winged Teal is a Species of Special Concern and a Species of Greatest Conservation Need in Iowa (Iowa DNR 2015) but has no special designation nationally. This species is hunted in Iowa, where it ranked second in 2017 and 2018 to the Mallard with an estimated annual harvest of ~40,000 birds (Raftovich et al. 2019). It is an early fall migrant, most common in September, and as such it is not among the most commonly harvested waterfowl in North America (Rohwer et al. 2020). Indeed, annual harvests are typically <600,000, with fewer harvested in Canada and Mexico (Rohwer et al. 2020); most teal are taken during a special September teal season (Raftovich et al. 2019). Conservation concerns include the loss and degradation of wetlands used for nesting, ingestion of spent lead shot, and possible exposure to a wide range of contaminants (Rohwer et al. 2020). Despite these concerns, recent wetland restoration and management efforts in Iowa hold promise that this species will remain a fairly common breeding species.

Blue-winged Teal

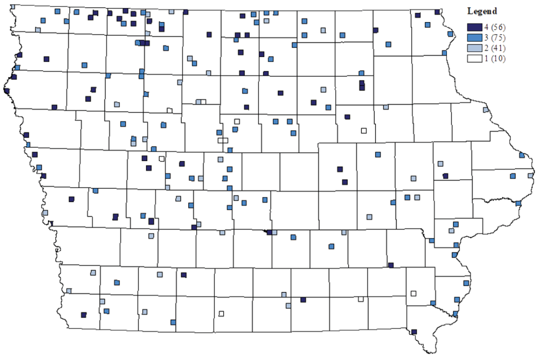
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	6	4	10
Possible	9	32	41
Probable	21	54	75
Confirmed	16	40	56
Conf & Prob	7.10%	23.60%	15.20%

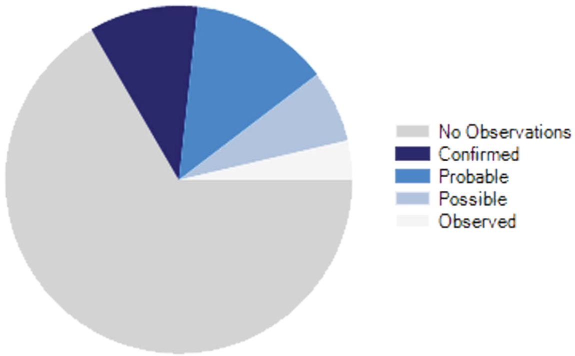
BBA I Results



BBA I



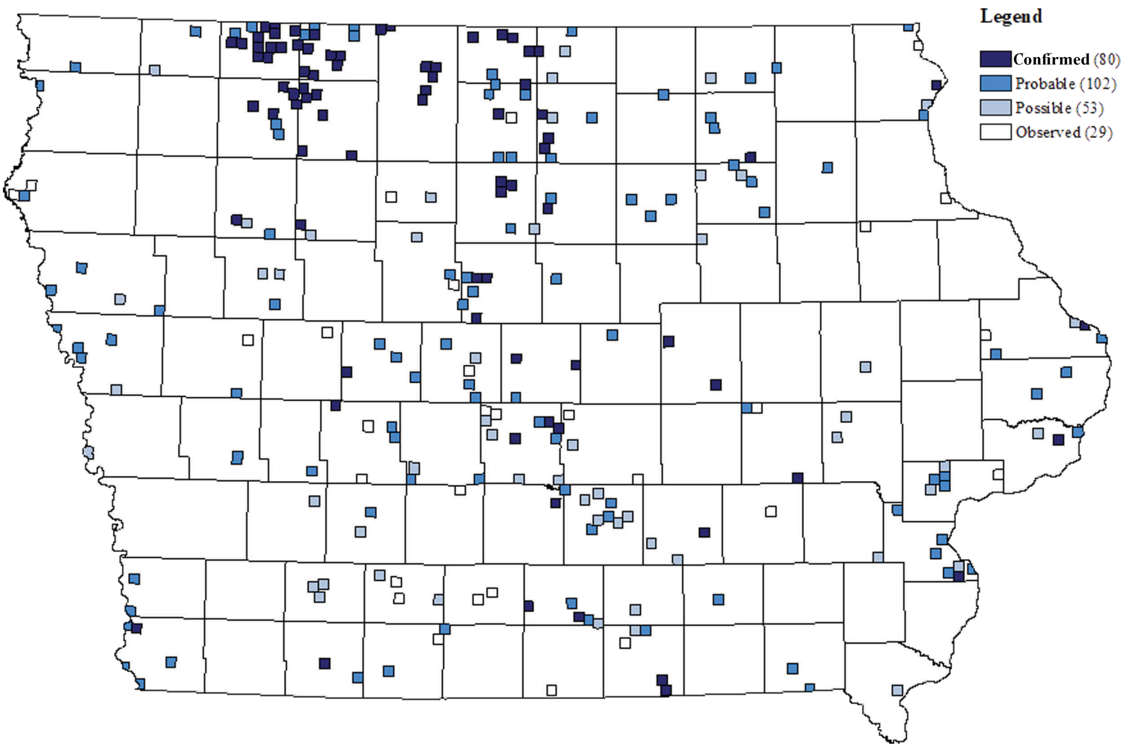
BBA II Results

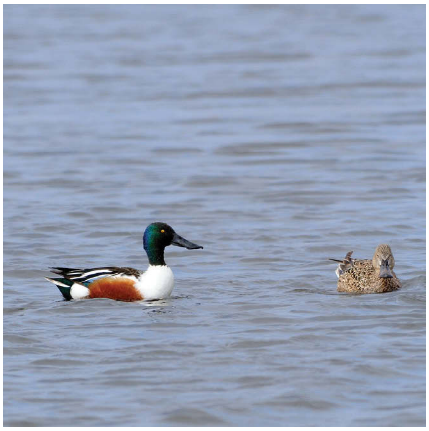


BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	9	20	29
Possible	18	35	53
Probable	29	73	102
Confirmed	14	66	80
Conf & Prob	8.20%	34.80%	21.10%

BBA II

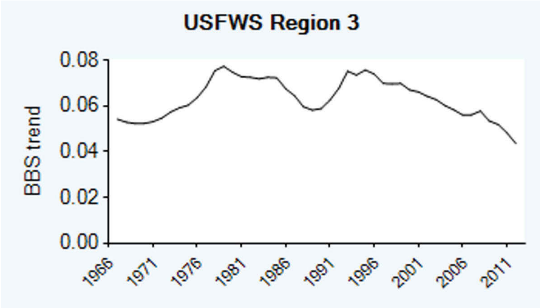




© Linda Petersen

Habitat	Shallow-water wetlands with emergent vegetation
Breeding Dates	24 May (PR)–16 Aug (CO)
Nest Type	Small depression on the ground lined with plant material and down
Clutch Size	8–12 eggs (rarely 7–14)
Incubation	26 days
Fledging	~6–7 weeks
Status	Fairly common migrant, uncommon and increasing summer visitor and breeder
BBS Trend	Increasing (trend = 2.8, 95% CI is 1.1, 4.5) [Central US]

Patterns since BBA I



The Northern Shoveler is an uncommon breeding duck of Iowa's prairie pothole wetlands. The shoveler has a broad Holarctic distribution and unlike other dabbling ducks it has a large, spatulate bill to strain small crustaceans from the water (Dubowy et al. 2020). The continental population is thought to have increased substantially since the mid-1990s, possibly in response to better habitat (Dobowy et al. 2020). In Iowa, this species has probably always been an uncommon breeding duck in north-central and northwestern Iowa with numerous nest and brood records since the 1960s (J. J. Dinsmore et al. 1984, Kent and Dinsmore 1996). Most nests were located during extensive waterfowl research studies in the 1960s and 1980s; recent breeding records all consist of brood sightings. Breeding is mostly in the northern and western portions of Iowa's Prairie Pothole Region with no recent records from central Iowa. The BBS data are insufficient to estimate a trend for Iowa, and this species is stable regionally (Sauer et al. 2017).

The Northern Shoveler was rarely reported during both atlas projects. During BBA II it was reported from 75 (9.5%) blocks, up from 35 (4.1%) blocks during BBA I. The confirmation rate rose slightly from 8.6% during BBA I to 13.3% during BBA II. During BBA II there were ten confirmed reports, seven of them clustered around the Iowa Great Lakes plus three isolated reports from Franklin, Mahaska, and Polk counties. Only one nest was found (Clay County) and most confirmations involved reports of broods. The 27 probable reports were consolidated in the Prairie Pothole Region except for two reports along the Missouri River and one from Chickasaw County. This was a striking increase from just three confirmed and eleven probable reports during BBA I, most of which were also clustered in the Prairie Pothole Region (Jackson et al. 1996). Not surprisingly, most reports were from priority/habitat blocks that contain most of the prairie pothole wetlands preferred by this species.

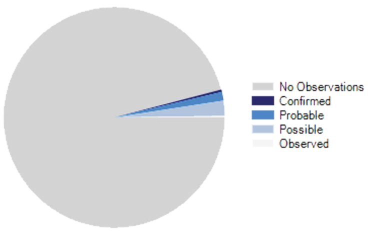
The Northern Shoveler has no special Iowa or national conservation status. The shoveler is a hunted species, mostly in the western and central U.S., although it is considered poor tasting compared to most other ducks (Kear 2005). The Iowa harvest in 2017 and 2018 numbered <5,000 individuals annually (Raftovich et al. 2019). J. J. Dinsmore (1994) does not mention this as a popular target for market hunters through the early 1900s. Conservation efforts are focused on maintaining and restoring wetland nesting habitat and trying to understand what, if any, deleterious effects are suffered from exposure to pesticides and other contaminants (Dobowy et al. 2020). The Northern Shoveler is not one of the emblematic ducks of Iowa's prairie wetlands, but it likely to remain an uncommon nesting species and may even increase in the coming decades.

Northern Shoveler

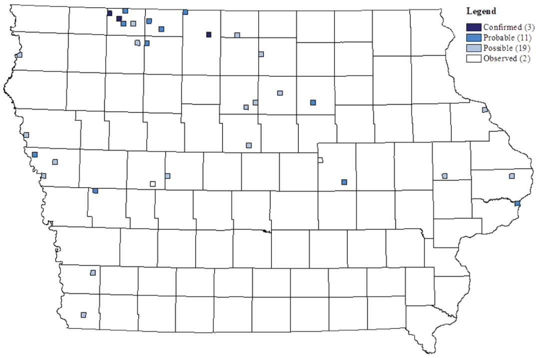
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	2	2
Possible	1	18	19
Probable	3	8	11
Confirmed	1	2	3
Conf & Prob	0.80%	2.50%	1.60%

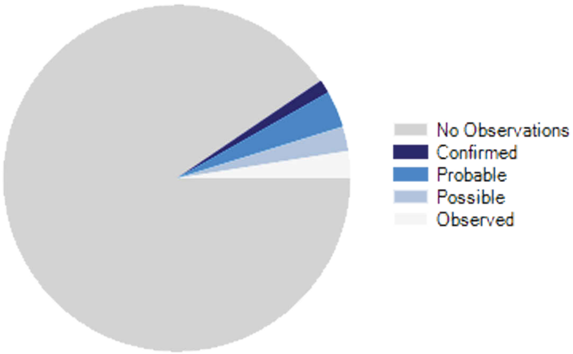
BBA I Results



BBA I



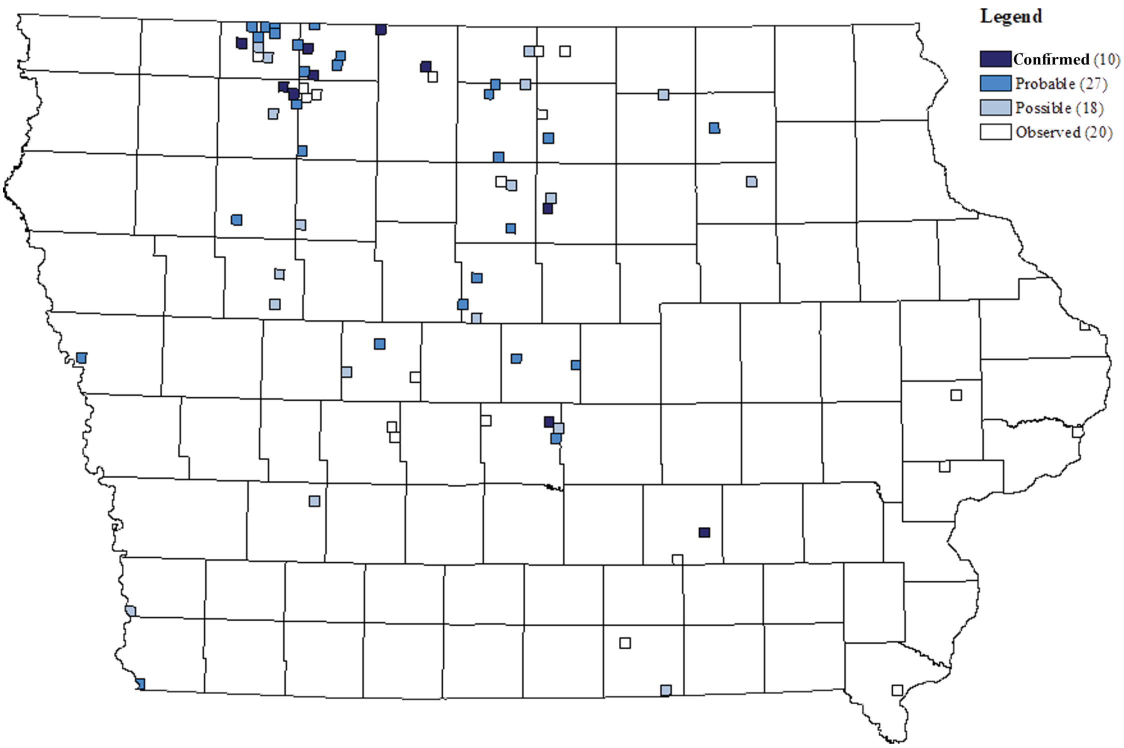
BBA II Results



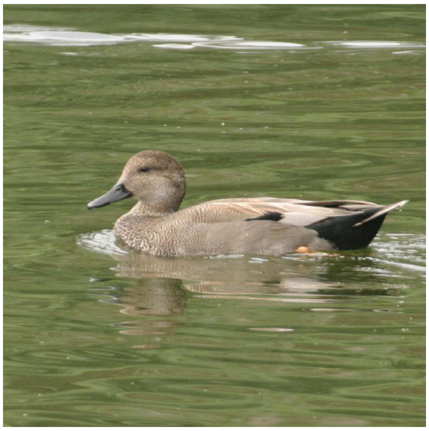
BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	5	15	20
Possible	4	15	19
Probable	4	23	27
Confirmed	1	9	10
Conf & Prob	1.00%	8.00%	4.30%

BBA II



Gadwall *Mareca strepera*

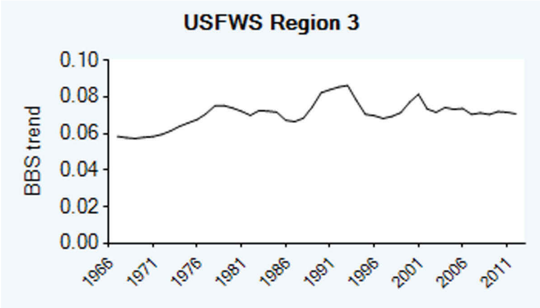


© Reid Allen

Habitat	Wide range of shallow-water wetlands with emergent vegetation
Breeding Dates	12 May (PR)–27 Aug (CO)
Nest Type	Small depression on the ground lined with plant material and down
Clutch Size	8–12 eggs (rarely 7–16)
Incubation	25–27 days
Fledging	ca. 7 weeks
Status	Common migrant, uncommon but increasing summer visitor and breeder
BBS Trend	Increasing (trend = 3.4, 95% CI is 2.3, 4.4) [Central US]

Patterns since BBA I

The Gadwall is an uncommon but increasing summer visitor and breeder in Iowa. Historically, it was most widely distributed in western North America, but in the last few decades has rapidly expanded eastward (Leschack et al. 2020). This expansion coincided with an increase in nesting records from Iowa. Nesting records from the late 1800s and early 1900s are scarce, and the species was most likely a rare to uncommon breeder (Anderson 1907, DuMont 1933, Bennett 1934). This pattern continued through the 1980s with only scattered nesting records, mostly from the Prairie Pothole Region, especially Clay and Palo Alto counties (J. J. Dinsmore et al. 1984, Kent and Dinsmore 1996). There was a noticeable increase in summer season reports beginning in the 1990s, concurrent with more nesting reports in north-central and northwestern Iowa. The BBS data are insufficient to estimate a trend for Iowa, and this species is stable regionally (Sauer et al. 2017).



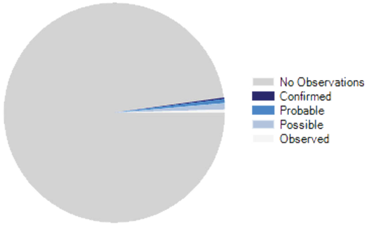
Gadwall showed a marked increase in Iowa during the time spanned by both atlas projects. During BBA II it was reported from 67 (8.5%) blocks, up dramatically from 19 (2.2%) blocks during BBA I. During BBA I there were just two confirmed reports (Dickinson and Kossuth counties), five widely scattered probable reports from northern Iowa, and a handful of possible and observed reports from elsewhere (Jackson et al. 1996). During BBA II it was clear that this species had established as an uncommon breeder in the Prairie Pothole Region, mostly in wetlands around the Iowa Great Lakes. The confirmation rate had nearly tripled to 30% by BBA II. During BBA II there were also isolated confirmations from Audubon and Clinton counties as well as several probable reports from along the Mississippi River in east-central Iowa.

The Gadwall has no special conservation designation in Iowa or nationally. It is a hunted species with most of the harvest in the central and western U.S.; it is the third most harvested duck behind the Mallard and Green-winged Teal (Leschack et al. 2020). The Iowa harvest in 2017 and 2018 was estimated at approximately 10,000 individuals annually, ranking it the sixth most commonly taken duck (Raftovich et al. 2019). Unlike many other dabbling ducks, the Gadwall has experienced recent population increases. Their numbers increased 129% to record levels from 1986 to 1996 concurrent with range expansions into the northwestern United States and eastern Canada (Leschack et al. 2020). It has benefited from human-induced changes to wetlands and the creation of artificial wetlands (Leschack et al. 2020). Threats include risk of over-harvest, exposure to DDT and other contaminants, and the loss of wetlands used for breeding (Leschack et al. 2020). The Gadwall is an adaptable species, however, and it is likely that it will continue to increase as a breeding duck in Iowa in the upcoming decades.

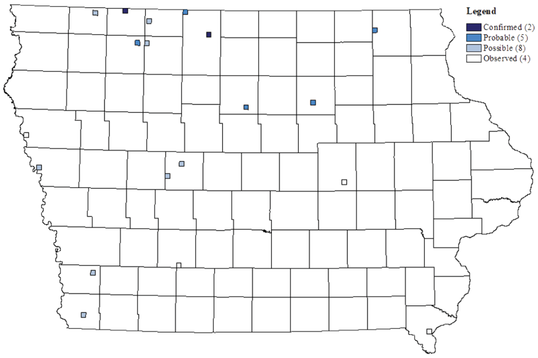
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	4	4
Possible	1	7	8
Probable	2	3	5
Confirmed	1	1	2
Conf & Prob	0.60%	1.00%	0.80%

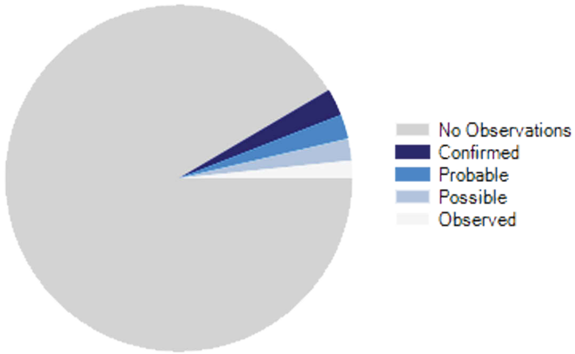
BBA I Results



BBA I



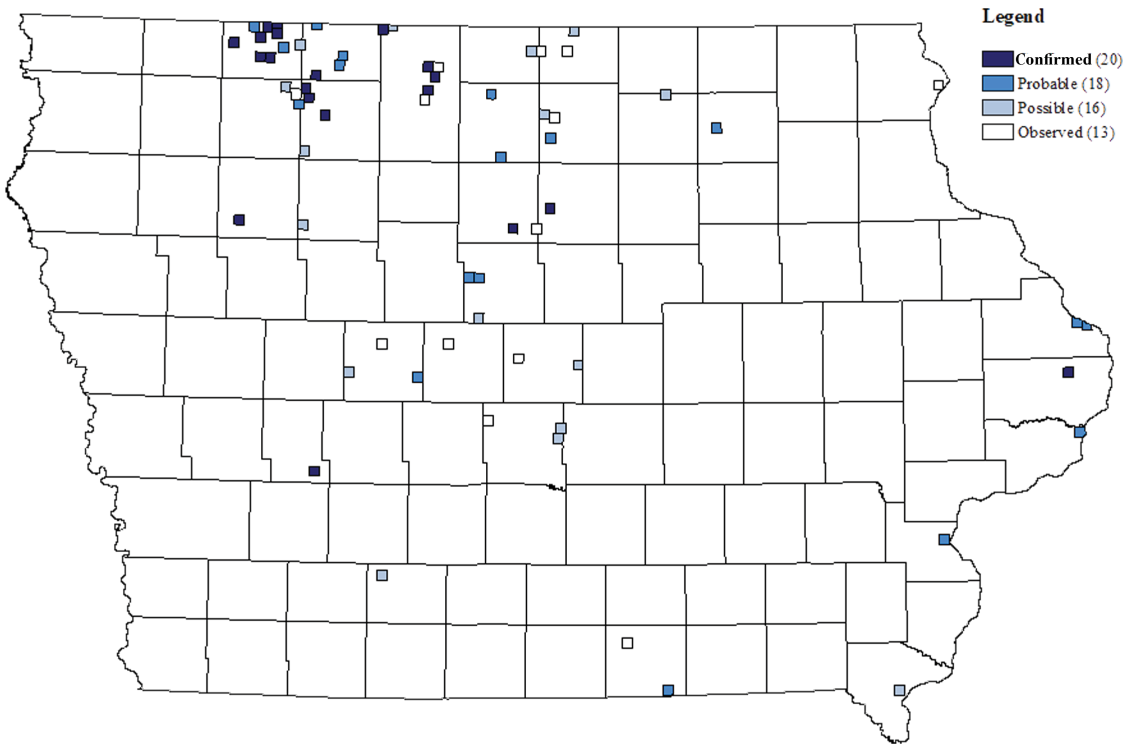
BBA II Results



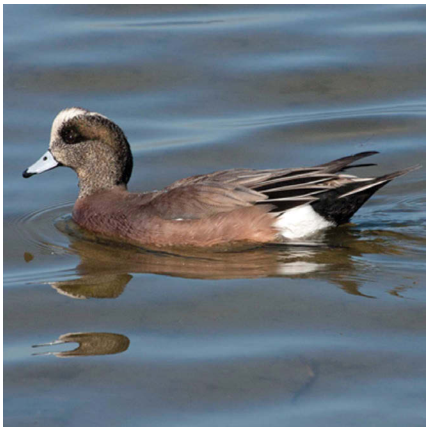
BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	2	11	13
Possible	2	14	16
Probable	2	16	18
Confirmed	3	17	20
Conf & Prob	1.00%	8.30%	4.40%

BBA II



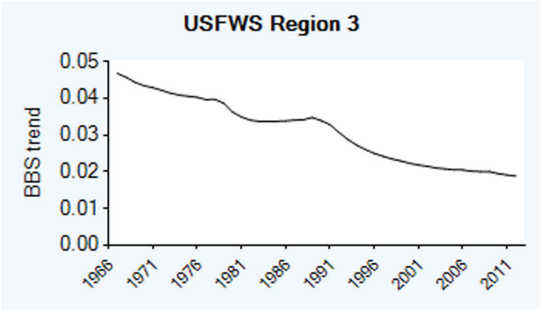
Sponsored by Candace Havely



© Reid Allen

Habitat	Wide range of shallow-water wetlands, especially those with emergent vegetation
Breeding Dates	NA
Nest Type	Small depression on the ground lined with plant material and down
Clutch Size	9–11 eggs (rarely 6–13)
Incubation	24–25 days
Fledging	~6–7 weeks
Status	Fairly common migrant, rare summer visitor and breeder
BBS Trend	Decreasing (trend = −2.5, 95% CI is −3.9, −1.2) [Central US]

Patterns since BBA I



The American Wigeon is an uncommon migrant and very rare Iowa nesting bird. This species has one of the most northerly breeding distributions of any dabbling duck, and its small, goose-like bill is well adapted for grazing on vegetation (Mini et al. 2020). Iowa is well to the south and east of its normal breeding range (Mini et al. 2020), although there are a few nesting records. Kent and Dinsmore (1996) listed six nesting records from Kossuth (2), Mills, Palo Alto, Winnebago, and Worth counties. There are no recent nesting records. Most nesting records are from the Prairie Pothole Region, except for a single record from the Missouri River bottoms. A few are seen in Iowa most summers, although most are thought to be nonbreeding individuals. The BBS data are insufficient to estimate a trend for Iowa, but this species is decreasing slightly nationally (Sauer et al. 2017).

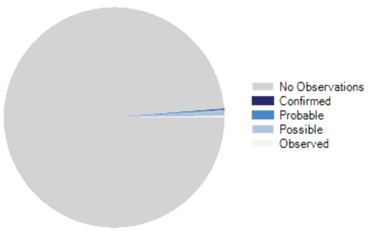
The American Wigeon was scarce in both atlas projects. During BBA II it was reported from just five (0.6%) blocks, down from 11 (1.3%) blocks during BBA I. The BBA II records include three possible reports (Greene, Winnebago, and Wright counties) and two observed reports. All were from habitat blocks. During BBA I there was one confirmed report from a Kossuth County grid block (Jackson et al. 1996). The other reports, all from priority blocks, were one probable, seven possible, and two observed from widely scattered blocks that were mostly in the northern half of the state. Theoretically this species should be most likely in the Prairie Pothole Region, although there are too few records to confirm such a pattern.

The American Wigeon a Species of Greatest Conservation Need (Iowa DNR 2015) but has no special national conservation status. This species has experienced a significant range shift to the north and west since the 1950s with an increase in Alaska balanced by a sharp decline in the Prairie Potholes (Mini et al. 2020). The wigeon is a hunted species, mostly in the western U.S., and harvest is managed by the U.S. Fish and Wildlife Service. The Iowa harvest in 2017 and 2018 numbered fewer than 5,000 individuals annually (Raftovich et al. 2019). It is especially vulnerable to hunting with the use of spinning-wing decoys (Ackerman et al. 2006). Conservation strategies include restoring and managing wetlands in the Prairie Pothole Region where most losses are to agriculture (Mini et al. 2020). Ingestion of organophosphates is also a concern because of this species' grazing habits (Kendall et al. 1992). Despite these concerns, the species' population is relatively stable. It is likely this species will continue as a rare and sporadic Iowa breeding bird.

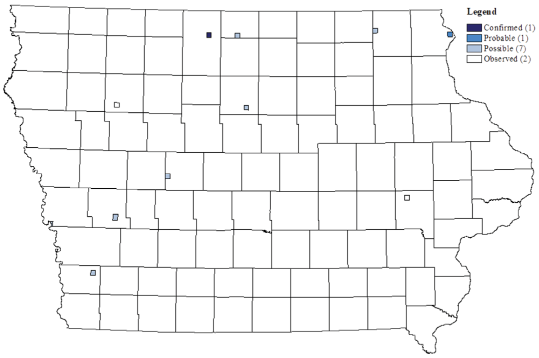
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	2	2
Possible	0	7	7
Probable	0	1	1
Confirmed	1	0	1
Conf & Prob	0.20%	0.30%	0.20%

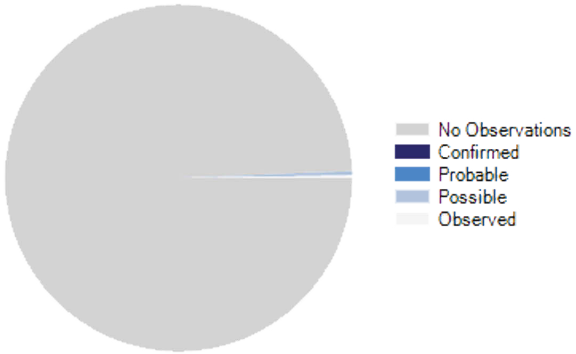
BBA I Results



BBA I



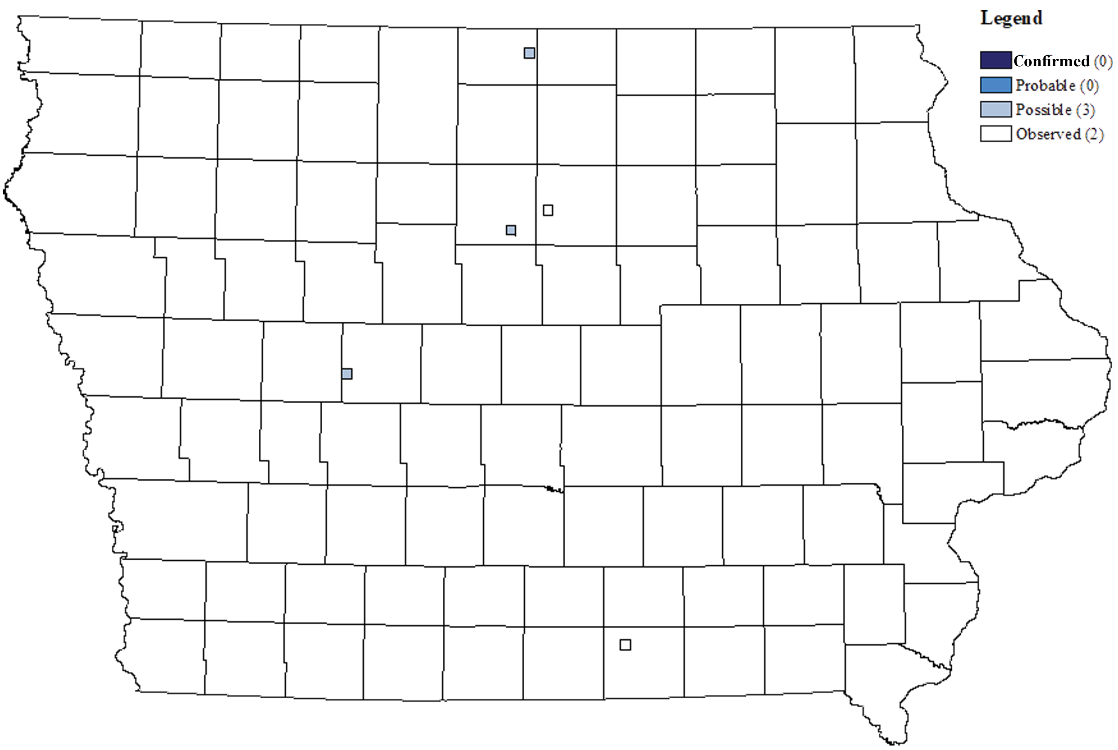
BBA II Results



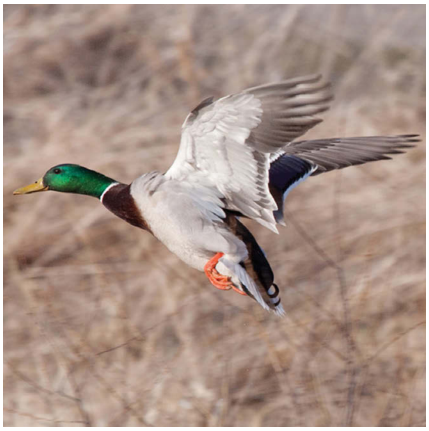
BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	2	2
Possible	0	3	3
Probable	0	0	0
Confirmed	0	0	0
Conf & Prob	0.00%	0.00%	0.00%

BBA II



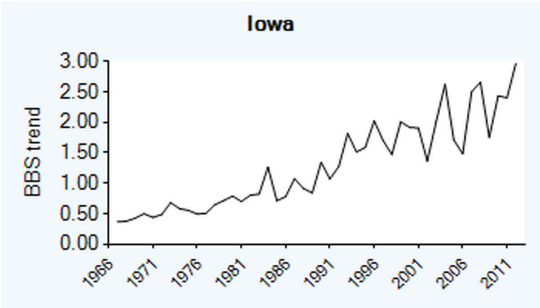
In Honor of Willie Suchy (Karen Kinkead)



© Linda Rudolph

Habitat	Almost any aquatic habitat, especially shallow wetlands
Breeding Dates	1 Apr (PR)–24 Aug (CO)
Nest Type	Small depression on the ground lined with plant material and down
Clutch Size	10–12 eggs (rarely 7–16)
Incubation	26–29 days
Fledging	7–8 weeks
Status	Common breeding bird and uncommon resident
BBS Trend	Increasing (trend = 4.9, 95% CI is 2.4, 8.0) [Iowa]

Patterns since BBA I



The Mallard is one of the two most common waterfowl species in Iowa (along with Canada Goose) where it is a statewide breeding bird (Jackson et al. 1996, Kent and Dinsmore 1996). It is also one of the most familiar and widely distributed dabbling ducks in the world (Drilling et al. 2020). This species was common in Iowa into the early 1900s (Anderson 1907, DuMont 1933), although several observers at that time noted it had declined in recent years. It has always had a statewide distribution, although the center of abundance historically was in wetlands of the Prairie Pothole Region (J. J. Dinsmore et al. 1984). This pattern still holds today, although it has become more common in other parts of Iowa than it was historically (Jackson et al. 1996). It tolerates a wide range of aquatic habitats for nesting including natural lakes and shallow wetlands, rivers and streams, farm ponds, and temporarily flooded agricultural fields. The BBS data suggest an increasing trend in Iowa (Sauer et al. 2012) and a declining regional trend (Sauer et al. 2017).

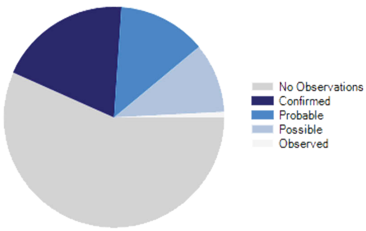
The Mallard had a similar pattern of occurrence during both atlas projects. Breeding was confirmed statewide, except within a small area in extreme northwestern Iowa where water is scarce. Mallards were found in 488 (61.7%) blocks during BBA II, a moderate increase from 373 (43.3%) blocks during BBA I. The confirmation rate was similar (~44%) during both atlas efforts. This species was detected most often in priority/habitat blocks, although less so than many other waterbirds because of its tendency to occupy almost any aquatic habitat. Confirmed reports during BBA II were more concentrated in the Prairie Pothole Region than during BBA I. BBA II also revealed a consolidation of nesting reports from southern Iowa, where the species was less well reported during BBA I. The concentration of confirmations in north-central and northwestern Iowa during BBA II is reflective of recent wetland restoration efforts in those regions.

The Mallard has no special conservation designation in Iowa or nationally. Mallards are the most harvested duck in North America where an estimated 3.5 million individuals, representing 20–25% of the fall population, are killed annually (Drilling et al. 2020). This species is hunted in Iowa, where it ranked first in 2017 and 2018 with an estimated annual harvest of ~50,000 birds; it comprised approximately one-third of Iowa's duck harvest (Raftovich et al. 2019). This species was also the subject of market hunting in the late 1800s and early 1900s, when it was one of the most sought-after species (J. J. Dinsmore 1994). Conservation concerns include the large-scale loss of wetlands, maintaining proper harvest management, ingestion of spent lead shot, and exposure to mercury and other toxins (Drilling et al. 2020). But given its adaptability, the Mallard is likely to remain among the most common waterfowl nesting in Iowa, and we can expect it to continue to consolidate its breeding range across much of southern Iowa.

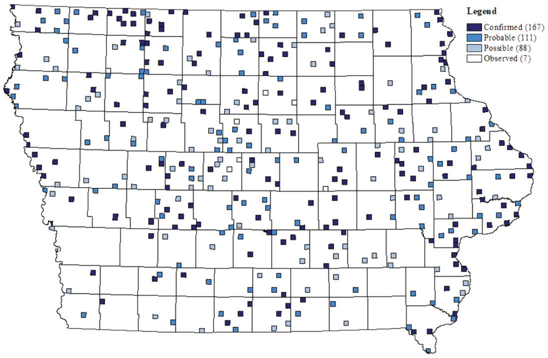
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	6	1	7
Possible	49	39	88
Probable	48	63	111
Confirmed	40	127	167
Conf & Prob	16.90%	47.60%	32.30%

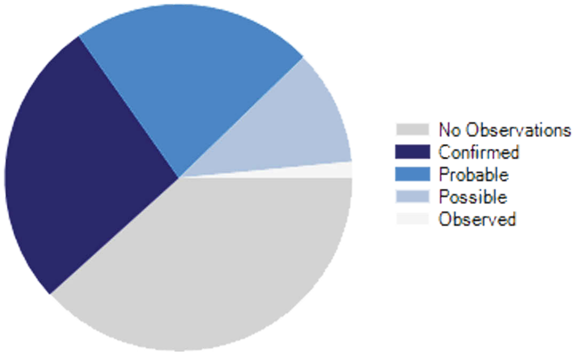
BBA I Results



BBA I



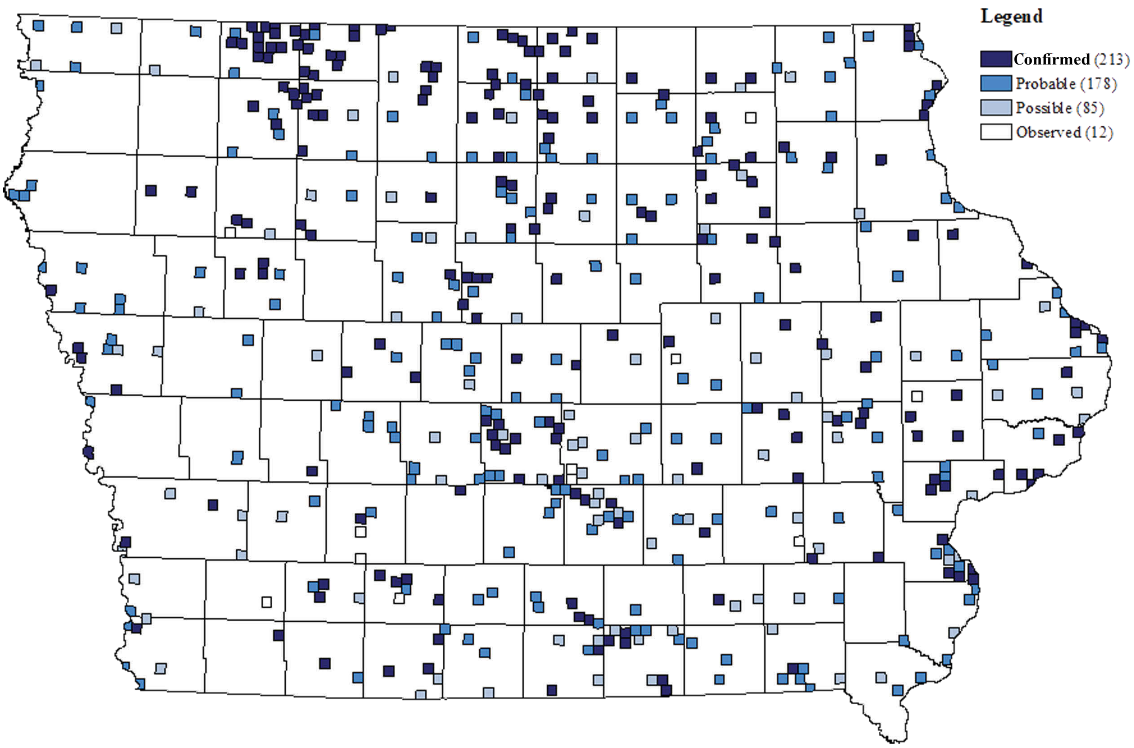
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	6	6	12
Possible	49	36	85
Probable	74	105	179
Confirmed	56	158	214
Conf & Prob	24.90%	65.90%	45.60%

BBA II



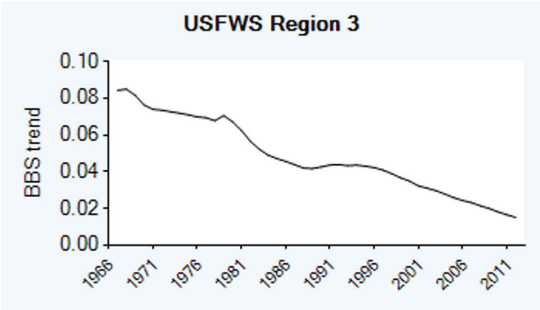
Sponsored by Stephen J. Dinsmore

© Wolf Oesterreich

Habitat	Shallow wetlands, lakes, and flooded forest
Breeding Dates	1 Jun (PR)–1 Jun (PR)
Nest Type	Small depression on the ground lined with plant material and down
Clutch Size	8–10 eggs (rarely 6–15)
Incubation	26–28 days
Fledging	Flight at ~44 days
Status	Uncommon migrant, rare winter and summer resident
BBS Trend	Stable (trend = 2.1, 95% CI is –3.8, 12.6) [Central US]

Patterns since BBA I

The American Black Duck is an uncommon migrant and winter visitor to Iowa with very few breeding records. The five confirmed nesting records are from Buena Vista, Clay, Palo Alto, and Scott counties with the more recent record from 1991 (Kent and Dinsmore 1996). It is possible that one or more of these records involved hybridization with the Mallard (Longcore et al. 2020), which is difficult to confirm because all parental care is by the female only. Summer reports have become quite scarce with the most recent reports from Franklin County in 2014 (J. J. Dinsmore 2014) and from Clay and Hardin counties in 2018 (J. J. Dinsmore 2018). This species is more widespread in eastern North America, and Iowa lies on the western edge of its usual range (Longcore et al. 2020). The BBS data are insufficient to estimate a trend for Iowa, but this species is decreasing regionally and nationally (Sauer et al. 2017).



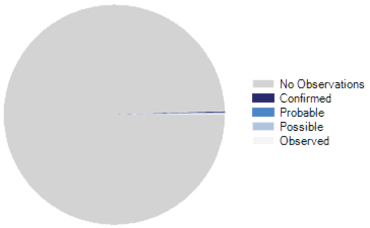
American Black Duck was rarely detected during both atlas projects. During BBA II there was a single probable report from Wright County, a possible report from Tama County, and two observed reports from Allamakee and Wright counties. This compared to BBA I where there were single possible reports from Clay and Palo Alto counties, and one observed report from Wright County (Jackson et al. 1996). All but one of the reports came from habitat and priority blocks. Nesting is most likely in the Prairie Pothole Region, although wetlands along the Mississippi River might also be suitable. While these reports were accepted as being this species, it is possible that some of the reports may have involved hybrids with the Mallard, which is expanding into areas formerly occupied by American Black Ducks (Longcore et al. 2020). Hunter harvest data confirm that hybridization occurs in the Mississippi Flyway, which includes Iowa (Longcore et al. 2020).

The American Black Duck does not have any formal Iowa or national conservation status, although it is the focus of conservation efforts through the Black Duck Joint Venture of the North American Waterfowl Management Plan that was established in 1989 (U.S. Fish and Wildlife Service 1994). This species is rarely hunted in Iowa, with an estimated annual harvest in 2017 and 2018 of <200 birds (Raftovich et al. 2019). One conservation concern has been possible genetic swamping by the Mallard, although this increasingly seems less plausible as a key concern because this species is not geographically isolated, over-harvested, or limited by nesting habitat (Young et al. 1997). This species will probably never be a regular breeder in Iowa, although recent wetland restoration efforts may produce more future nesting records.

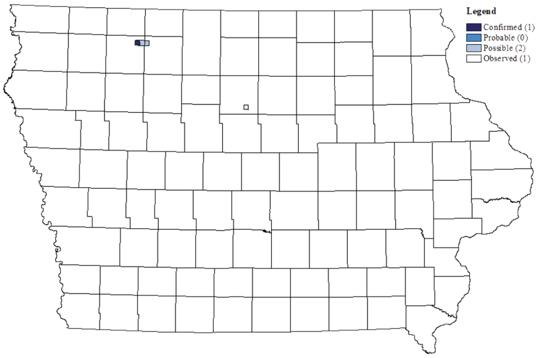
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	1	1
Possible	1	1	2
Probable	0	0	0
Confirmed	0	1	1
Conf & Prob	0.00%	0.30%	0.10%

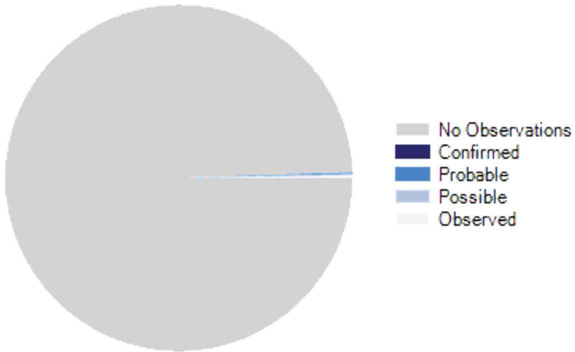
BBA I Results



BBA I



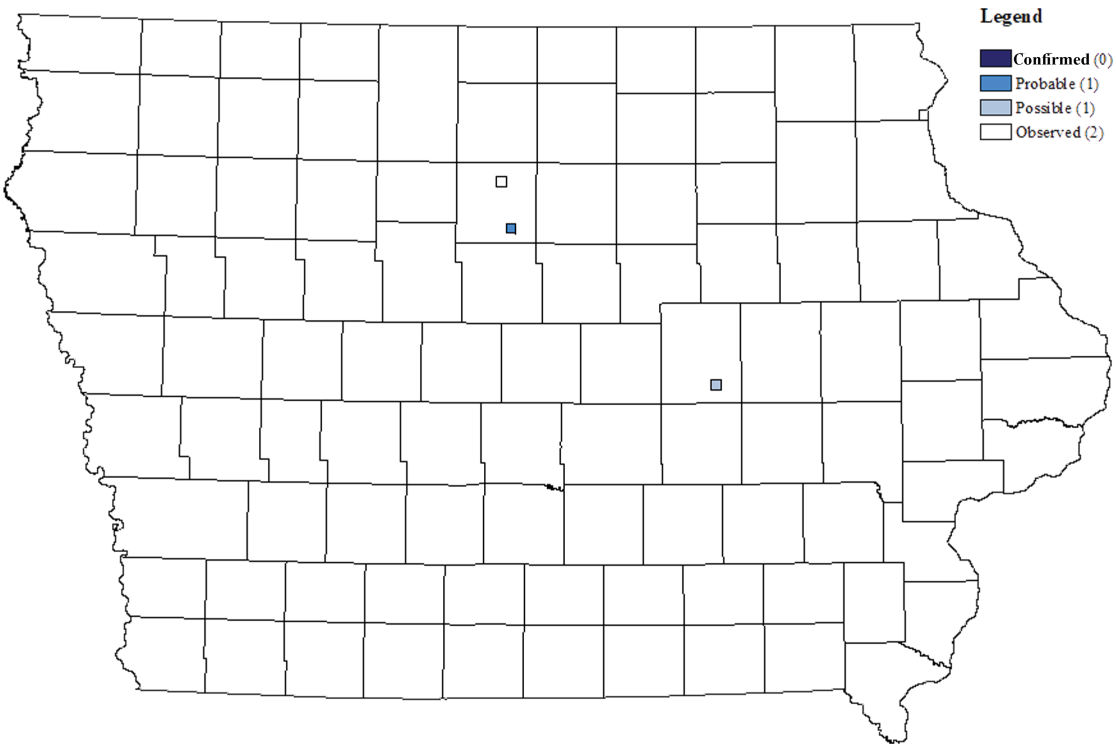
BBA II Results



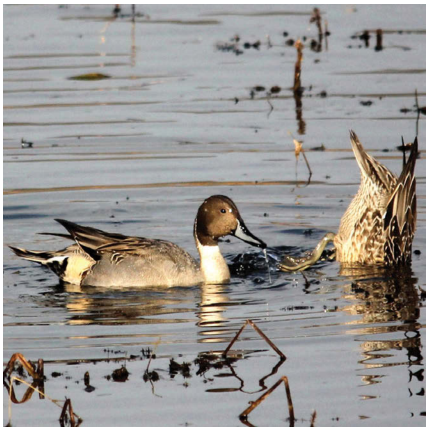
BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	2	2
Possible	0	1	1
Probable	0	1	1
Confirmed	0	0	0
Conf & Prob	0.00%	0.30%	0.10%

BBA II



In Memory of Mary Beth Hunt (Paul Roisen)

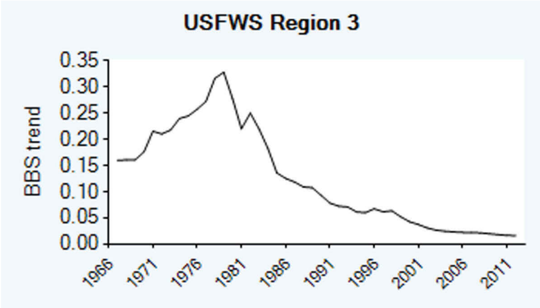


© Doug Harr

Habitat	Shallow-water wetlands with emergent vegetation
Breeding Dates	5 May (PR)–1 Aug (CO)
Nest Type	Small depression on the ground lined with plant material and down
Clutch Size	7–9 eggs (rarely 6–12)
Incubation	26–29 days
Fledging	~7–8 weeks
Status	Fairly common migrant, rare summer visitor and breeder
BBS Trend	Stable (trend = –0.8, 95% CI is –3.4, 1.1) [Central US]

Patterns since BBA I

The Northern Pintail is a rare breeding bird of Iowa's prairie wetlands, which lie on the southern edge of the species' breeding distribution (Clark et al. 2020). It is noted for its slender appearance, has the broadest distribution of any duck species (Bellrose 1980), and has experienced precipitous population declines since the 1970s (Clark et al. 2020). It was probably never a common nesting bird in Iowa, although historical data are sparse. Only sporadic reports of nesting occurred in the early and mid-1900s (J. J. Dinsmore et al. 1984). Since the 1960s there are few firm nesting records, mostly from the northern Prairie Pothole Region but also south to Guthrie and Harrison counties (Anderson 1907, DuMont 1933, Kent and Dinsmore 1996). Recent breeding records include two broods in Kossuth County in 2007 (J. J. Dinsmore 2007) and Osceola County in 2012 (J. J. Dinsmore 2012). There have been no reports of nesting since BBA II. A few are seen in Iowa most summers, although most are thought to be nonbreeding individuals. The BBS data are insufficient to estimate a trend for Iowa, but this species is sharply decreasing regionally (Sauer et al. 2017).



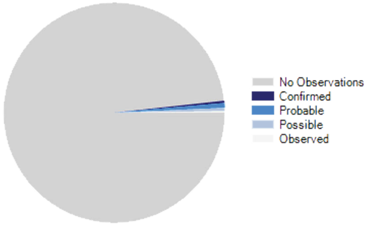
The Northern Pintail was rarely reported during both atlas projects. During BBA II it was reported from 22 (2.8%) blocks, up from 15 (1.7%) blocks during BBA I. The confirmation rate (~20%) was low during both atlas efforts. During BBA II there were five confirmed reports, all from the northern tier of counties in the Prairie Pothole Region in Dickinson, Kossuth (2), Osceola, and Worth counties. There were three probable reports from further south, plus a mix of observed and possible reports from locations where breeding was unlikely. This contrasted with a less clear pattern during BBA I, which included just three confirmed reports (Cerro Gordo, Dickinson, and Kossuth counties), six widely scattered probable reports, and fewer observed and possible reports (Jackson et al. 1996). Not surprisingly, most reports were from priority/habitat blocks that contain most of the prairie pothole wetlands preferred by this species.

The Northern Pintail is a Species of Greatest Conservation Need in Iowa (Iowa DNR 2015) but has no special national conservation status. The pintail is a hunted species, mostly in the western United States, and harvest is managed by the U.S. Fish and Wildlife Service. The Iowa harvest in 2017 and 2018 numbered fewer than 6,000 individuals annually (Raftovich et al. 2019). Most of the harvest is concentrated in California, Louisiana, and Texas and varies annually (Miller and Duncan 1999). J. J. Dinsmore (1994) does not mention this as a popular target for market hunters through the early 1900s. Conservation strategies include restoring and managing wetlands in the Prairie Pothole Region especially (Clark et al. 2020) and restoring and protecting upland nesting habitat (Miller and Duncan 1999). The pintail has never been a common Iowa nesting bird, but perhaps it will persist on natural and restored prairie pothole wetlands across the northern part of the state.

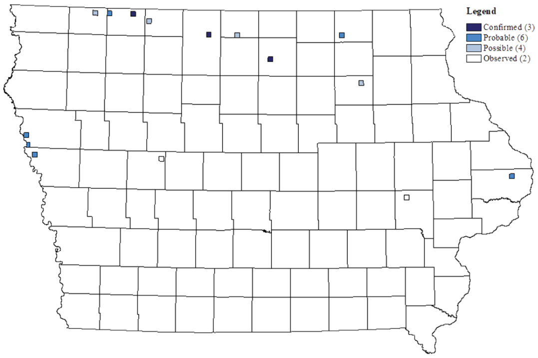
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	2	2
Possible	1	3	4
Probable	1	5	6
Confirmed	2	1	3
Conf & Prob	0.60%	1.50%	1.00%

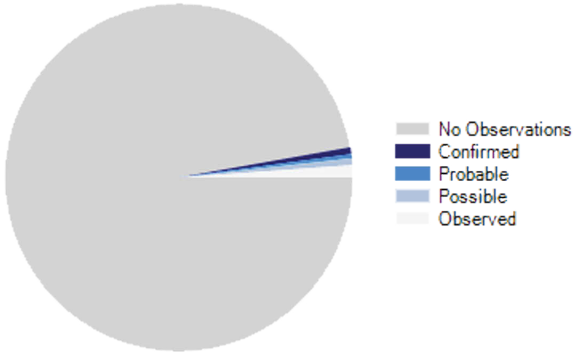
BBA I Results



BBA I



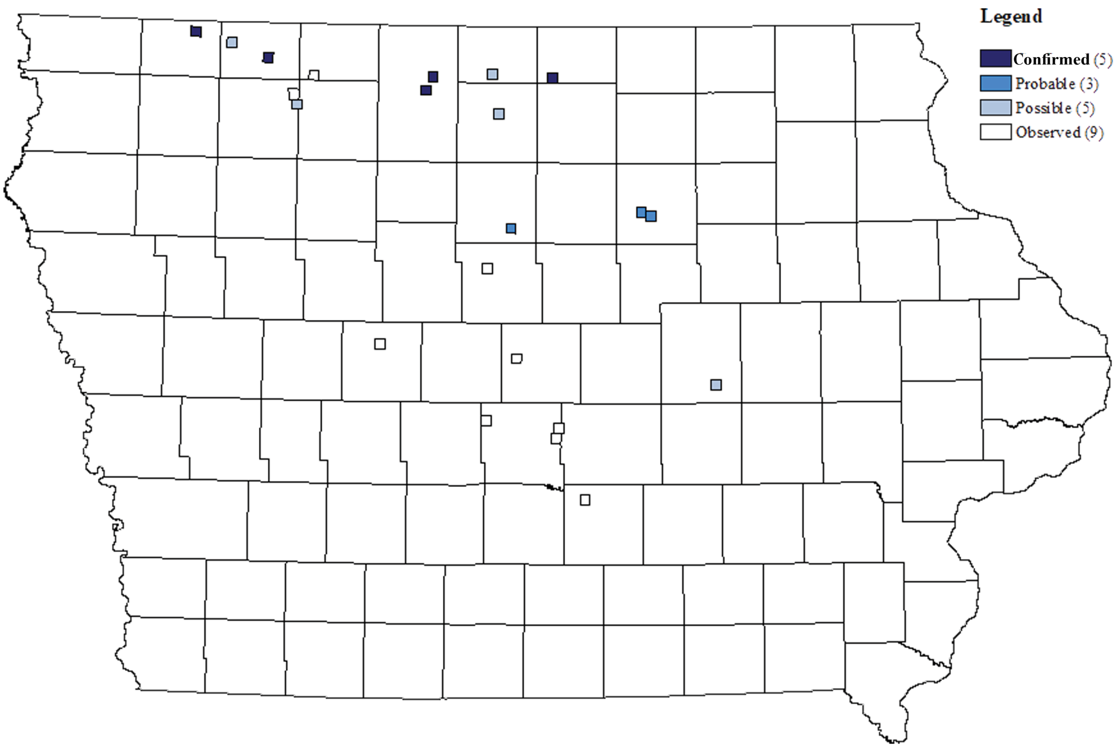
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	3	6	9
Possible	0	5	5
Probable	0	3	3
Confirmed	3	2	5
Conf & Prob	0.60%	1.30%	0.90%

BBA II

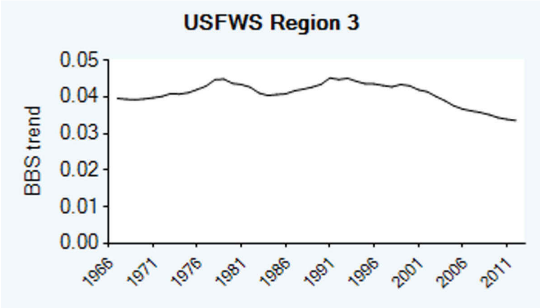


Sponsored by Stan Buman

Habitat	A wide range of shallow-water wetlands with emergent vegetation
Breeding Dates	24 May (PR)–6 Aug (CO)
Nest Type	Small depression on the ground lined with plant material and down
Clutch Size	10–12 eggs (rarely 6–18)
Incubation	23–24 days
Fledging	~44 days
Status	Fairly common migrant, rare summer visitor and breeder
BBS Trend	Stable (trend = –0.3, 95% CI is –3.1, 1.4) [Central US]

Patterns since BBA I

The Green-winged Teal is a rare breeding bird of Iowa's prairie wetlands. Iowa is south of the species' normal breeding range and there is no evidence it has ever been anything other than a rare breeding bird. This is North American's smallest dabbling duck, and it's breeding range encompasses forested wetlands at northern latitudes; it is less common in prairie wetlands than other dabbling ducks (Johnson et al. 2020). It is regularly reported from Iowa in summer, although breeding records are scarce (Dinsmore et al. 1984, Kent and Dinsmore 1994). Historical evidence for nesting is scant with some listing no breeding evidence while others noted it as a breeding bird (Anderson 1907, Jackson et al. 1996). The most recent breeding record prior to BBA II was from Story County in 2004 (J. J. Dinsmore 2004); there were scattered breeding records in the prior two decades, mostly from the Prairie Pothole Region. There have been no confirmed nesting records since BBA II, an indication of this species' rarity as an Iowa breeding bird. Breeding Bird Survey data are insufficient to estimate a trend for Iowa, but this species is stable regionally (Sauer et al. 2017).



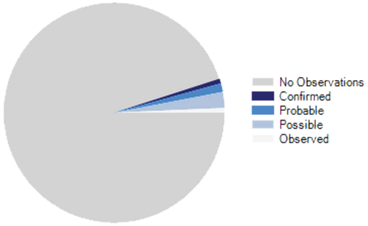
The Green-winged Teal was only rarely reported during both atlas efforts. During BBA II it was reported from 33 (4.2%) blocks, down slightly from 43 (5%) blocks during BBA I. Both atlas efforts showed a small cluster of records from the Prairie Pothole Region, which included all seven confirmed records in BBA II and two of six confirmed records in BBA I (Jackson et al. 1996). The seven confirmations were in two clusters in BBA II with three reports from Dickinson/Emmet counties and the other four from Cerro Gordo, Franklin, and Wright counties. Most reports during BBA II (22 of 33) were in the observed and possible categories and were unlikely to represent nesting individuals. Indeed, all probable and confirmed reports in BBA II were from the Prairie Pothole Region.

The Green-winged Teal has no special conservation designation in Iowa or nationally. The Green-winged Teal is a hunted species but is most commonly taken in areas to the west of Iowa; it is the second most harvested duck species in North America (Baldassarre and Bolen 1994). The Iowa harvest in 2017 and 2018 was estimated at approximately 20,000 individuals annually, ranking it the fourth most commonly taken duck (Raftovich et al. 2019). This species has been poorly studied relative to most other waterfowl and little is known about threats. Its breeding habitat seems intact except near the southern portion of its range (Johnson et al. 2020). Harvest management and risks from contaminants and spent lead shot have also been suggested as threats to this species (Johnson et al. 2020). Iowa is at the southern edge of this species' breeding range, so the Green-winged Teal is likely to remain a rare and erratic breeding bird of prairie pothole wetlands.

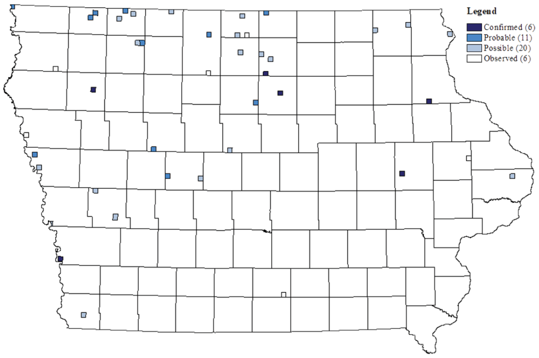
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	4	2	6
Possible	4	16	20
Probable	5	6	11
Confirmed	3	3	6
Conf & Prob	1.50%	2.30%	2.00%

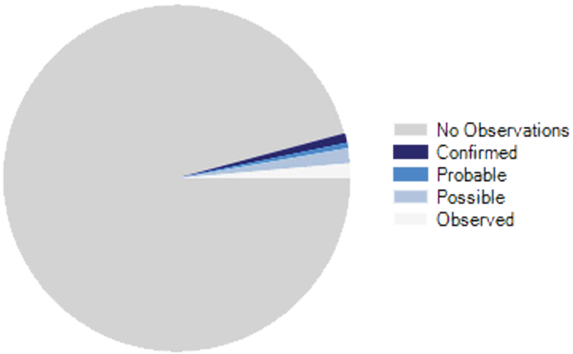
BBA I Results



BBA I



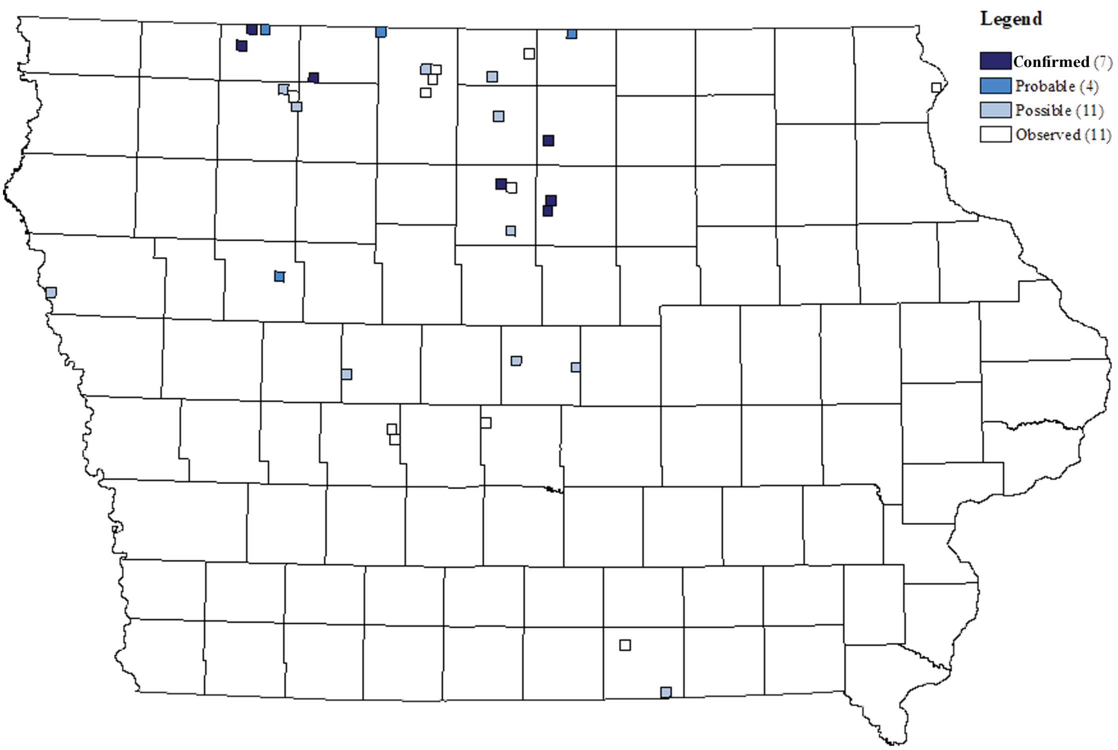
BBA II Results



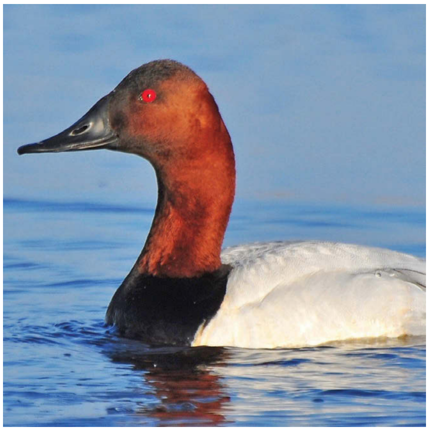
BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	2	9	11
Possible	1	10	11
Probable	1	3	4
Confirmed	2	5	7
Conf & Prob	0.60%	2.00%	1.30%

BBA II



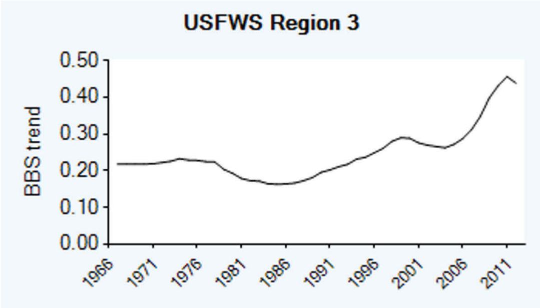
Sponsored by Stan Buman



© Lowell Washburn

Habitat	Large shallow-water wetlands with emergent vegetation
Breeding Dates	NA
Nest Type	Small depression on the ground lined with plant material and down
Clutch Size	7–9 eggs
Incubation	24–27 days
Fledging	~10–12 weeks
Status	Uncommon migrant, very rare summer visitor and breeder
BBS Trend	Stable (trend = 2.0, 95% CI is –0.4, 4.7) [Central US]

Patterns since BBA I



The Canvasback is a rare summer visitor and breeding bird of Iowa's larger prairie wetlands. It is a large duck of the Canadian prairies and parklands, and much of the continental population stages during migration along the Mississippi River in eastern Iowa (Mowbray 2020). During most summers a few individuals are noted with records concentrated in the Prairie Pothole Region; smaller numbers occur along the Mississippi River and elsewhere in the state. These probably represent injured or nonbreeding birds. Its history as a nesting bird in Iowa is not well known, but it was apparently absent through the 1930s (Anderson 1907, DuMont 1933). The first nesting record was in 1937 in Clay County (Bennett 1937). Kent and Dinsmore (1996) summarized a regular pattern of nesting from the 1960s through the 1990s, after which nesting records declined. Recent nesting records include broods in 1996 in Kossuth County (J. J. Dinsmore 1996), in 2004 in Hancock County (J. J. Dinsmore 2004), and in 2014 in Kossuth County (J. J. Dinsmore 2014). The only modern nest record is from 1988 in Osceola County, said to be the first found in 50 years (J. J. Dinsmore 1988). The BBS data are insufficient to estimate a trend for Iowa, but this species is stable regionally (Sauer et al. 2017).

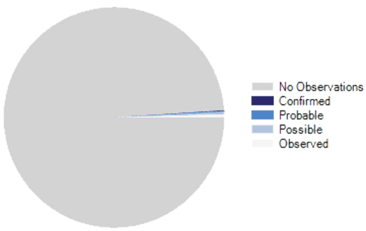
The Canvasback was sparsely reported during both atlas projects. It was found in five (0.6%) blocks during BBA II, similar to nine (1%) blocks during BBA I (Jackson et al. 1996). During BBA II, there were no confirmed reports; all reports were either possible (3) or observed (2). None were reported from the Prairie Pothole Region during BBA II, and all the reports probably pertained to injured or nonbreeding individuals. The pattern during BBA I differed with one confirmed report from Osceola County, a probable report from Palo Alto County, and three possible reports from elsewhere in the Prairie Pothole Region (Jackson et al. 1996). Indeed, all but a report from Union County came from north-central and northwestern Iowa in this species' expected breeding range. Most reports were from priority and habitat blocks that include large, natural prairie wetlands.

The Canvasback is a Species of Greatest Conservation Need in Iowa (Iowa DNR 2015) but has no special conservation designation nationally. The Canvasback is a hunted species and is much prized for its taste (J. J. Dinsmore 1994). This species was a highly prized target of market hunters in Iowa in the late 1800s and early 1900s; prices went as high as $36 per dozen in the 1890s (J. J. Dinsmore 1994). The Iowa harvest in 2017 and 2018 was estimated at <3,000 individuals annually, no doubt a result of its concentration along the Mississippi River and the restrictive harvest regulations (Raftovich et al. 2019). Mortality due to hunting appears to be additive, so harvest regulations for this species are carefully managed with frequent changes in response to population fluctuations (Mowbray 2020). The greatest harvest is in the Mississippi Flyway, where the season has been periodically closed (Mowbray 2020). Other conservation concerns include exposure to pesticides and other toxicants, ingestion of spent lead shot, the degradation and elimination of breeding and wintering habitat, and disturbance at staging and wintering areas (Mowbray 2020). The Canvasback is likely to remain a rare Iowa nesting bird, although recent efforts such as the Shallow Lakes Restoration Project (Geisthardt et al. 2013) hold hope that a few may occasionally nest on Iowa's large natural wetlands.

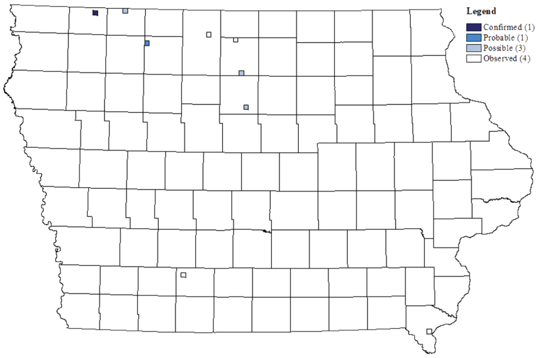
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	2	2	4
Possible	0	3	3
Probable	0	1	1
Confirmed	1	0	1
Conf & Prob	0.20%	0.30%	0.20%

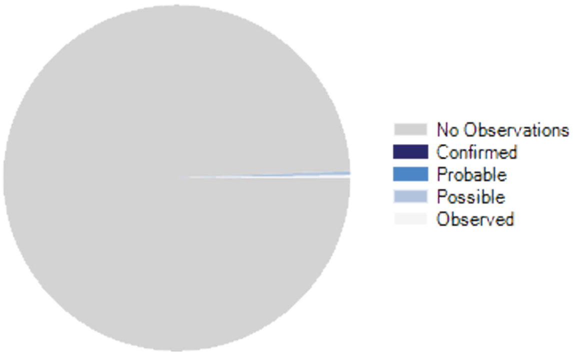
BBA I Results



BBA I



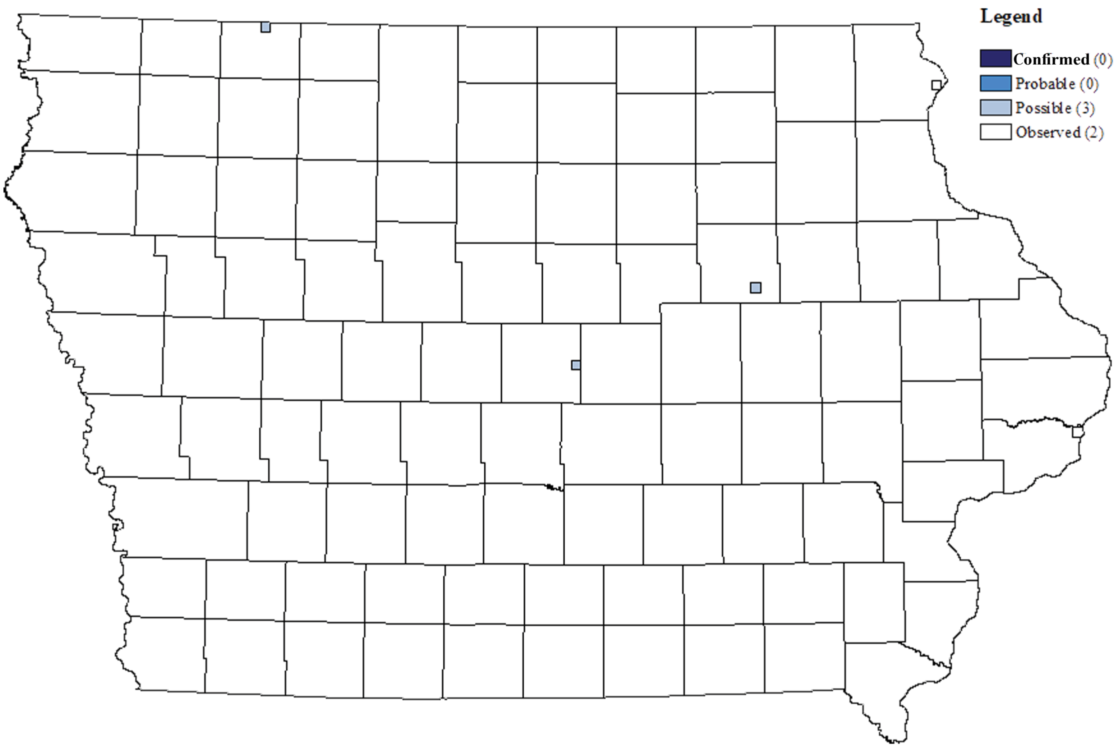
BBA II Results



BBA II (2008–2012) Breeding Evidence

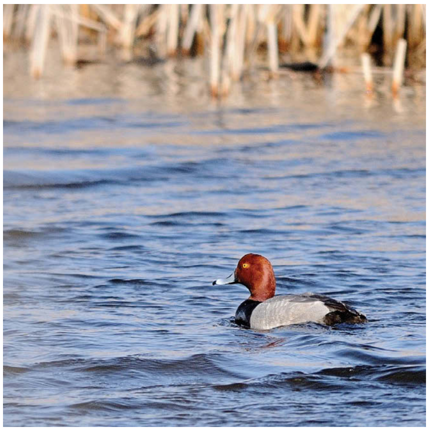
Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	1	1	2
Possible	0	3	3
Probable	0	0	0
Confirmed	0	0	0
Conf & Prob	0.00%	0.00%	0.00%

BBA II



In Memory of Irene Alexander (Diane Dentlinger)

Redhead *Aythya americana*

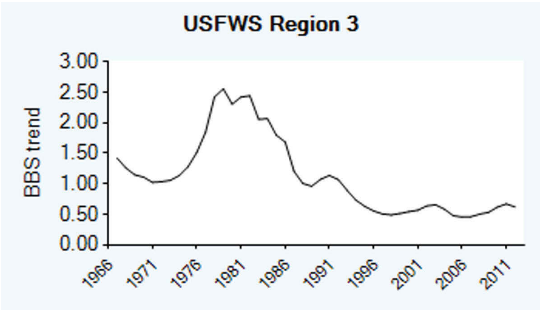


© Linda Petersen

Habitat	Primarily shallow-water wetlands with emergent vegetation
Breeding Dates	24 May (PR)–1 Aug (PR)
Nest Type	Small depression on the ground lined with plant material and down
Clutch Size	10–15 eggs
Incubation	24 days
Fledging	56–73 days
Status	Uncommon migrant and summer visitor, erratic breeder
BBS Trend	Increasing (trend = 2.8, 95% CI is 0.6, 5.0) [Central US]

Patterns since BBA I

The Redhead is an uncommon and erratic nesting bird of Iowa's prairie pothole wetlands. This species is a breeding bird of the Prairie Pothole Region and western United States and concentrates in winter in coastal marshes along the Gulf Coast (Woodin and Michot 2020). This species is notable because it has reproductive strategies that include facultative brood parasitism with Canvasback as the host as well as dual interspecific brood parasitism with the Ruddy Duck (Weller 1959, Joyner 1973). Breeding was unknown in Iowa until a small population was discovered in Clay County in 1933 (DuMont 1933). Since then small numbers have bred regularly on prairie potholes in north-central and northwestern Iowa plus a few records from Fremont and Mills counties in southwestern Iowa (Bennett 1938, Kent and Dinsmore 1996). J. J. Dinsmore et al. (1984) called them a common nesting bird in Clay and Palo Alto counties. The few recent nest reports have included evidence of parasitism by the Ruddy Duck (S. J. Dinsmore pers. obs.). This species is widely reported as a nonbreeding summer visitor in Iowa, including large concentrations such as 141 on 27 June 2008 at Diamond Lake in Dickinson County (J. J. Dinsmore 2008). Some summers there are few to no reports, however, which is a hint of its erratic summer presence in Iowa. The BBS data are insufficient to estimate a trend for Iowa, but this species has declined regionally (Sauer et al. 2017).



The Redhead was sparsely reported during both atlas projects. It was found in 26 (3.3%) blocks during BBA II, similar to 21 (2.4%) blocks during BBA I (Jackson et al. 1996). During BBA II there were six confirmed reports, all from the Prairie Pothole Region in Cerro Gordo, Dickinson (3), Franklin, and Kossuth counties. All confirmed reports were of broods. The nine probable reports were also confined to the Prairie Pothole Region except for a single report in Fremont County. The observed and possible reports were more widely scattered, most in areas where this species is unlikely to breed. In both atlas projects most reports were from priority/habitat blocks that contain the large, natural wetlands favored by this species.

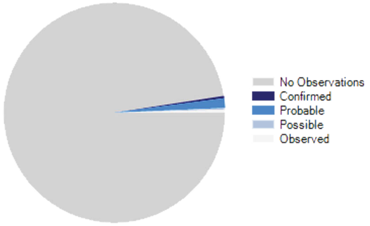
The Redhead is a Species of Greatest Conservation Need in Iowa (Iowa DNR 2015) but has no special conservation designation nationally. The Redhead is a hunted species, although it is more commonly hunted in the western United States and along the Gulf Coast (Woodin and Michot 2020). This species was targeted by market hunters in Iowa in the late 1800s and early 1900s when it sold for up to $10 per dozen, second in price only to the Canvasback (J. J. Dinsmore 1994). The Iowa harvest in 2017 and 2018 was estimated at <1,500 individuals annually (Raftovich et al. 2019). Primary conservation concerns include the loss and degradation of prairie wetlands and the loss of submerged aquatic vegetation at some wintering sites such as the Chesapeake Bay (Woodin and Michot 2020). The Redhead will probably continue to be an uncommon and erratic breeding bird in Iowa, where the restoration of large wetlands may prove beneficial (Geisthardt et al. 2013).

Redhead

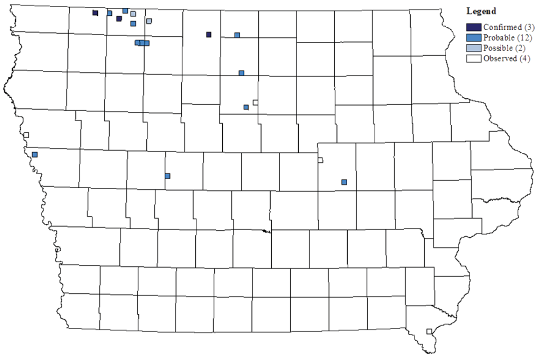
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	1	3	4
Possible	1	1	2
Probable	1	11	12
Confirmed	2	1	3
Conf & Prob	0.60%	3.00%	1.70%

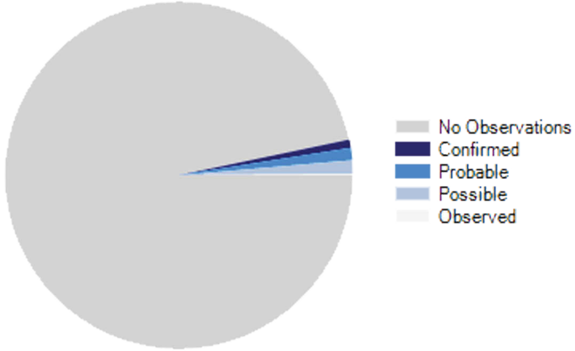
BBA I Results



BBA I



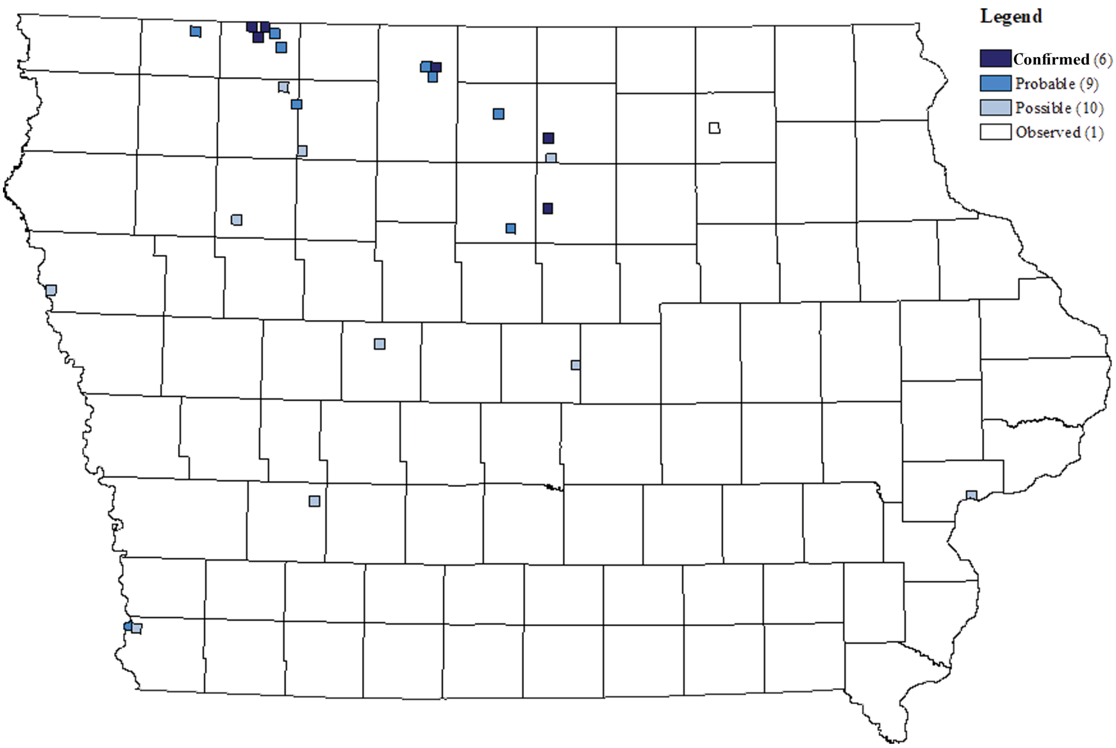
BBA II Results



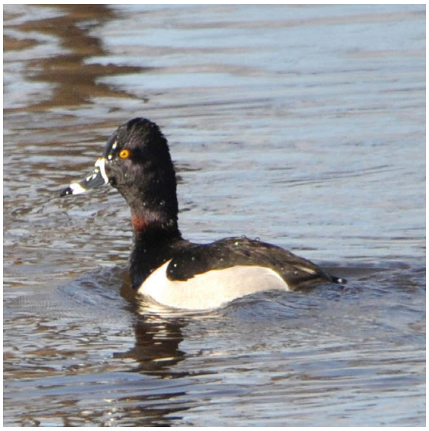
BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	1	1
Possible	1	9	10
Probable	3	6	9
Confirmed	0	6	6
Conf & Prob	0.60%	3.00%	1.70%

BBA II

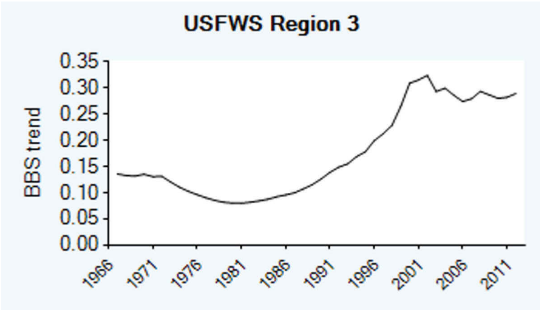


Sponsored by Kevin Murphy



Habitat	A wide range of lakes and shallow-water wetlands
Breeding Dates	24 May (PR)–28 Jun (PR)
Nest Type	Small depression on the ground lined with plant material and down
Clutch Size	6–12 eggs
Incubation	26 days
Fledging	49–56 days
Status	Fairly common migrant, very rare summer visitor and breeder
BBS Trend	Increasing (trend = 4.8, 95% CI is 2.6, 8.4) [Central US]

Patterns since BBA I



The Ring-necked Duck is a rare summer visitor to Iowa with very few documented breeding records. This widespread duck breeds primarily in forested wetlands to the north of Iowa; its name correctly identifies a hard-to-see ring around the male's neck (Roy et al. 2020), although some suggest a more appropriate name would be "Ring-billed Duck" for the distinctive white band on its bill. Each summer, a few individuals are seen at scattered wetlands throughout Iowa. Most of the records are concentrated in the Prairie Pothole Region and are usually of solitary males. Despite its regular summer occurrence, there are few confirmed breeding records, which number approximately ten since 1960 (Kent and Dinsmore 1996). J. J. Dinsmore et al. (1984) thought a few nested most years, although later reports suggest otherwise (Jackson et al. 1996, Kent and Dinsmore 1996). The most recent evidence of breeding is from Trumbull Lake, Clay County in 2016 (J. J. Dinsmore 2016), the first breeding record since 1985. The BBS data are insufficient to estimate a trend for Iowa, but this species is increasing slightly regionally (Sauer et al. 2017).

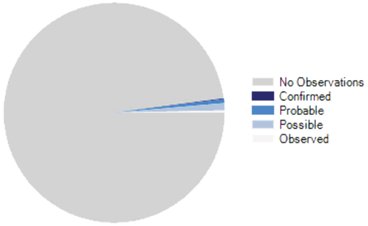
The Ring-necked Duck was sparsely reported during both atlas projects. It was found in 27 (3.4%) blocks during BBA II, up slightly from 18 (2.1%) blocks during BBA I (Jackson et al. 1996). During BBA II there were no confirmed reports and the nine probable reports were all from the Prairie Pothole Region except for an isolated report in Appanoose County. This was similar to the pattern found during BBA I. In that effort, there was a single confirmed report from Calhoun County and five probable reports, four from the Prairie Pothole Region with an isolated report from Louisa County. The remaining observed and possible reports during both atlas projects were probably of nonbreeding or injured individuals and many occurred away from likely nesting sites. Most reports were from priority/habitat blocks that include large, natural prairie wetlands, although a few were found in grid blocks.

The Ring-necked Duck is a Species of Greatest Conservation Need in Iowa (Iowa DNR 2015) but has no special conservation designation nationally. This is a hunted species and Iowa harvest in 2017 and 2018 was estimated at <5,500 individuals annually (Raftovich et al. 2019). Most (>50%) of the annual harvest is in the Mississippi Flyway, where >250,000 are shot annually (Roy et al. 2020). Unlike many other waterfowl, this species demography is poorly known and needs further study (Conroy and Eberhardt 1983). It is hard to identify clear conservation measures for this species because it breeds in more permanent wetlands where habitat loss and degradation are of less concern (Roy et al. 2020). McAuley (1986) suggested that acidification may be reducing reproductive success on northern wetlands. Hunting losses and threats from pesticides and other contaminants do not seem to be serious threats to this species at present (Roy et al. 2020). Ring-necked Ducks are likely to remain very rare breeding bird because Iowa is well south of this species' normal breeding range.

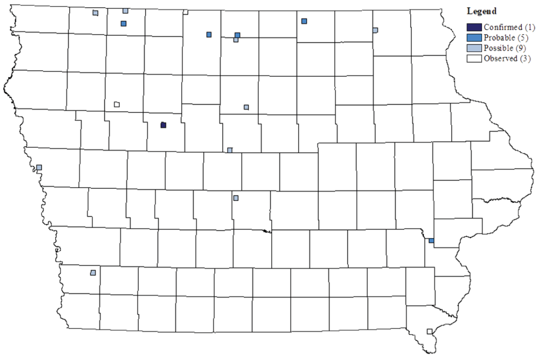
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	1	2	3
Possible	2	7	9
Probable	2	3	5
Confirmed	0	1	1
Conf & Prob	0.40%	1.00%	0.70%

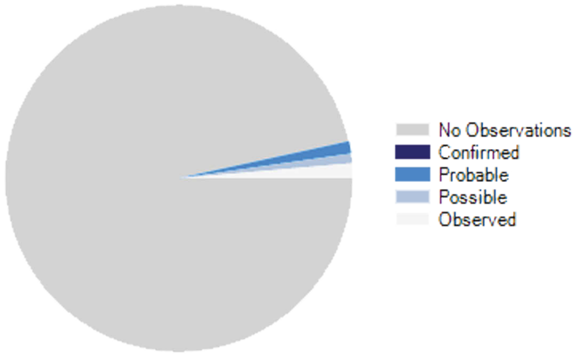
BBA I Results



BBA I



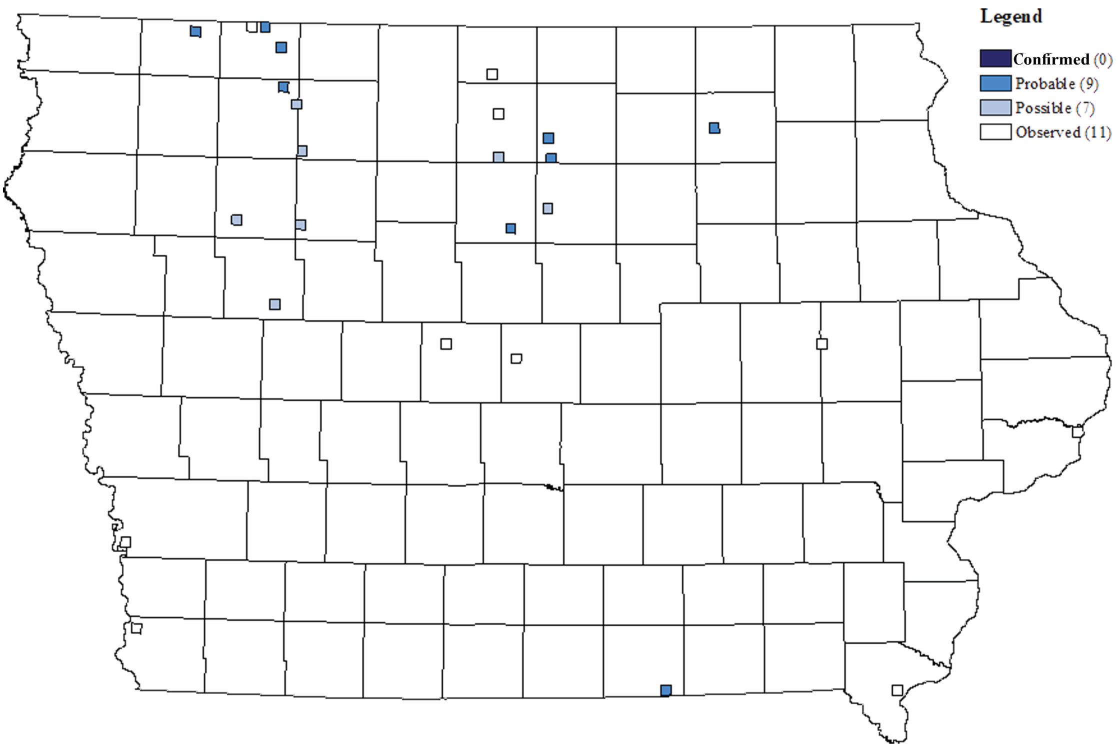
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	3	8	11
Possible	0	7	7
Probable	2	7	9
Confirmed	0	0	0
Conf & Prob	0.40%	1.80%	1.00%

BBA II



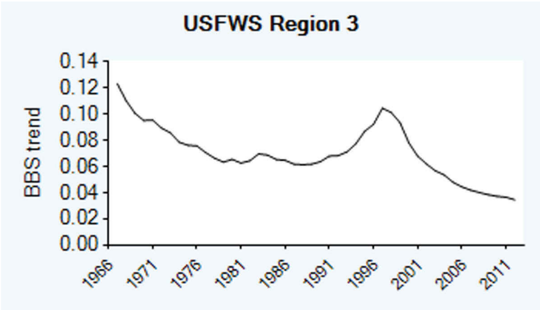
Sponsored by Lena Dinsmore

© Wolf Oesterreich

Habitat	Wetlands ranging from large lakes to small depressional wetlands
Breeding Dates	NA
Nest Type	Small depression on the ground lined with plant material and down
Clutch Size	6–15 eggs (rarely to 17)
Incubation	26–27 days
Fledging	45–50 days
Status	Common migrant, uncommon summer visitor
BBS Trend	Stable (trend = 0.8, 95% CI is –1.0, 2.6) [Central US]

Patterns since BBA I

The Lesser Scaup is a regular summer visitor and very rare breeding bird in Iowa. This species breeds in boreal wetlands and has recently expanded into the Prairie Pothole Region. They winter in large rafts in coastal estuaries along the Pacific and Gulf coasts with some moving farther south into Central and South America (Anteau et al. 2020). A few scaup are present in Iowa each summer, but most are probably nonbreeders or injured individuals. The first nesting record was from Lee County in 1897 (Praeger 1925), followed by five additional nesting records through 1983 from Cerro Gordo, Clay, Dickinson, Sioux, and Story counties (Kent and Dinsmore 1996). There are no more recent nesting records from Iowa. The BBS data are insufficient to estimate a trend for Iowa, but this species is declining regionally (Sauer et al. 2017).

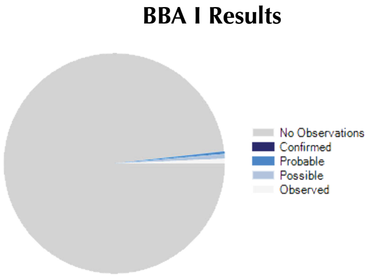


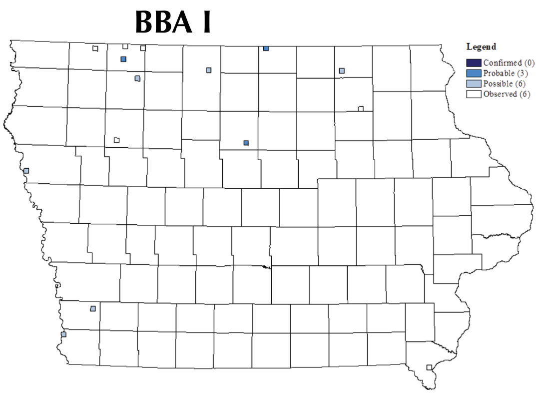
The Lesser Scaup was rarely reported during both atlas projects. It was found in just 15 (1.9%) blocks during BBA II, similar to 15 (1.7%) blocks during BBA I (Jackson et al. 1996). There were no confirmed reports during either atlas project. Indeed, virtually all reports probably pertained to nonbreeding or injured individuals. During BBA II all the reports were in the observed (8) and possible (7) categories. There were three probable reports during BBA I from Dickinson, Worth, and Wright counties, in addition to six observed and six possible reports statewide. There isn't a clear pattern of records from either atlas project, except to say that there were reports from prairie pothole wetlands where this species might be expected to breed occasionally.

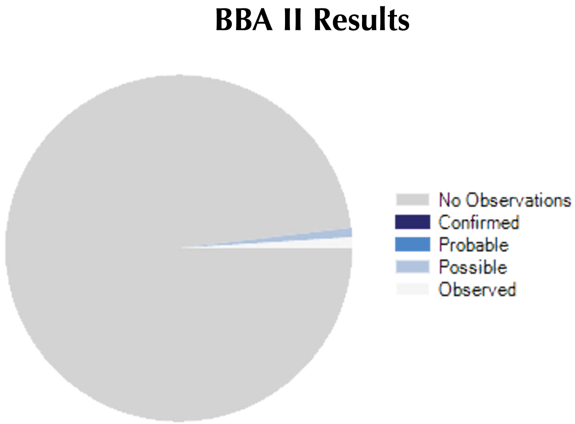
The Lesser Scaup is a Species of Greatest Conservation Need in Iowa (Iowa DNR 2015) but has no special conservation designation nationally. Scaup are hunted widely in North America with most of the harvest (~50%) in the Mississippi Flyway (Anteau et al. 2020). This species was taken in large numbers by market hunters in Iowa in the late 1800s and early 1900s but was less desirable than other species (J. J. Dinsmore 1994). The Iowa harvest in 2017 and 2018 was estimated at <2,000 individuals annually, which seems low given this species abundance in fall and the prevalence of hunting along the Mississippi River where it is especially common (Raftovich et al. 2019). The primary conservation concern is the loss and degradation of wetlands that are used year-round, especially migratory stopovers (Anteau et al. 2020). Recent studies indicate that Lesser Scaup were not acquiring and replacing energy reserves during spring migration stopovers in the Prairie Pothole Region, including Iowa (Anteau and Afton 2004). These concerns led to the Living Lakes Initiative (Ducks Unlimited 2012), which aims to restore spring migration habitat throughout this region. The hope is that this will result in scaup arriving on the breeding grounds in better condition, which should improve reproduction and recover populations. Recent research indicates that recreational harvest is not a significant cause for recent scaup declines (Anteau et al. 2020). It is likely that the Lesser Scaup will remain a very rare breeding bird in Iowa, given that we are well south of its normal breeding range.

BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	2	4	6
Possible	2	4	6
Probable	1	2	3
Confirmed	0	0	0
Conf & Prob	0.20%	0.50%	0.30%

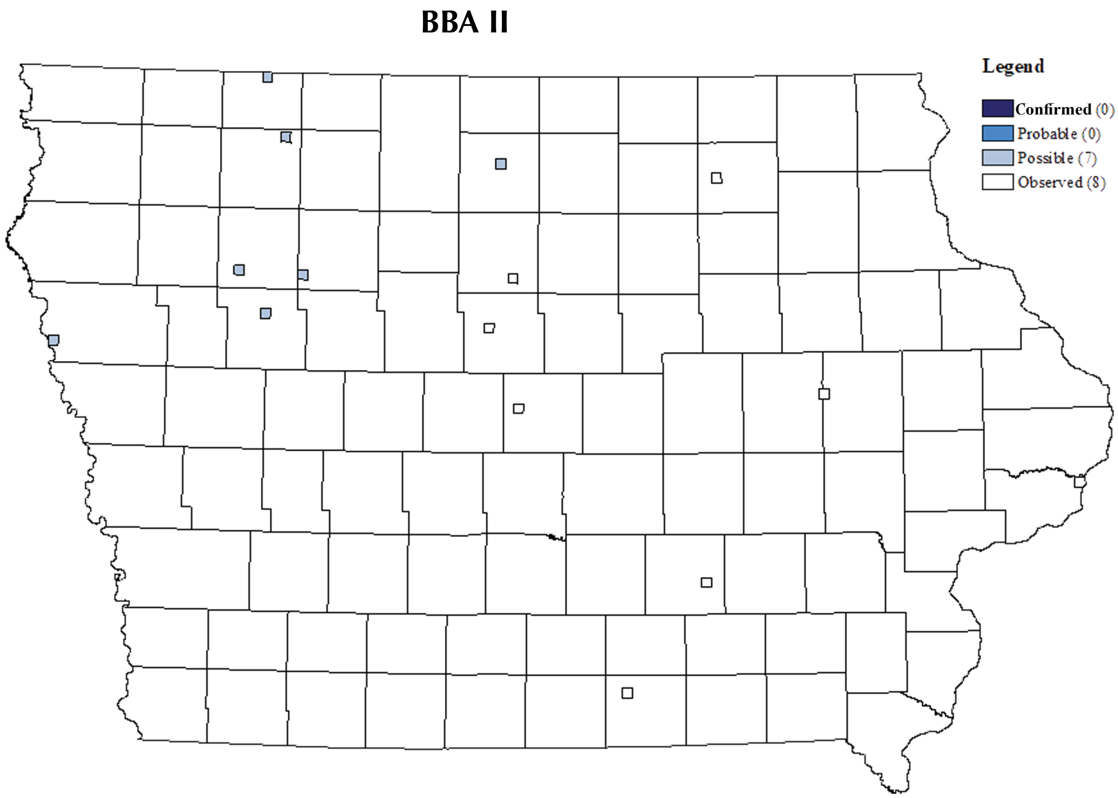






BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	2	6	8
Possible	0	7	7
Probable	0	0	0
Confirmed	0	0	0
Conf & Prob	0.00%	0.00%	0.00%



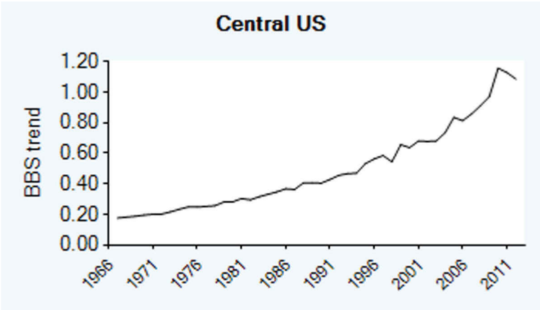
Bufflehead *Bucephala albeola*

© Doug Harr

Habitat	Primarily larger lakes, marshes, and rivers with surrounding forest
Breeding Dates	NA
Nest Type	Cavity lined with plant material, down, and feathers
Clutch Size	8–12 eggs (rarely 7–16)
Incubation	29 days
Fledging	50–55 days
Status	Fairly common migrant, very rare summer visitor, three breeding records
BBS Trend	Increasing (trend = 4.3, 95% CI is 2.4, 7.1) [Central US]

Patterns since BBA I

The Bufflehead is a very rare summer visitor and nesting bird in Iowa. This smallest diving duck nests in cavities, especially those of the Northern Flicker, in boreal forests and aspen parklands well north of Iowa (Gauthier 2020). It is an irregular summer visitor with nine records since 2000, most from the northern Prairie Pothole Region. Most or all of these reports probably pertain to nonbreeding or injured individuals that are over-summering well south of their normal breeding range. There are only three breeding records from 1962 at McCray Slough, Sac County (Sieh 1962), a brood in 1992 near Dan Greene Slough in Clay County (J. J. Dinsmore 1992), and a brood from 31 May to mid-June 1998 at Dan Green Slough, Clay County (Kent 1998b, J. J. Dinsmore 1998). The BBS data are insufficient to estimate a trend for Iowa or regionally, but this species is stable nationally (Sauer et al. 2017).



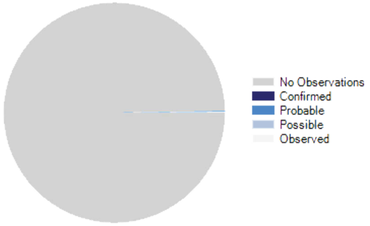
The Bufflehead was very rarely reported during both atlas projects. It was found in 13 (1.6%) blocks during BBA II, an increase from just two (0.2%) blocks during BBA I (Jackson et al. 1996). There were no confirmed reports during either atlas project. During BBA II, there were six observed and seven possible reports, most from northern Iowa and only five of the possible reports were from wetlands where breeding is likely. Most reports were from priority/habitat blocks that include large, natural prairie wetlands where this species might occasionally breed.

The Bufflehead has no special conservation designation in Iowa or nationally. The Bufflehead is a hunted species with most harvest concentrated in the Atlantic and Mississippi flyways (Gauthier 2020). It was taken by early market hunters in the late 1800s and early 1900s but was less desirable than other species (J. J. Dinsmore 1994). The Iowa harvest in 2017 and 2018 was estimated at <3,500 individuals annually (Raftovich et al. 2019). Conservation concerns include this species' vulnerability to hunting, losses of aspen parkland to agriculture, loss of boreal forest to timber harvest, and the fact that this species has delayed maturity and often doesn't renest, which can slow population recovery (Gauthier 2020). It has been suggested that expanded nest box programs might benefit this species (Gauthier 2020). Exposure to pesticides and other contaminants does not seem to be a concern for this species at present (Gauthier 2020). The Bufflehead is not expected to breed in Iowa in the future, although past events suggest that it could do so occasionally if the right conditions persist.

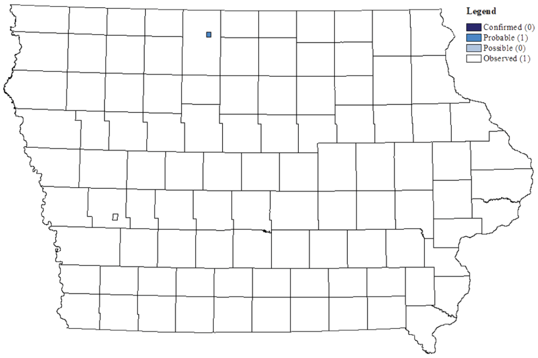
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	1	1
Possible	0	0	0
Probable	1	0	1
Confirmed	0	0	0
Conf & Prob	0.20%	0.00%	0.10%

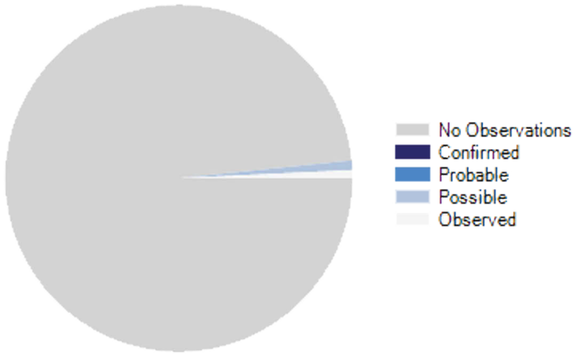
BBA I Results



BBA I



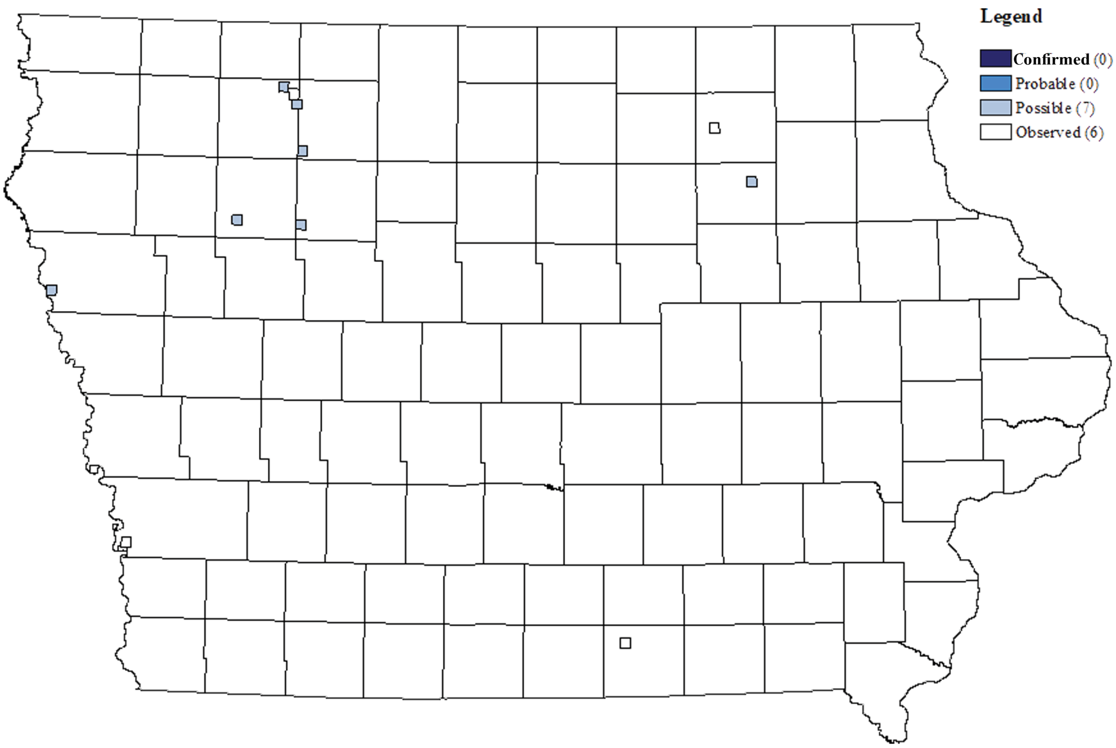
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	1	5	6
Possible	0	7	7
Probable	0	0	0
Confirmed	0	0	0
Conf & Prob	0.00%	0.00%	0.00%

BBA II



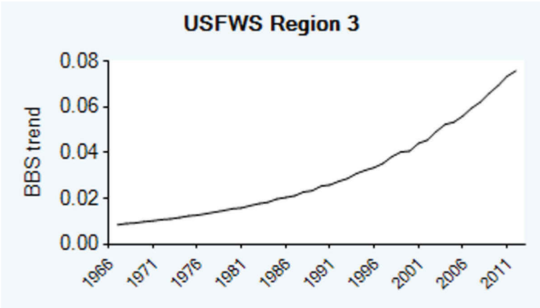
Sponsored by Douglas E. Chapman

© Stanley Buman

Habitat	Lakes, marshes, small ponds, and rivers near suitable nesting cavities
Breeding Dates	26 Apr (PR)–12 Aug (CO)
Nest Type	Cavity lined with down and feathers, almost always over or near water; readily uses nest boxes
Clutch Size	5–12 eggs
Incubation	31 days
Fledging	71 days
Status	Uncommon migrant and breeder
BBS Trend	Increasing (trend = 6.4, 95% CI is 4.4, 18.9) [Central US]

Patterns since BBA I

The Hooded Merganser is a local but increasing breeding bird in Iowa and has likely benefited from the widespread use of Wood Duck nest boxes. It nests in cavities in forested wetlands, mainly in the eastern United States, and while its basic ecology is known there is little to no information on its population size or status (Dugger et al. 2020). There were few breeding records in the early 1900s (Anderson 1907, DuMont 1933), although it may have been more common previously. As recently as the early 1990s it was considered a rare summer resident statewide, occurring most commonly along the Mississippi River (J. J. Dinsmore et al. 1984, Kent and Dinsmore 1996). The Hooded Merganser is now a familiar breeding bird of wetlands throughout Iowa. The BBS data suggest a weak increasing trend in Iowa (Sauer et al. 2012), but this species is stable nationally (Sauer et al. 2017).



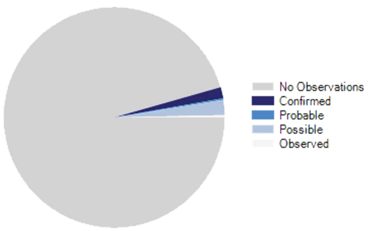
The Hooded Merganser occurred almost statewide during BBA II, with a sparse distribution in northeastern and far western Iowa away from the Mississippi and Missouri rivers. It was found in 150 (20%) blocks during BBA II, a huge increase from just 38 (4.4%) blocks during BBA I (Jackson et al. 1996). During BBA II there were also 19 probable and 44 possible reports, both increases from BBA I. Most BBA II records were from blocks along major river corridors and from wetlands in the Prairie Pothole Region. This pattern was particularly obvious in a wide swath extending from southeastern Iowa northwest to the Iowa Great Lakes region. The confirmation rate during BBA II was 54%, which was up from 37% during BBA I. Not surprisingly, most reports were from priority/habitat blocks, which is where most larger wetlands and rivers are found.

The Hooded Merganser has no special conservation status in Iowa or nationally. Mergansers are a hunted species, although they are not prized by hunters and are generally considered poor tasting (Dugger et al. 2020). It was taken by early market hunters in the late 1800s and early 1900s but was less desirable than other species (J. J. Dinsmore 1994). The Iowa harvest in 2017 and 2018 was estimated at <750 individuals annually (Raftovich et al. 2019). Over-hunting was thought to be responsible for declines through the early 1900s but is not a threat today (Dugger et al. 2020). The primary conservation concern today is habitat loss and alterations on the breeding and wintering grounds (Dugger et al. 2020). There are concerns that forestry practices favored the removal of cavity-producing trees, although ageing forests may have reduced this threat (Dugger et al. 2020). Management activities to increase nesting cavities, including the use of artificial nest boxes and by preserving cavity trees, in addition to measures to improve wetland water quality are important to this species (Dugger et al. 2020). Clearly, the Hooded Merganser is an avian success story for Iowa and this species should continue to thrive in wetlands and along rivers statewide.

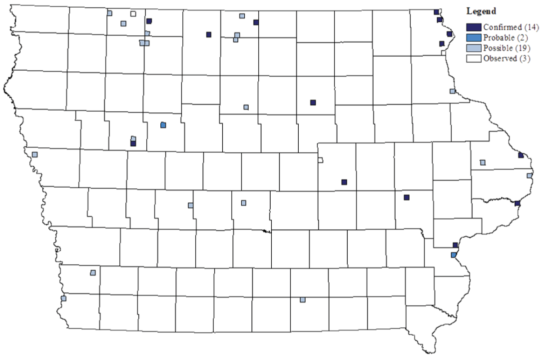
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	1	2	3
Possible	2	17	19
Probable	0	2	2
Confirmed	2	12	14
Conf & Prob	0.40%	3.50%	1.90%

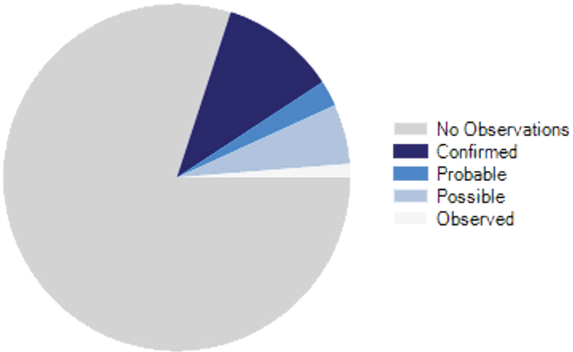
BBA I Results



BBA I



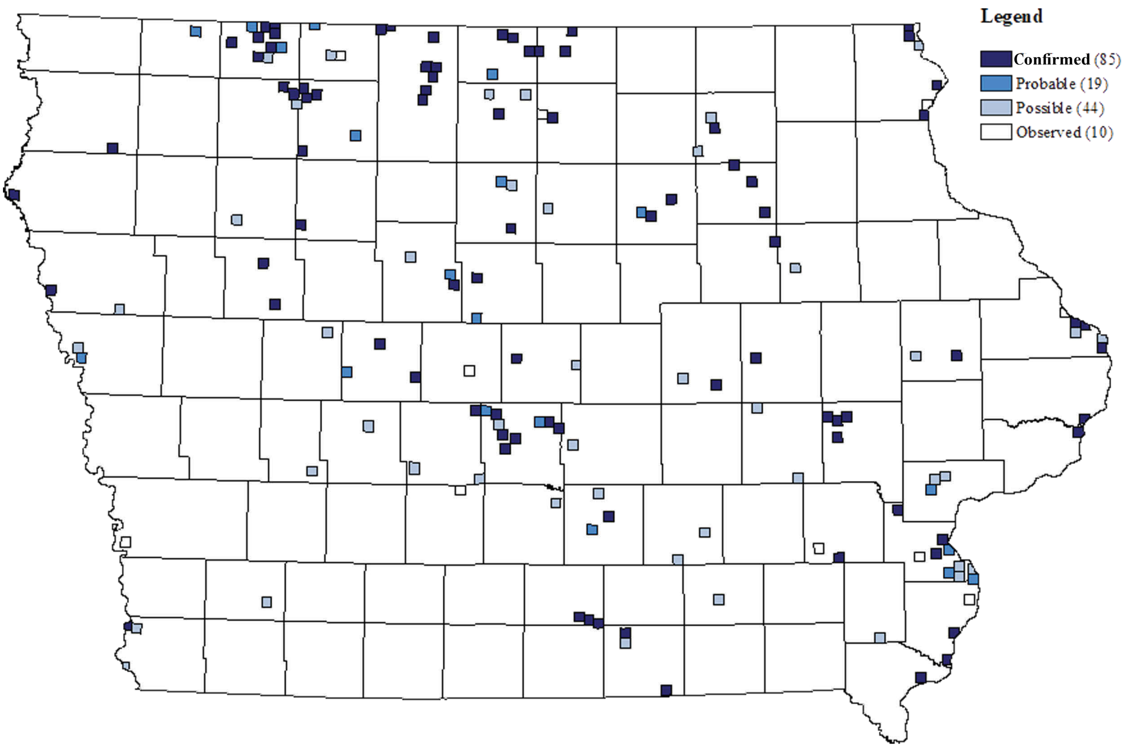
BBA II Results



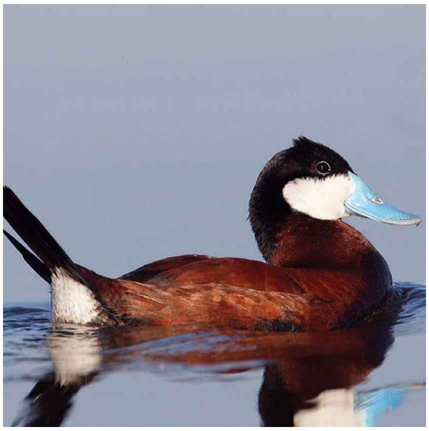
BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	1	9	10
Possible	9	35	44
Probable	2	17	19
Confirmed	17	68	85
Conf & Prob	3.60%	21.30%	12.10%

BBA II

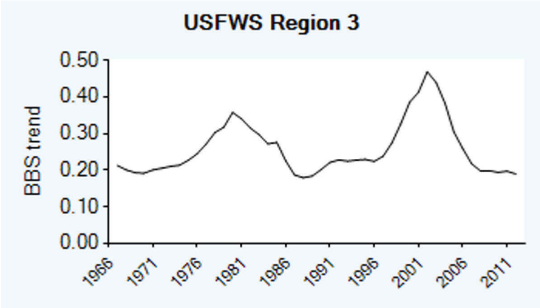


Sponsored by Anna Roisen



Habitat	Primarily shallow-water wetlands with dense emergent vegetation
Breeding Dates	24 May (PR)–1 Aug (PR)
Nest Type	Floating platform attached to living plants, not usually lined with down
Clutch Size	6–10 eggs (rarely to 20)
Incubation	24 days
Fledging	42–49 days
Status	Fairly common migrant, uncommon summer visitor and breeder
BBS Trend	Increasing (trend = 2.6, 95% CI is 1.0, 7.3) [Central US]

Patterns since BBA I



The Ruddy Duck is an uncommon breeding bird of Iowa's prairie pothole wetlands. This species is a common breeder throughout the Prairie Pothole Region, and is known for its distinctive stiff tail, comical courtship displays, and nest parasitism (Brua 2020). Their nests are parasitized by the Redhead and other species, and in turn they parasitize nests of many duck species, including Pied-billed Grebe, and American Coot (Brua 2020). This species was a fairly common nesting duck of prairie wetlands in north-central and northwestern Iowa historically (Anderson 1907, DuMont 1933, Bennett 1938). This pattern continued through the 1980s when this species ranked among the five most numerous ducks nesting in Iowa (J. J. Dinsmore et al. 1984). By the 1990s it was considered a rare summer resident, although breeding had been documented in Johnson, Monona, and Winneshiek counties (Kent and Dinsmore 1996). Numbers vary annually with the species absent in some years. In good years large concentrations sometimes occur such as 123 plus a brood on 15 July 2015 at Trumbull Lake in Clay County (J. J. Dinsmore 2015). This species is a late spring migrant and many linger into June at wetlands throughout Iowa, although most of these are not at breeding sites. The BBS data are insufficient to estimate a trend for Iowa, but this species is stable regionally (Sauer et al. 2017).

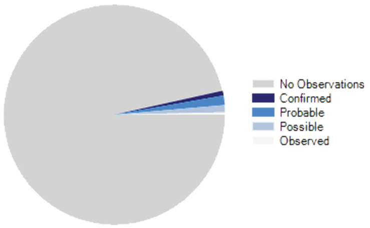
The Ruddy Duck was sparsely reported during both atlas projects. It was found in 45 (5.7%) blocks during BBA II, up from 30 (3.5%) blocks during BBA I (Jackson et al. 1996). During BBA II there were six confirmed reports, all in the Iowa Great Lakes region except for a single report from Pocahontas County. There were an additional 19 probable reports during BBA II, again concentrated in the Prairie Pothole Region but with additional reports from Buena Vista, Mills, Story, and Woodbury counties. The 20 observed and possible reports probably included many nonbreeding individuals, although some were in areas where the species could breed. The pattern during BBA I was similar with most confirmed and probable reports from the Prairie Pothole Region, except for a confirmed record from Monona County and a probable record from Woodbury County and a confirmed record from Winneshiek County. Interestingly, there were very few reports from the eastern half of Iowa in either atlas project. Most reports (>80%) were from priority/habitat blocks that include large, natural prairie wetlands.

The Ruddy Duck has no special conservation designation in Iowa or nationally. Ruddy Ducks are hunted, but the species is generally avoided by hunters because of its poor flavor (Brua 2020). Historically it was more popular as other species were over-hunted; it was also easy to hunt because it gathered in large flocks and was reluctant to fly (Phillips 1926). There is no evidence that it was sought after by market hunters in Iowa in the late 1800s and early 1900s (J. J. Dinsmore 1994). The Iowa harvest in 2017 and 2018 was estimated at <600 individuals annually, no doubt a reflection of its unpopularity with hunters (Raftovich et al. 2019); fewer than 50,000 are shot annually now in the United States (Brua 2020). The primary threat to this species is the loss and degradation of wetlands in the Prairie Pothole Region, although exposure to pesticides and other toxins may represent an under-studied threat (Brua 2020). It is likely that the Ruddy Duck will remain an uncommon and local breeding bird of Iowa's prairie pothole wetlands and we can look forward to its comical courtship displays as a harbinger of the summer breeding season.

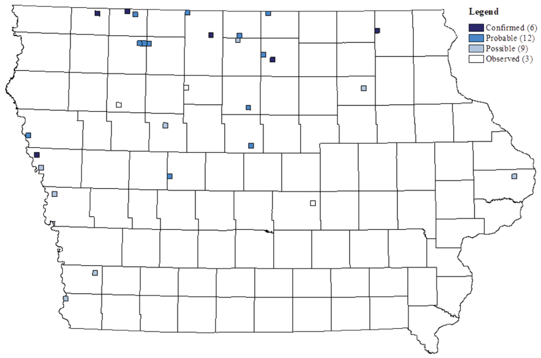
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	3	3
Possible	0	9	9
Probable	3	9	12
Confirmed	2	4	6
Conf & Prob	1.00%	3.30%	2.10%

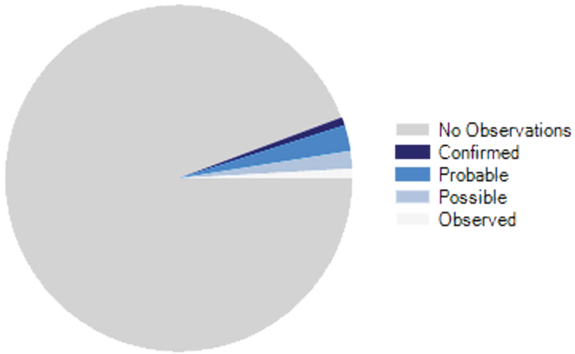
BBA I Results



BBA I



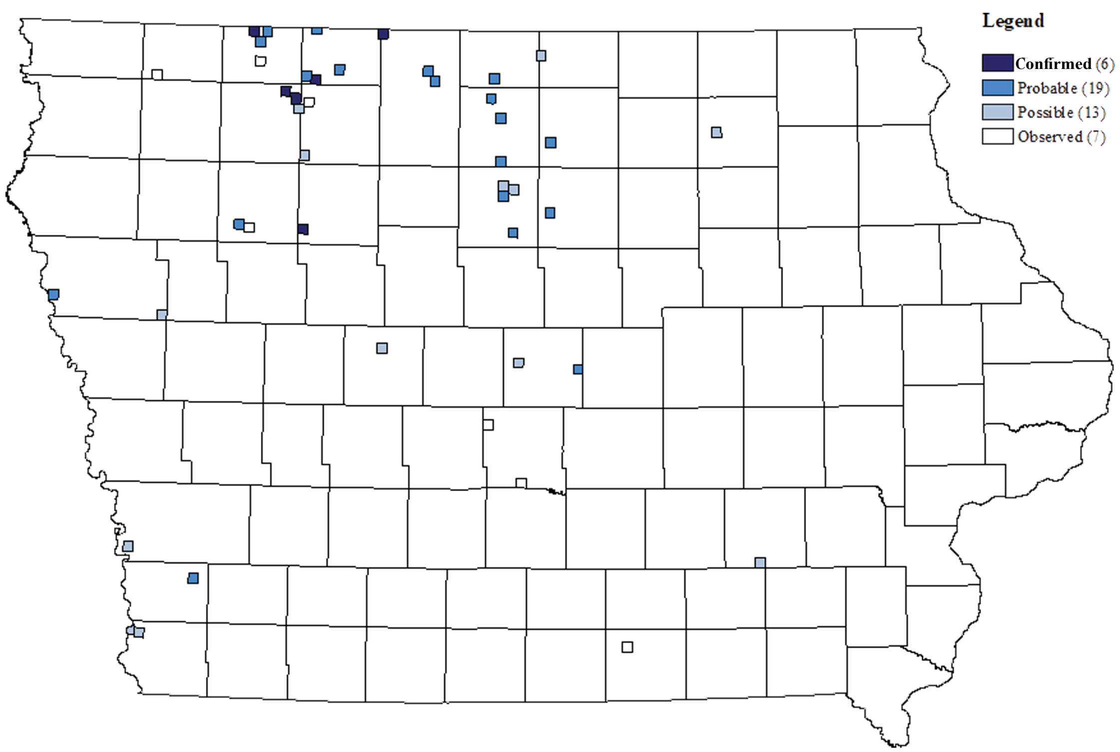
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	2	5	7
Possible	3	10	13
Probable	1	18	19
Confirmed	1	5	6
Conf & Prob	0.40%	5.80%	2.90%

BBA II



Sponsored by Olivia, Natalie, Katy, and Shane Patterson

© Adam Ciha

Habitat Grassland with shrubs and savanna

Breeding Dates 6 Apr (PR)–19 Aug (CO)

Nest Type A grass-lined scrape on the ground, concealed by vegetation arched over the top

Clutch Size 15 eggs average

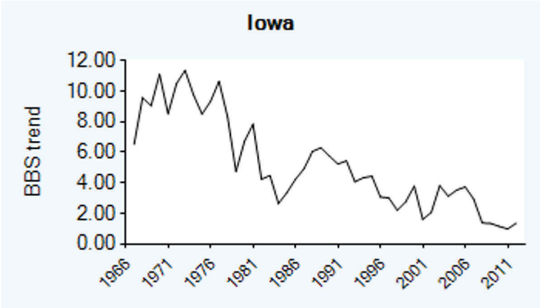
Incubation 23–24 days

Fledging Precocial at hatching and can walk but incapable of flight for about 2 weeks

Status Regular nester and permanent resident

BBS Trend Decreasing (trend = −3.9, 95% CI is −5.2, −2.9) [Iowa]

Patterns since BBA I



The Northern Bobwhite is a native game bird, once a common resident in all parts of the state and now mostly found in southern Iowa. With its ability to produce two large broods each year, it can repopulate quickly, when habitat and weather conditions are optimal. During the first atlas, bobwhites were located in 388 (45.1%) blocks, while it was found in only 219 (27.7%) blocks during BBA II. Results from Iowa's August Roadside Survey indicate this quail has declined by approximately 74% since 1962, with an average of 3.33 quail counted per 30-mile route during the time period (1985–1990) of the first atlas and an average of 0.51 quail counted per route during the time period (2008–2012) of the second atlas (Bogenschutz 2013). Iowa BBS data, from 2001–2011, show an average annual decrease of 3.9% for Northern Bobwhite (Sauer et al. 2012). Quail were confirmed nesting in 126 (32.4%) of BBA I blocks and only 17 (7.8%) of BBA II blocks. This is almost the same as the first atlas when 87% of confirmed nesting records were of broods, 88% of BBA II confirmations were of broods, most of which were young with an adult. In the second atlas, 81 (37%) of the records were probable breeding (mostly pairs), and 121 (55.3%) of the block records were possible breeding (mostly whistling males). Certainly, the bobwhite was easily detected because of the male's frequent calls. The distribution of Northern Bobwhite changed dramatically since the first atlas. During BBA I, quail were detected in 84 counties, including all southern Iowa counties, all counties on the western border, and all eastern Iowa border counties except Allamakee.

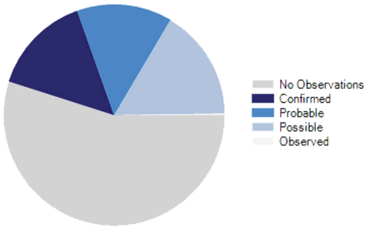
During the second atlas, only five block records of this diminutive game bird were found north of Highway 20. Most records came from the southern three tiers of counties and from the Loess Hills of western Iowa, extending north into the Broken Kettle Bird Conservation Area (BCA) in Plymouth County. The most northerly record and largest outlier record was the detection of fledged young at Effigy Mounds National Monument block in Allamakee County. The next closest record is three counties further south. While the eastern part of the state (especially east-central) was well populated during the first atlas, it is no longer. Like other Iowa grassland birds, quail populations are suffering from habitat loss, as more and more grassland and "waste areas" are cleared to make way for additional acres of row crops.

Some good news for this species is that our neighbor state to the south, Missouri, still has good numbers of quail. During Missouri's BBS, quail were found in 97.4% of the 1,207 blocks monitored, and it was the sixth most recorded species in Missouri's atlas project (Jacobs and Wilson 1997). Also, Iowa DNR is a partner in a national initiative, called Northern Bobwhite Conservation Initiative (NBCI), whose goal is to restore quail habitat and quail populations. Two of the target areas, where restoration work is being implemented, are in Kellerton Grassland BCA in Ringgold County and Sand Creek Savanna BCA in Decatur and Ringgold counties. While habitat is being managed for quail, many other birds of Greatest Conservation Need will benefit, too.

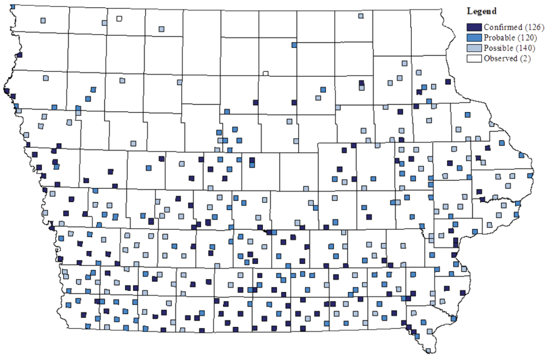
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	1	1	2
Possible	77	63	140
Probable	61	59	120
Confirmed	46	80	126
Conf & Prob	20.50%	34.80%	28.60%

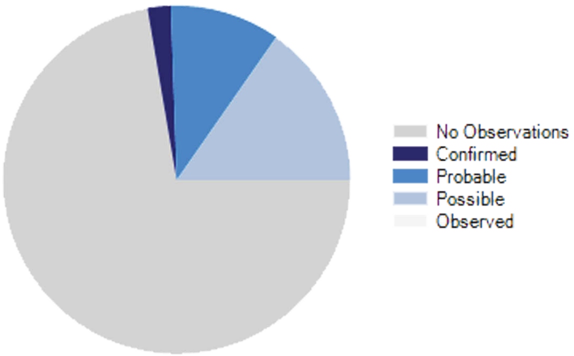
BBA I Results



BBA I



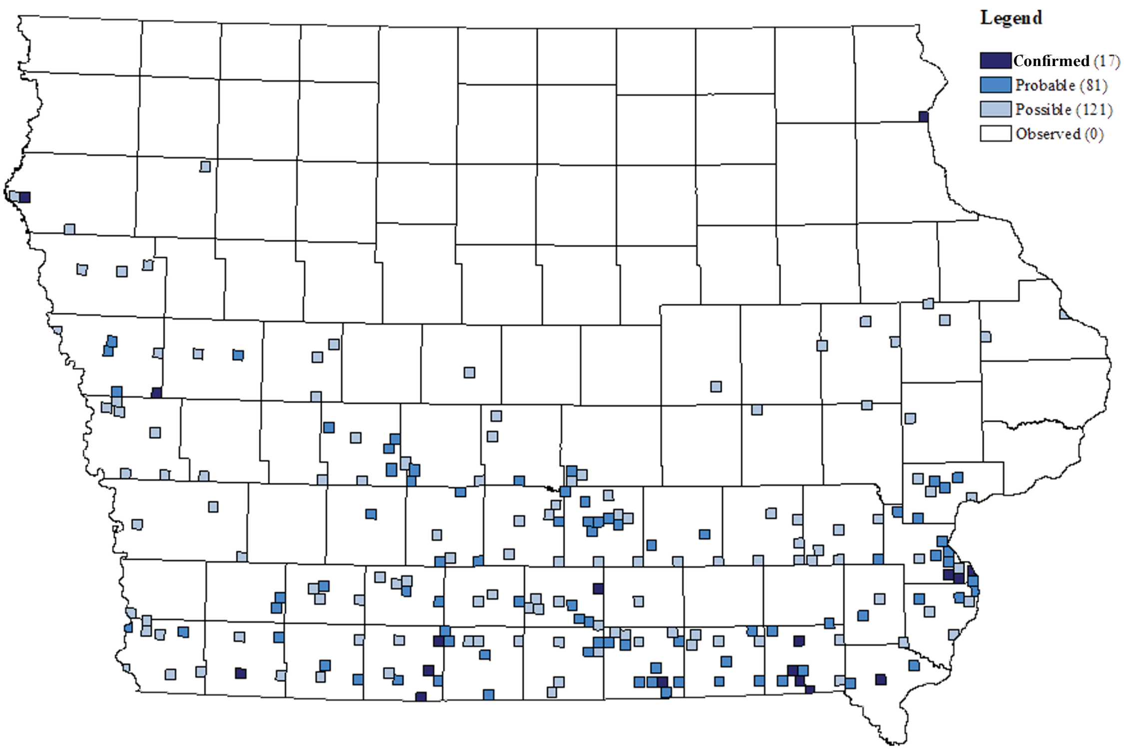
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	51	70	121
Probable	26	55	81
Confirmed	6	11	17
Conf & Prob	6.10%	16.50%	11.40%

BBA II



Sponsored by Raymond Cummins

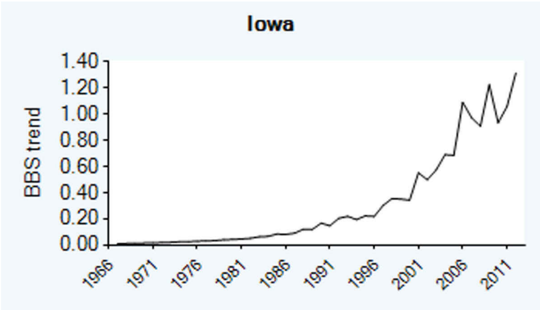
Wild Turkey *Meleagris gallopavo*

© Kip Ladage

Habitat	Oak-hickory woodlands with herbaceous ground-cover
Breeding Dates	30 Mar (PR)–13 Sep (CO)
Nest Type	Ground depression in dead leaves, generally at base of a tree
Clutch Size	12–15 eggs
Incubation	25–27 days
Fledging	Precocial, leaving nest soon after hatching
Status	Common nester and permanent resident
BBS Trend	Increasing (trend = 11.1, 95% CI is 8.3, 16.9) [Iowa]

Patterns since BBA I

The Wild Turkey is a native game bird that was extirpated from Iowa in the early 1900s, then reintroduced beginning in the 1960s. This species has been trapped and relocated throughout the state and now occupies virtually every remnant oak woodland stand that can support it (Fritzell et al. 2013). Turkeys were found in 273 (31.7%) of BBA I blocks and in 483 (61.1%) of BBA II blocks, which may reflect the expansion of Iowa's population since the first atlas. Iowa BBS results, from 2001–2011, indicate an average annual increase of 11.1% for Wild Turkey (Sauer et al. 2012). Iowa's spring turkey harvest data also reflect an overall increase in Iowa's turkey population, with a peak harvest of birds in 2004 (Gosselink 2013).



Confirmed nesting for Wild Turkey was noted in 63% of BBA I blocks and 42.4% of BBA II blocks. Most of the nesting confirmations were brood sightings or broods seen with hens. While there was a lower rate of nesting confirmation during the second atlas, the total number of confirmed nesting records increased from 172 (BBA I) to 205 (BBA II). Results for the Illinois BBA were similar to Iowa's BBA II results, and turkeys were confirmed nesting in 43.4% of all blocks with records (Kleen et al. 2004). While nesting confirmation rates differed between Iowa's atlases, the type of blocks most reports came from was largely the same. Priority blocks of BBA I and habitat blocks of BBA II typically contain high quality public woodland areas that are managed for turkeys, and these blocks contained 70% of BBA I records and 66% of BBA II records, respectively.

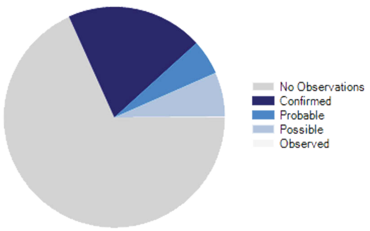
The overall distribution of Iowa's largest game bird was similar for both atlas periods, although there was a substantial increase in the number of records (especially confirmed nesting) in more northern counties within the Des Moines Lobe and Iowan Surface Landform Regions. For instance, northern counties lacking records in the first atlas and with confirmed nesting records for BBA II include Buena Vista, Dickinson, Emmet, Winnebago, Cerro Gordo, Chickasaw, and Franklin. While a handful of counties still lack BBA records, it is most likely that Wild Turkeys now nest in all 99 Iowa counties.

There are now 2.7 million acres of hardwood forests in Iowa, which reflects an increase in Iowa forest cover since the 1970s. That trend favors turkeys. The emphasis of public forest managers to manage for oak and other mast tree species also will benefit this species. Turkey poult production is especially important to sustain turkey populations (McRoberts et al. 2014) and changing spring weather conditions can have an impact on poult survival. Prolonged rainy and cool temperature weather conditions during spring can kill turkey poults. Brood counts in Pennsylvania were negatively correlated with total rainfall for May and June and with the number of days in April and May when temperatures were below 0°C (Latham 1958). Healy and Nenno (1985) noted that rain and low temperatures, extending over an 18-hour period, killed some 12- and 15-day old poults, but the same weather conditions did not kill four- and six-day old young that were still being brooded by a hen. Overall, the future of Iowa's Wild Turkey population will be tied mostly to habitat, and if mast-producing woodlands are maintained, this handsome and hardy species should do fine.

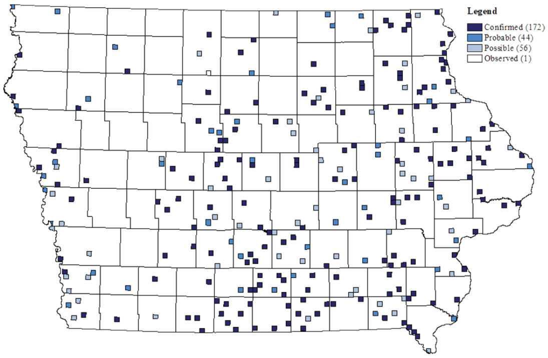
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	1	0	1
Possible	13	43	56
Probable	13	31	44
Confirmed	53	119	172
Conf & Prob	12.60%	37.60%	25.10%

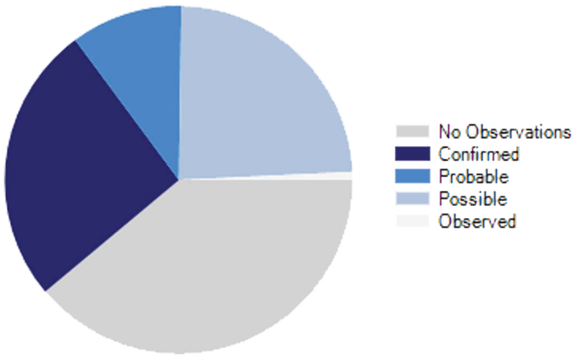
BBA I Results



BBA I



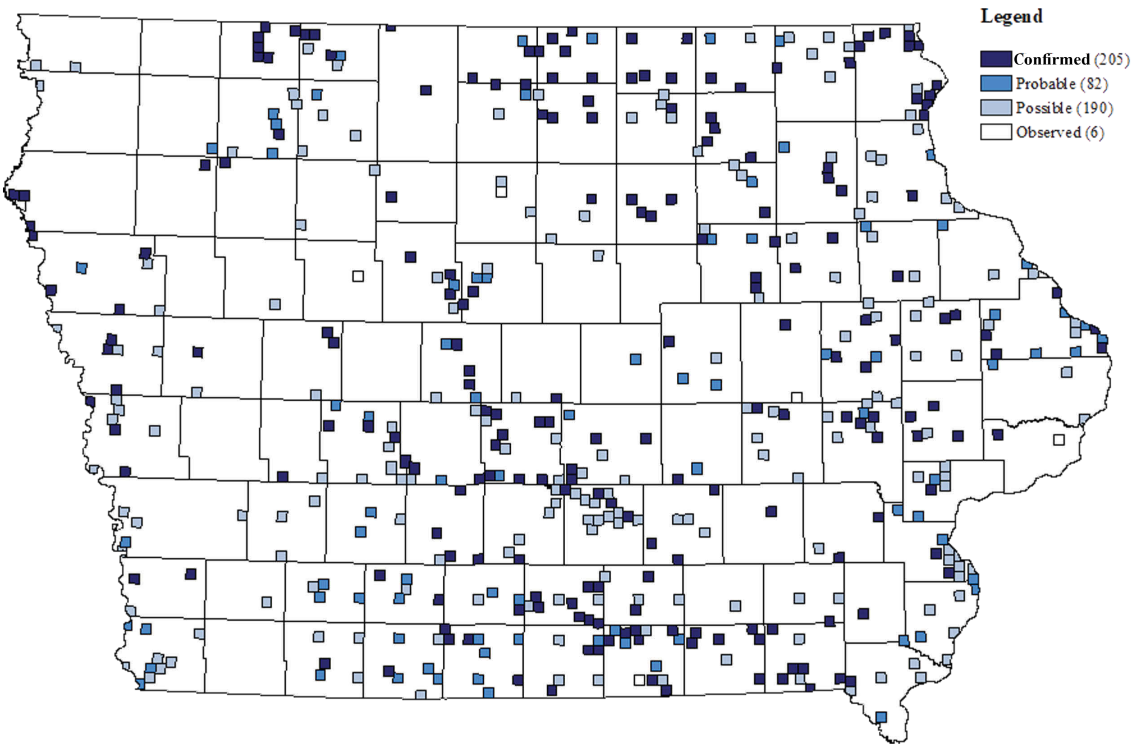
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	3	3	6
Possible	76	115	191
Probable	31	51	82
Confirmed	54	151	205
Conf & Prob	16.30%	50.60%	33.30%

BBA II



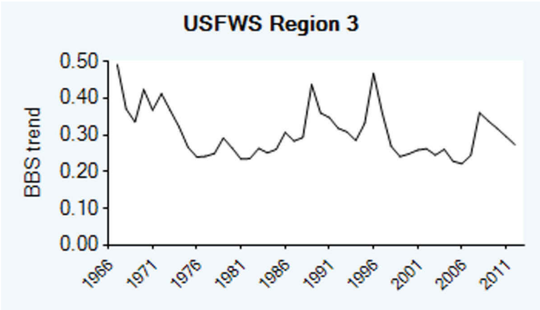
In Honor of Steve Dinsmore and family
(Paul Skrade)

© Tom Schilke

Habitat	Deciduous and coniferous woodland with dense understory and especially associated with aspen woodlands
Breeding Dates	5 May (PR)–8 Aug (PR)
Nest Type	Depression on ground, lined with vegetation and usually placed at the base of a tree or stump
Clutch Size	9–14 eggs
Incubation	23–24 days
Fledging	Precocial, leaving nest within 24 hours of hatching
Status	Regular nester and permanent resident
BBS Trend	Stable (trend = −0.7, 95% CI is −3.7, 1.8) [Central US]

Patterns since BBA I

While the Ruffed Grouse was historically found throughout the forested portions of the state, the grouse remaining in the northeastern corner of Iowa appear to be the only ones still connected to a much larger population (to the north). During the first atlas, this species was found in 42 (4.9%) blocks, while only 17 (2.1%) block records were documented in the second atlas. Similarly, Ruffed Grouse was confirmed nesting in 17 (40.5%) of BBA I blocks and only one (5.9%) of BBA II blocks. Probable nesting was documented in 8 (19%) of BBA I blocks and 6 (35.3%) of BBA II blocks. Because this species has very specific habitat requirements, it is not surprising to find that most records came from blocks containing public forest. During the first atlas, at least 74% of block records were from public forests, while 94% of BBA II block records came from public land. Missouri BBA data for Ruffed Grouse were similar to Iowa's BBA II data, with only 17 (1.4%) records in blocks, two of which were confirmed nesting records (Jacobs and Wilson 1997). There are not enough BBS data from Iowa to determine a population trend. Iowa DNR has tracked the grouse population in the past using the Small Game Survey and a Spring Drumming Count Survey, although grouse was removed from the Small Game Survey in 2008. There seem to now be so few grouse that the Spring Drumming Count is perhaps not a very effective measure (Fritzell et al. 2013).



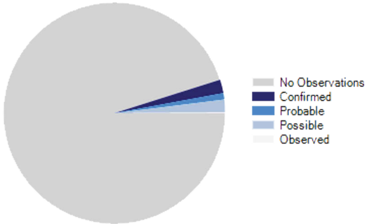
Ruffed Grouse distribution has changed somewhat since the first atlas. For instance, two reintroduced populations that were documented in the first atlas seem to no longer exist. While there were BBA I records from two blocks in Shimek State Forest (Lee County) and two block records from Boone Forks Wildlife Management Area (WMA) (one record each for Hamilton and Webster counties, respectively), no records were found in these counties during BBA II. On a more positive note, the grouse population inhabiting Stephens State Forest (Lucas County) and Sand Creek and Dekalb WMAs (Decatur County) was documented during both atlases. All other BBA II records came from the traditional grouse areas in six northeastern Iowa counties, within the Landform Regions of the Paleozoic Plateau and Iowan Surface. While records were documented in 20 counties during the first atlas, records came from just eight counties during BBA II.

Iowa ceased its Ruffed Grouse release program in 2000, mostly because the habitat conditions were not improving causing initial grouse populations to decline. This species is closely associated with aspen (*Populus* spp.), particularly quaking aspen (*P. tremuloides*), and in the Midwest, highest population densities occur in aspen-dominated forests (Rusch et al. 2000). Grouse also depend on periodic disturbance and particularly favor young tree growth where there is a density of 6,000 to 8,000 stems per acre (Gullion 1984). In an effort to boost Ruffed Grouse populations, Iowa DNR is presently involved with several programs to create more early-successional habitat for grouse, including its Forest Stewardship Program. The future of Iowa's Ruffed Grouse continues to be tied to forestry practices.

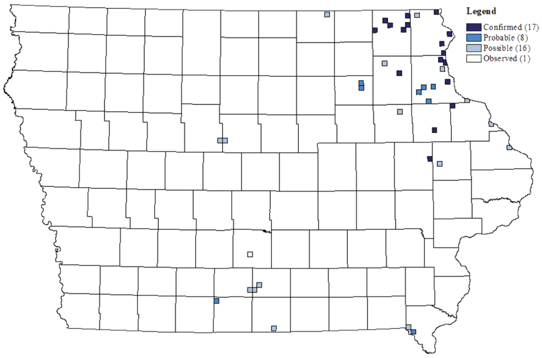
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	1	1
Possible	4	12	16
Probable	3	5	8
Confirmed	4	13	17
Conf & Prob	1.30%	4.50%	2.90%

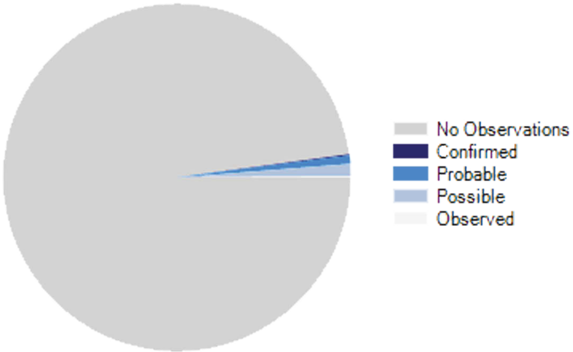
BBA I Results



BBA I



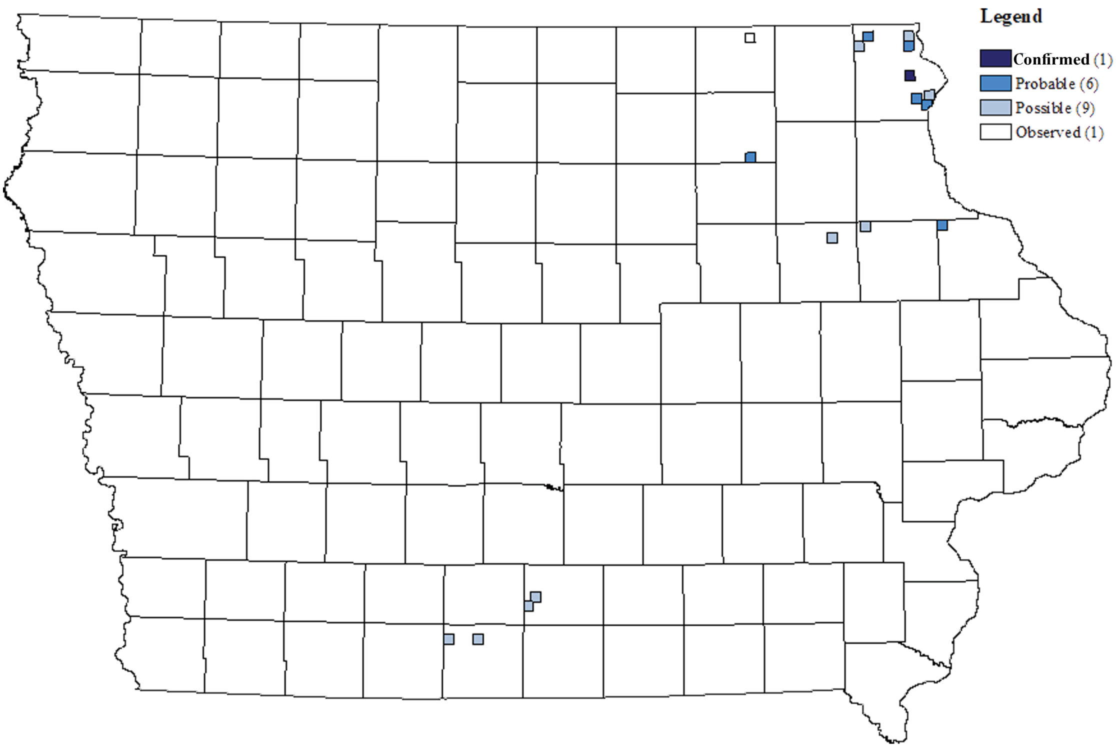
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	1	0	1
Possible	3	6	9
Probable	2	4	6
Confirmed	1	0	1
Conf & Prob	0.60%	1.00%	0.80%

BBA II



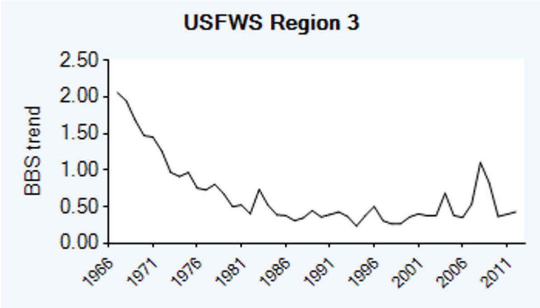
In Honor of Clair Rausch (Kirsten Winter)

© Lowell Washburn

Habitat	Large areas of tall grasses with few trees and elevated areas for booming grounds
Breeding Dates	28 Mar (PR)–7 Aug (CO)
Nest Type	Bowl-shaped depression on the ground, lined with dried vegetation and feathers
Clutch Size	5–17 eggs
Incubation	23–25 days
Fledging	Precocial, leaving nest within 24 hours of hatching
Status	Reintroduced, regular nester in Ringgold County
BBS Trend	Stable (trend = 3.4, 95% CI is −0.2, 8.4) [Central US]

Patterns since BBA I

The last wild nests of Iowa's Greater Prairie-Chickens were documented in Appanoose and Wayne counties in 1952 (Stempel and Rodgers 1961), and the last wild flock was documented at Willow Slough in Mills County in 1960 (J. J. Dinsmore et al. 1984). Since 1980, numerous prairie-chicken restoration efforts have occurred, and Iowa DNR is currently bolstering Ringgold County's reintroduced population with wild caught birds from Nebraska (Shepherd 2013). The only BBA II record is for a brood of prairie-chickens documented at the Kellerton BCA (Ringgold County), and the only record for BBA I was a brood of prairie-chickens produced in the Ringgold WMA. One other BBA II block record was not recorded in the database. Three prairie-chickens seen in the Broken Kettle BCA in early March 2010 (Scott Moats pers. comm.) appear to have come from a Nebraska population located about 11 miles west near Ponca.



Illinois BBA data are almost identical to that of Iowa, with one block record of confirmed nesting, reflecting the one remaining population of that state that consisted of 15 leks and perhaps 200 birds in three counties in 2000 (Kleen et al. 2004). The Missouri BBA project, on the other hand, received reports for 21 blocks that included one outlying remnant population and a newly discovered population with one-third of that state's atlas reports recorded as confirmed nesting (Jacobs and Wilson 1997).

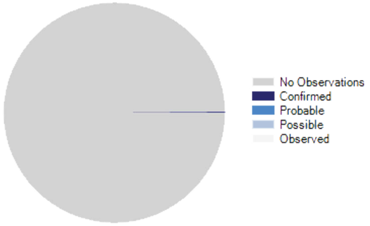
Prairie-chickens face the same problems today as more than a century ago. The elimination and alteration of permanent grasslands suitable for nesting, brood rearing, and roosting continues as a major cause of population decline for this most area-sensitive grassland nesting species (Stempel and Rodgers 1961, Hamerstrom and Hamerstrom 1973, Kirsch 1974, Svedarsky 1988, Mechlin et al. 1991, Johnson et al. 2011). Comparisons between marker types (nuclear versus mitochondrial DNA) and temporal samples suggest that overall connectivity between populations existed throughout the historic range of Greater Prairie-Chickens (Johnson et al. 2011). This allowed for greater exchange of genetic material. Today many populations are highly fragmented and isolated, perhaps too small to be sustainable, and significantly low levels of genetic diversity have been observed in prairie-chicken populations from both Illinois and Wisconsin (Johnson et al. 2011). These same held concerns are why more wild birds are being added to the Iowa population.

For the long-term persistence of this species, maintaining connectivity is critical for the larger historic population that inhabits Kansas, Nebraska, and South Dakota (Johnson et al. 2011). Expanding populations within state boundaries and reconnecting populations of prairie-chickens across state lines is a strategy being implemented to retain this species. Toward this end, Iowa DNR is working together with Missouri Department of Conservation (DOC) and The Nature Conservancy (TNC) to increase the population that currently resides in the Grand River Grasslands and Kellerton BCA. The mobile nature of the Greater Prairie-Chicken indicates it is a species that requires a large landscape of grassland habitat. For instance, distances moved during the spring phase of dispersal between a bird's first wintering site and first breeding site can be up to 47 km (Hamerstrom and Hamerstrom 1949, Schroeder and Braun 1993), and 7% of 369 juvenile males and 47% of 125 juvenile females moved greater than 8 km between their first wintering and first breeding areas (Hamerstrom and Hamerstrom 1973). A large benefit of managing for prairie-chickens is that habitat is potentially provided for all other Iowa grassland nesting birds, and Iowa BBA II data confirm that this statement is true within the Kellerton BCA.

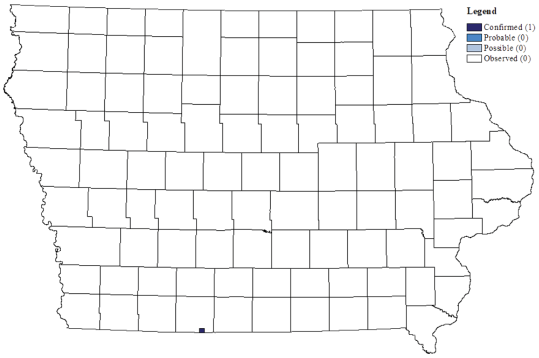
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	0	0	0
Probable	0	0	0
Confirmed	1	0	1
Conf & Prob	0.20%	0.00%	0.10%

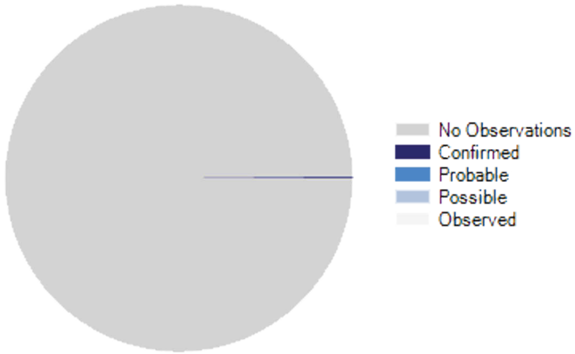
BBA I Results



BBA I



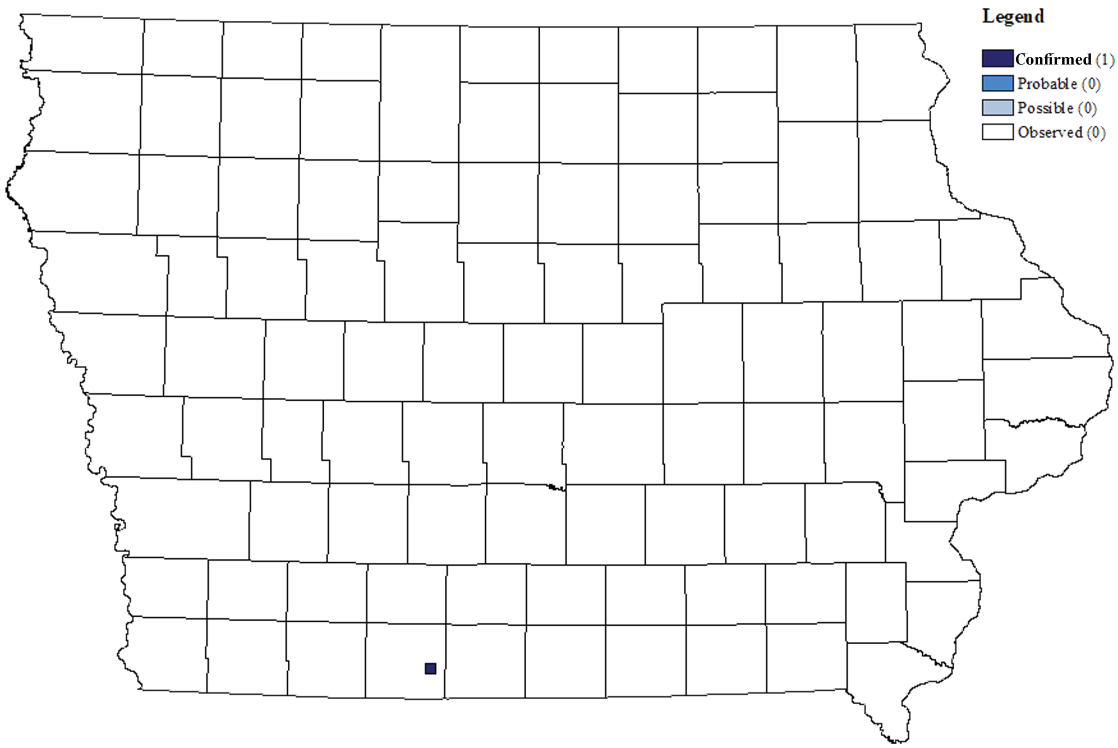
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	0	0	0
Probable	0	0	0
Confirmed	0	1	1
Conf & Prob	0.00%	0.30%	0.10%

BBA II



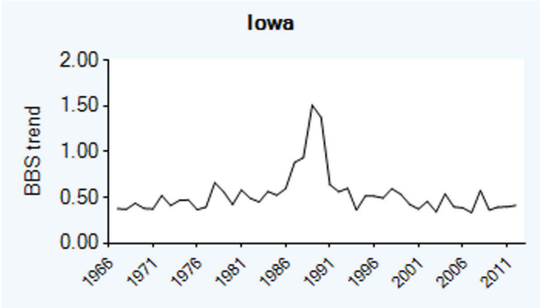
Sponsored by James Dinsmore

© Doug Harr

Habitat	Open habitats, especially agricultural fields and grasslands with hedgerows
Breeding Dates	24 May (PR)–26 Aug (PR)
Nest Type	Ground scrape lined with dead, herbaceous vegetation
Clutch Size	Avg. of 15
Incubation	23–25 days
Fledging	Precocial and fly at 13–15 days
Status	Regular nester and uncommon permanent resident
BBS Trend	Stable (trend = 1.1, 95% CI is −2.1, 4.4) [Iowa]

Patterns since BBA I

Since the Gray Partridge (formerly known as Hungarian Partridge) is a species that originated on the open steppes of Europe, for many decades this species adapted especially well to northern Iowa's highly altered agricultural landscape. Iowa's August Roadside Survey results show that this partridge's numbers grew especially in the late 1980s, which corresponded with drought conditions and increased planting of Conservation Reserve Program grasslands (Andrews et al. 1993). Since that time, Gray Partridge numbers have diminished greatly. The mean number of Gray Partridge counted per August roadside survey route in 1988 was 19, while the current ten-year average is 1.71 partridges per 30-mile route (Fritzell et al. 2013). Iowa atlas numbers may reflect this change, since this species was detected in 328 (38.1%) blocks during the first atlas and was found in only 65 (8.2%) blocks during the second atlas. Another significant change since the first atlas is the number of blocks with confirmed nesting records. During BBA I, nesting was confirmed in 129 (39.3%) of the blocks, while nesting was confirmed in just 20 (30.8%) of the blocks during the second atlas. The proportion of probable nesting records—mostly pairs observed in suitable nesting habitat—was similar for both atlases, contributing 44% of the records found during the first atlas and 37% of the records in the second atlas. Results were similar for the Illinois BBA, where this partridge was found in just 5.8% of its blocks (all in northern Illinois), and nesting was confirmed in 48% of all blocks sampled (Kleen et al. 2004).



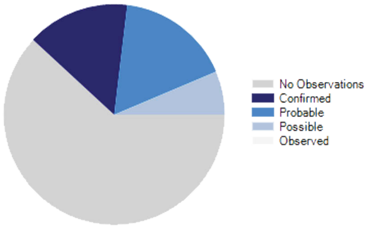
While Gray Partridge was found in 81 counties during the first atlas, with nearly statewide distribution, it was found almost exclusively in the northern half of the state (in only 36 counties) during the second atlas, with no records found south of Interstate 80. While the first atlas showed numerous blocks with confirmed nesting in the Missouri Alluvial Plain, there were no records in blocks in that area of the state during BBA II. During the first atlas, there were nearly as many records found in the Southern Iowa Drift Plain as were found in the entire state during the second atlas, while just a few records were found in this large region during BBA II. Similarly, Gray Partridge was confirmed nesting in nine blocks in Lyon County (northwestern corner of the state) during the first atlas, and it was found as a possible nester in just one Lyon County block during BBA II.

Rands (1986) observed that the removal of hedgerow nesting cover and increased use of agricultural pesticides was negatively impacting Gray Partridge populations. By the early 1990s, it was obvious that populations were declining in areas with intensive agriculture (Carroll 1993). In North Dakota, the lack of nesting cover was noted as a major limiting factor for this species (Carroll et al. 1990, Carroll and Crawford 1991, Carroll 1992). It has been observed that food sources decline with cleaner farming methods, and a key factor in Gray Partridge brood survival and overall population stability is the abundance of insects as a food source for chicks during the first five to six weeks of life (Erpelding et al. 1986, 1987, Offerdahl and Fivizzano 1987). If Iowa continues to be known for leading the nation in the total amount of pesticides used (Anonymous 1991, U.S. Department of Agriculture 1996), and if industrialized farming methods continue to predominate, Gray Partridge numbers can be expected to remain low.

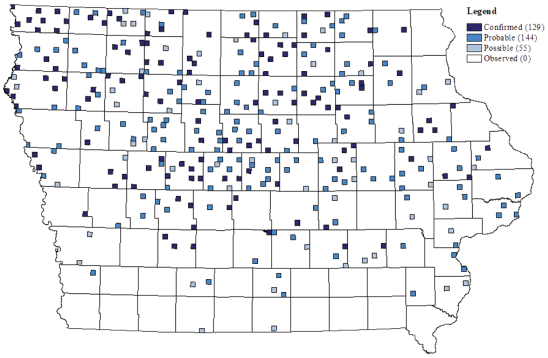
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	32	23	55
Probable	72	72	144
Confirmed	68	61	129
Conf & Prob	26.80%	33.30%	31.70%

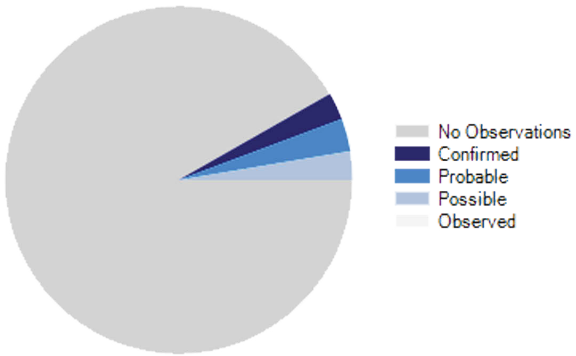
BBA I Results



BBA I



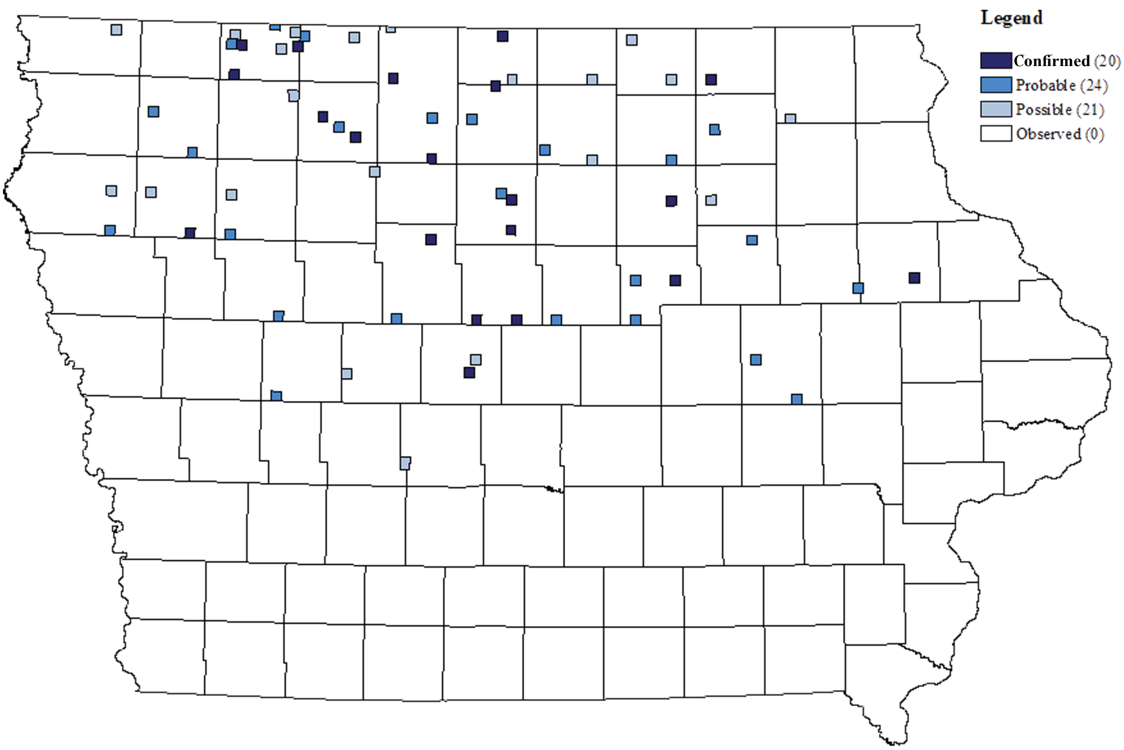
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	14	7	21
Probable	16	8	24
Confirmed	12	8	20
Conf & Prob	5.40%	4.00%	5.10%

BBA II



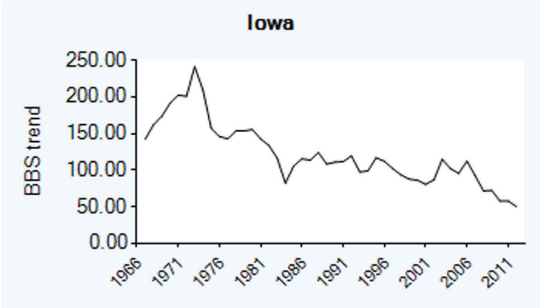
Sponsored by Anna Roisen

© Doug Harr

Habitat	Agricultural areas with grassy ditches, marshes, and bordering hedges or woodlots
Breeding Dates	26 Mar (PR)–7 Sep (CO)
Nest Type	Sparsely lined with vegetation and breast feathers in a slight ground depression
Clutch Size	Avg. 9–10
Incubation	23–28 days
Fledging	Precocial, leaving nest soon after hatching
Status	Regular nester and permanent resident
BBS Trend	Decreasing (trend = −1.9, 95% CI is −2.8, −0.9) [Iowa]

Patterns since BBA I

The Ring-necked Pheasant is a nonnative game bird first stocked in Iowa in the early 1900s. Because Iowa is such a highly agricultural state, pheasant population numbers have fluctuated over time and closely reflect land use and farming methods. Iowa's August Roadside Survey has been in place since 1962, and its results have provided a good method to track population changes. During the first atlas period, nearly two million acres of grassland acres were enrolled in Iowa through the Federal Farm Program's Conservation Reserve Program (CRP), and the pheasant population increased as more potential habitat became available (Andrews et al. 1993). Pheasants were found in 638 (74.1%) of BBA I blocks and in 633 (80%) of BBA II blocks, which appears to be quite similar results for both atlases. Less than half as many confirmed nesting records occurred in the second atlas, compared to the first. Some results for the Illinois BBA were similar to Iowa's BBA I results, because pheasants were confirmed nesting in 49.8% of all blocks sampled (Kleen et al. 2004). Iowa August Roadside Survey results indicate that the mean number of pheasants counted per 30 mile survey route in 1990 was 41.2, while that mean count decreased to 7.8 pheasants in 2012; the 2012 count results indicate a -64.8% change from the latest ten-year average (Fritzell et al. 2013). Iowa BBS data, from 2001–2011, indicate an average annual decrease of 1.9% (Sauer et al. 2012). The pheasant was found in only 4% more habitat blocks than grid blocks, which likely reflects the fact that pheasants do not typically require large patches of habitat to survive.



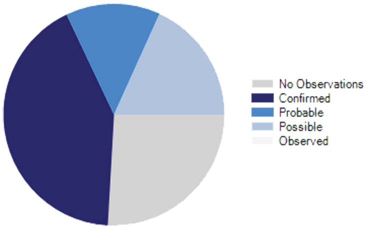
The distribution of this colorful pheasant remained essentially the same for both atlas periods, and records were documented in all counties for both atlases. Even though pheasants were not confirmed nesting in 96 counties, as they were in the first atlas, they continue to exist wherever adequate habitat is available—a tribute to this bird's adaptability. While grassland habitat increased in Iowa during the late 1980s, the opposite trend is now happening. The amount of Iowa grassland habitat converted to row-crop agriculture from 2006 to 2011 was about 376,000 acres; a land conversion rate that has not been witnessed since before the Dust Bowl in the 1930s (Wright and Wimberly 2013). While maintaining productive nesting cover may be the most important factor to maintain a healthy pheasant population (Farris et al. 1977), changing weather patterns, with increased snowfall and cooler and wetter springs, seem to be affecting pheasant production in recent years. According to pheasant biologist, Todd Bogenschutz (pers. comm.), pheasant populations have never increased following winters with more than the average number of inches of snowfall, while Iowa's pheasant population typically shows increases following mild winters (December–March) with springs (April–May) that are dryer and warmer than normal.

Modern-farming technology continues to steadily degrade most prime pheasant habitats (Giudice and Ratti 2001). As the transition continues from small diversified farms to large industrial scale farms, growing mostly two crops and using "clean farming practices," there will continue to be loss of field-edge habitat and loss of wetland habitat due to drainage and conversion to tilled land, as well as an increasing use of farm pesticides to increase production volume (Giudice and Ratti 2001, U.S. Department of Agriculture 1996, 2012). When all the facts are considered, it is fair to say that pheasants and other grassland birds have many challenges ahead.

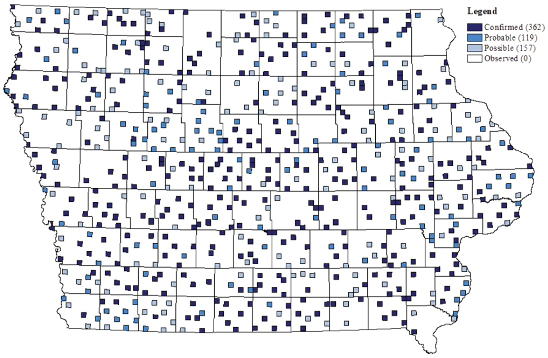
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	87	70	157
Probable	72	47	119
Confirmed	162	200	362
Conf & Prob	44.80%	61.90%	55.90%

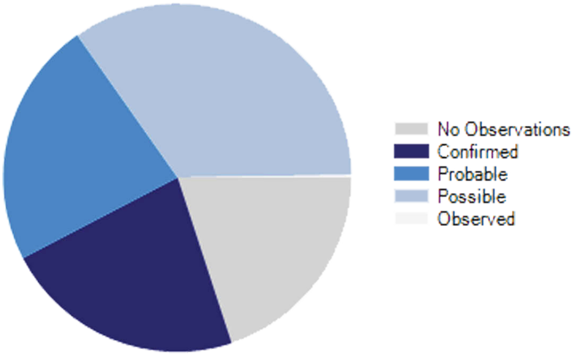
BBA I Results



BBA I



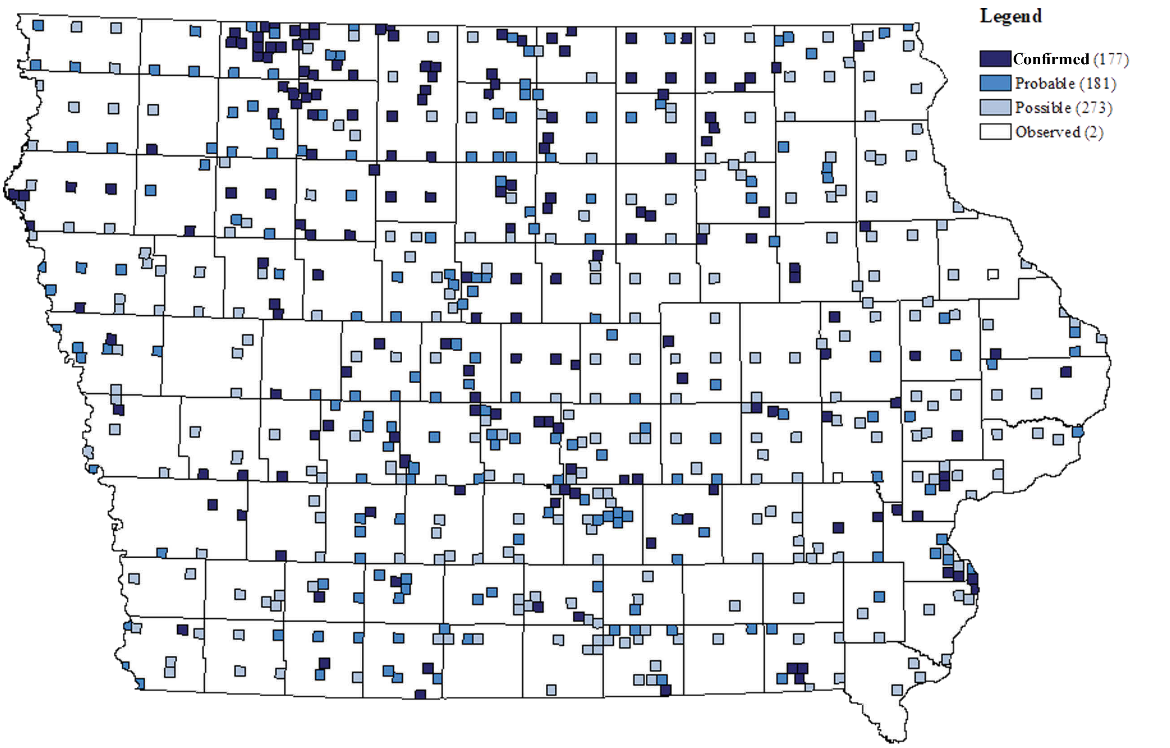
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	2	0	2
Possible	157	118	275
Probable	82	99	181
Confirmed	64	113	177
Conf & Prob	28.00%	53.10%	41.60%

BBA II

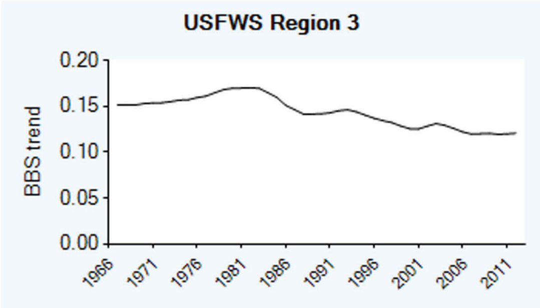


In Honor of Kirsten Winter (Carol Winter)

© Stanley Buman

Habitat	Freshwater marshes, lakes, sloughs, and ponds usually containing emergent or submergent vegetation
Breeding Dates	18 Apr (PR)–19 Aug (CO)
Nest Type	A floating platform constructed of plant material; anchored to vegetation
Clutch Size	In Iowa, 2–10 eggs (mean = 6.2)
Incubation	Varies from 23–27 days
Fledging	Young are independent 25–62 days after hatching (avg. 35 days); fledging time variable and possibly related to food quality
Status	Fairly common nesting species
BBS Trend	Increasing (trend = 1.9, 95% CI is 0.3, 3.3) [Central US]

Patterns since BBA I



The Pied-billed Grebe is the most widespread and most common nesting grebe in North America (Muller and Storer 1999). In Iowa it shares the same habitat as American Coot and is a common nester in marshes, lakes, and riparian sloughs—wherever adequate nesting habitat exists. This smallish grebe was detected in 165 (20.9%) of the 791 blocks visited, which was nearly double the number 84 (9.8%) of blocks in which this species was detected during BBA I. Perhaps an indicator that this grebe has specific habitat requirements for nesting, 83% of detections for this species were in habitat blocks. Considering this bird's secretive habits and how difficult it can be to see this grebe in the dense cattail marsh areas it typically inhabits, the confirmation of this grebe in 60 (36.4%) of the blocks seems a significant rate.

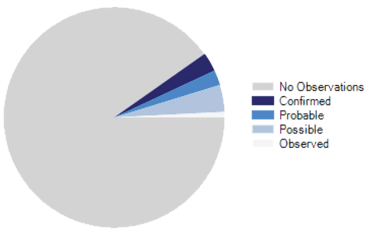
Distribution of this species, which appears to be statewide, is similar to the first atlas. As was shown during the first atlas, most confirmed nesting reports were within the Des Moines Lobe (Prairie Pothole) region in north-central Iowa. Backwater areas associated with the Mississippi River and its major tributaries in far eastern Iowa also produced several confirmed and probable nesting records, as did wetlands in the Missouri River floodplain. Areas lacking any records included several counties in extreme northwestern and southeastern Iowa and at least eight counties in northeastern Iowa. The southernmost block with confirmed nesting noted was in Sedan Bottoms WMA in Appanoose County.

The Pied-billed Grebe is vocal and aggressive; two traits that make it easier to detect than some other wetland species (Muller and Storer 1999). Probable nesting in blocks comprised 19.4% of all records, and the breeding evidence code most used for this category was pair observed in suitable nesting habitat. Breeding evidence codes most used for confirmed nesting included recently fledged young and attending young. Overall, 55.8% of the blocks where this grebe was detected were listed as confirmed or probable nesting status, but it is unknown whether this percentage is a reasonable representation of actual nesting. Atlassers in Illinois recorded Pied-billed Grebes as confirmed or probable nesters in 77.4% of blocks in which they were found in that state (Kleen et al. 2004).

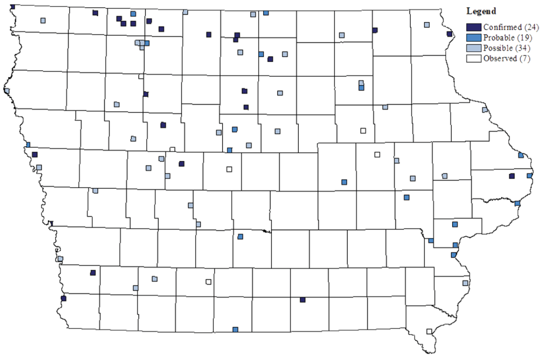
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	3	4	7
Possible	5	29	34
Probable	3	16	19
Confirmed	3	21	24
Conf & Prob	1.10%	9.30%	5.00%

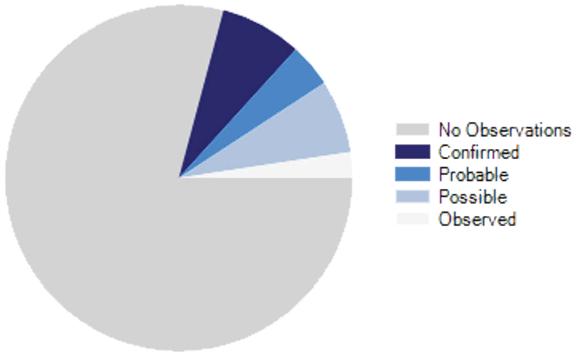
BBA I Results



BBA I



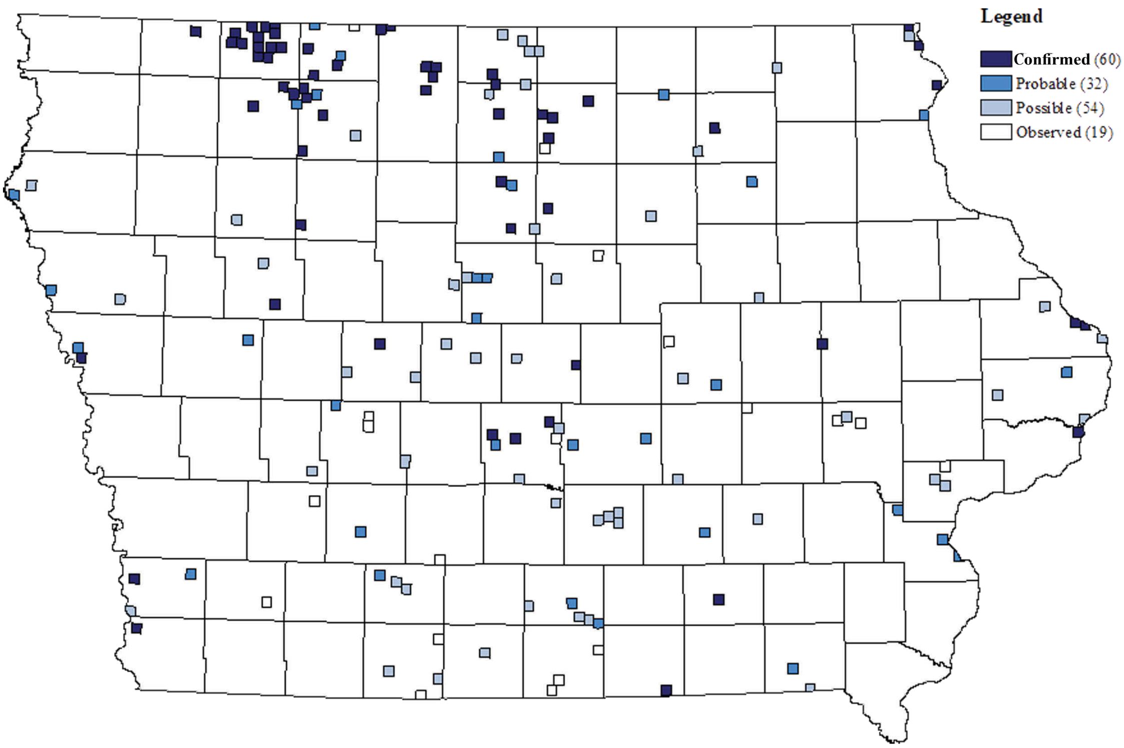
BBA II Results



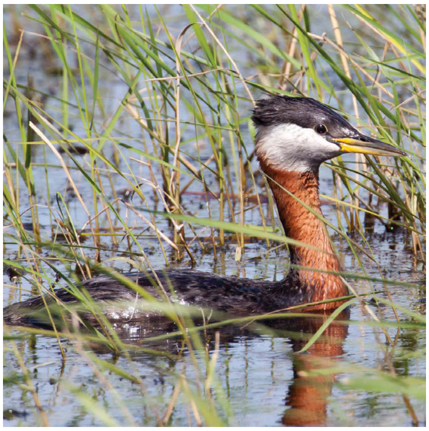
BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	4	15	19
Possible	12	43	55
Probable	4	28	32
Confirmed	9	51	60
Conf & Prob	2.50%	19.80%	10.70%

BBA II



Sponsored by Carol Winter

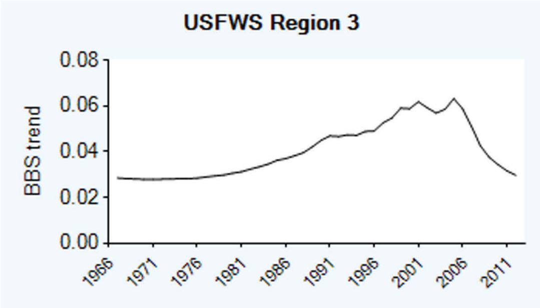


© Paul Roisen

Habitat	Marshes, shallow lakes, and sloughs with stands of emergent vegetation
Breeding Dates	18 May (PR)–13 Aug (CO)
Nest Type	Mound of plant material atop floating matt of aquatic vegetation attached to surrounding plants
Clutch Size	1–9 eggs (typically 4–5 eggs)
Incubation	20–23 days
Fledging	49–63 days
Status	Occasional nesting species
BBS Trend	Stable (trend = 0.7, 95% CI is −1.8, 3.4) [Central US]

Patterns since BBA I

Named for its chestnut colored neck, the Red-necked Grebe is a northern nesting species that typically inhabits shallow lakes and marshes. Known for its rather raucous calls on breeding grounds, its voice has been described as similar to that of a braying donkey, a trait that allows atlassers to easily identify it.



There is no concrete historical evidence that the Red-necked Grebe nested in Iowa, and by 1984, only four summer records existed for this species (J. J. Dinsmore et al. 1984). It is a recent nesting species in wetlands of Iowa's Prairie Pothole Bird Conservation Region in north-central and northwestern Iowa. The first Iowa nesting evidence recorded was a pair observed building a nest at Four-Mile Lake in Emmet County on 9 June 1993 (J. J. Dinsmore 1993), and that nest was abandoned. The first successful nest was confirmed with four eggs at Jemmerson Slough WMA (Dickinson County) on 17 June 1998, and on 7 July 1998, three newly hatched young were observed at that site (Fairbairn 1998). More recent nesting evidence includes two pairs of Red-necked Grebes with broods seen at Cheever Lake (Emmet County) on 21 July 2001 (J. J. Dinsmore 2001), an occupied nest on Cheever Lake on 28 June 2003 (J. J. Dinsmore 2003), and two pairs (one adult with two young riding on its back) seen at Grover's Lake (Dickinson County) on 15 July 2007 (J. J. Dinsmore 2007).

The Red-necked Grebe was detected in eight (1%) blocks during BBA II and was not detected during BBA I. This large grebe prefers large wetlands and rarely occupies water bodies smaller than 2 ha toward the southern end of its range (Riske 1976 in Stout and Nuechterlein 1999, De Smet 1983 in Stout and Nuechterlein 1999). This species was confirmed to nest in four blocks, all of which were public areas. The four confirmed nesting locations were at Diamond Lake (Dickinson County), Union Slough National Wildlife Refuge (Kossuth County), Eagle Lake WMA (Hancock County), and Big Wall Lake WMA (Wright County). Young were documented at all four sites. There were no probable nesting records, and the two possible nesting records were on public wetland areas in Winnebago and Worth counties. Since 2015, Trumbull Lake (Clay County) has been particularly important for Red-necked Grebes, with multiple broods observed.

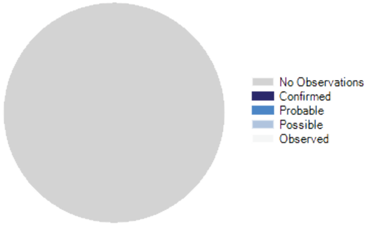
Based on results of aerial surveys and breeding population censuses, the North American population of Red-necked Grebes was thought to likely exceed 45,000 individuals (Stout and Nuechterlein 1999). It is estimated that at least 70% of the population resides in Canada, and although BBS data are limited for this species, Canadian BBS trends (Sauer et al. 2005) indicate an overall stable population during the last 20 years.

The nearest nesting population of Red-necked Grebes to Iowa is southern Minnesota and southern Wisconsin. It is listed as state Endangered in Wisconsin (Wisconsin Department of Natural Resources 2005), and it is listed in Minnesota as a Species of Greatest Conservation Need, primarily because this species is uncommon and its lake and wetland habitats are in serious decline (Minnesota Department of Natural Resources 2013). One of the more serious threats to this species is the modification and degradation of lakes and human disturbance from water-based recreational activities (Del Hoyo et al. 1992). All nest sites documented for the Red-necked Grebe in Iowa have been on public lands, and this grebe is listed as a Species of Greatest Conservation Need. How Iowa's wetland areas are managed, and the type of activities allowed during the nesting season may determine the future of this nesting species.

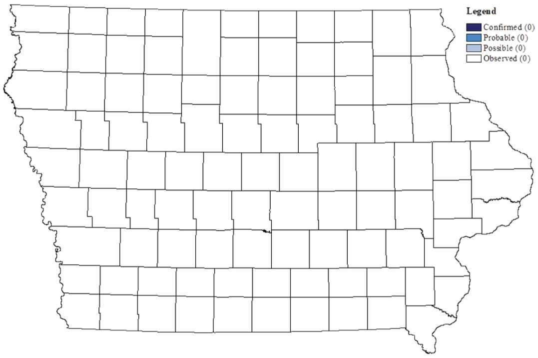
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	0	0	0
Probable	0	0	0
Confirmed	0	0	0
Conf & Prob	0.00%	0.00%	0.00%

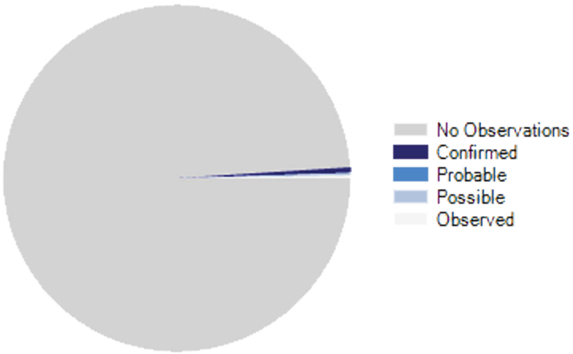
BBA I Results



BBA I



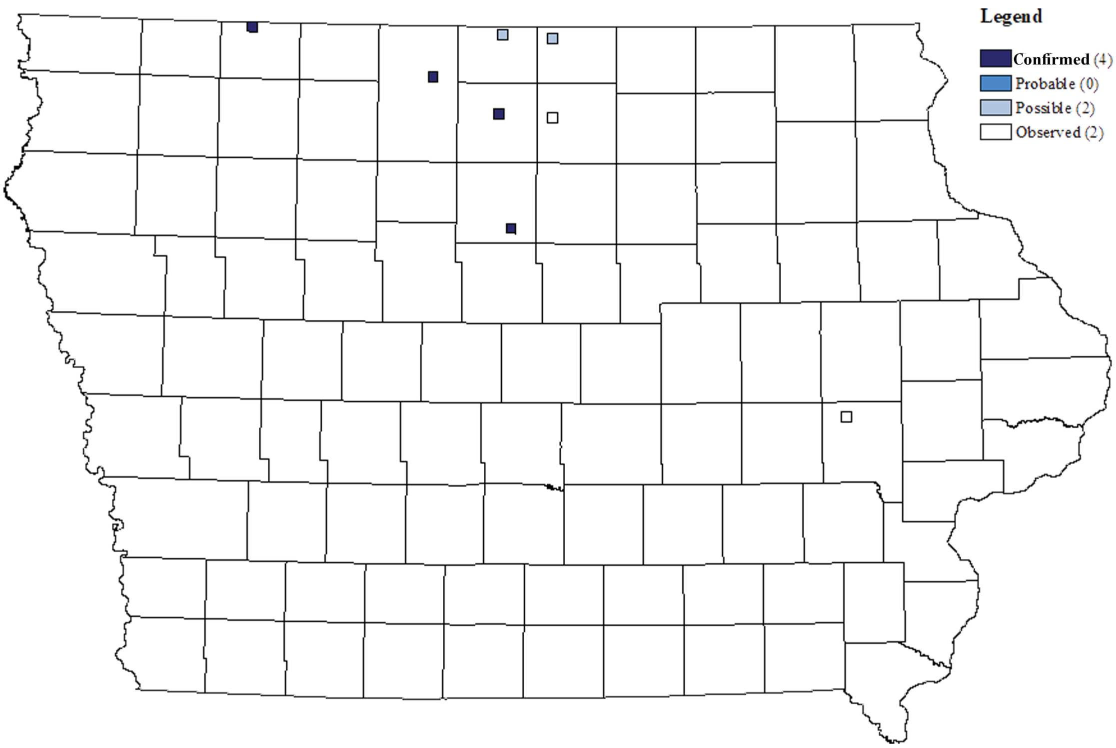
BBA II Results



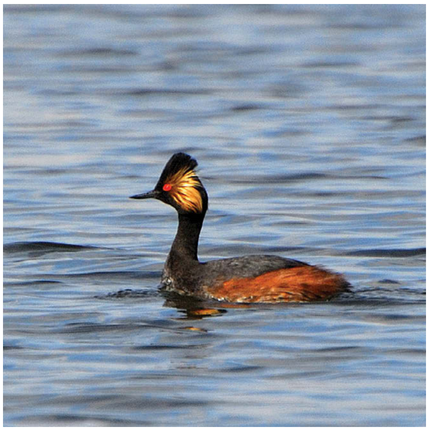
BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	1	1	2
Possible	1	1	2
Probable	0	0	0
Confirmed	1	3	4
Conf & Prob	0.20%	0.80%	0.50%

BBA II



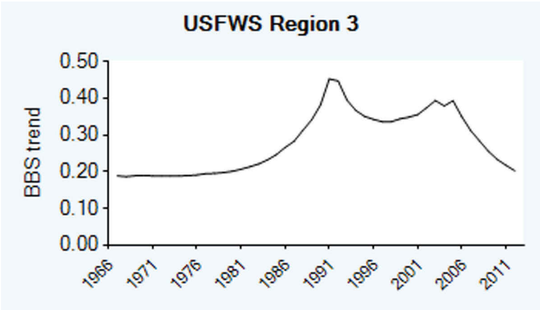
Sponsored by Bruce Ehresman



© Kip Ladage

Habitat	Shallow, larger wetlands typically containing emergent and submergent vegetation
Breeding Dates	14 Jun (PR)–1 Aug (CO)
Nest Type	Mound (12–14 in. dia.) of plant material atop floating mat of aquatic vegetation
Clutch Size	1–6 eggs (typically 3–4 eggs)
Incubation	20–22 days
Fledging	~35 days
Status	Occasional nesting species
BBS Trend	Stable (trend = 0.0, 95% CI is −5.4, 2.5) [Central US]

Patterns since BBA I



While the Eared Grebe is the most abundant species of its family in North America (Cullen et al. 1999), Iowa is at the eastern edge of its breeding range. It is considered a local and rare nesting species in wetlands of Iowa's Prairie Pothole Bird Conservation Region in north-central and northwestern Iowa (Jackson et al. 1996). This smallish grebe was detected in six (0.8%) blocks, quite like five blocks in which this species was detected during BBA I. In Minnesota, this species typically nests in marshes larger than 30 ha, with 42–100% open water (Boe 1992). In Iowa, this type of wetland habitat is found almost exclusively on public land. Not surprisingly, all three blocks where this species was confirmed nesting, as well as the two probable nesting records, were in habitat blocks. The three records of confirmation all were of attending young, and the three blocks included Diamond Lake WMA (Dickinson County), Maynard Reece WPA (Kossuth County), and Big Wall Lake WMA (Wright County). Probable nesting included a territorial adult at Eagle Lake (Hancock County) and evidence of courtship at Coulter Marsh (Franklin County). Prior to this atlas, the last known confirmed nesting for this species was near Center Lake and at Grover's Lake in Dickinson County in 1993 (Kent and Dinsmore 1996). A pair of Eared Grebes was seen at Grover's Lake on 24 May 2011, just outside a BBA block.

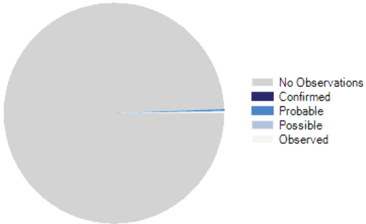
Distribution of this species was similar for both atlases, with the highest evidence of nesting confined to the Des Moines Lobe region. Since 1992, the Wetland Reserve Program has funded the purchase of 593 easements and contracts in Iowa, and there have been at least 64,593 wetland acres permanently protected and converted from agricultural purposes back to wetlands and grasslands (Natural Resources Conservation Service 2005), especially in the Des Moines Lobe. It appears that this landscape-scale wetland restoration effort has provided more Eared Grebe habitat, and this species is beginning to respond with its presence during nesting season. If Iowa can continue to create and enhance large landscape-scale wetlands, areas where this species currently nests can potentially serve as epicenters from which Eared Grebe colonies may grow (Boe 1993, 1994).

Eared Grebe

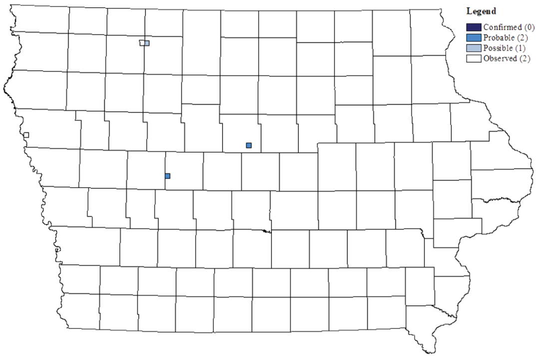
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	1	1	2
Possible	0	1	1
Probable	0	2	2
Confirmed	0	0	0
Conf & Prob	0.00%	0.50%	0.20%

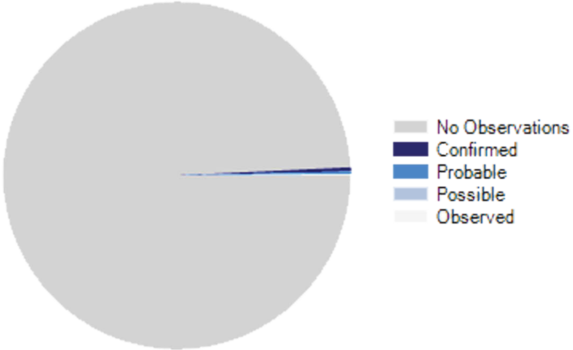
BBA I Results



BBA I



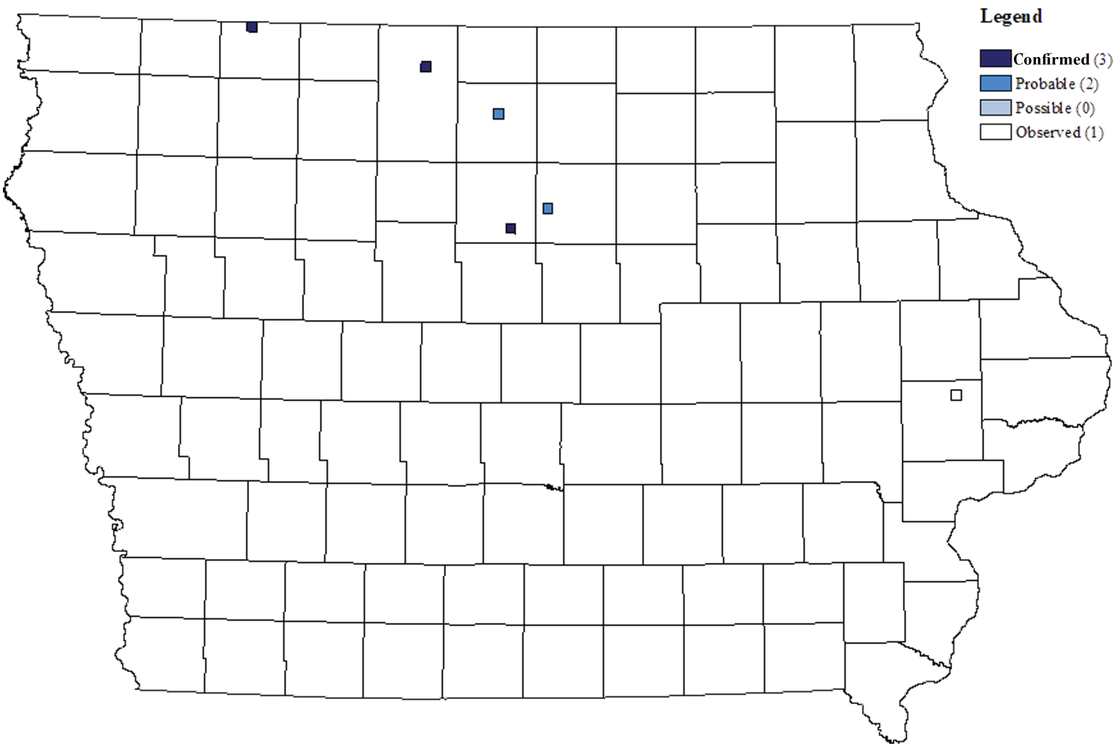
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	1	0	1
Possible	0	0	0
Probable	0	2	2
Confirmed	0	3	3
Conf & Prob	0.00%	1.30%	0.60%

BBA II

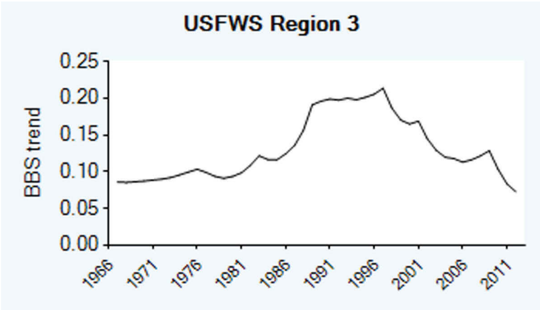


Sponsored by Marlene Ehresman

© Tyler Harms

Habitat	Lakes and marshes with thick stands of emergent vegetation and presence of fish
Breeding Dates	NA
Nest Type	Large mound of plant material atop floating matt of aquatic vegetation attached to surrounding plants
Clutch Size	2–6 eggs (typically 3–4 eggs)
Incubation	22–24 days
Fledging	~70 days
Status	Occasional nesting species
BBS Trend	Increasing (trend = 4.4, 95% CI is 0.6, 10.3) [Central US]

Patterns since BBA I



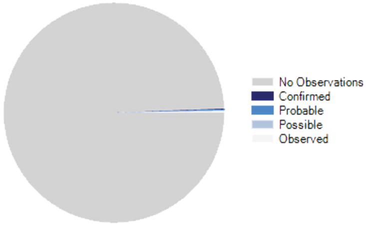
The Western Grebe is a rare nesting species in wetlands of Iowa's Prairie Pothole Bird Conservation Region in north-central and northwestern Iowa (Jackson et al. 1996). This largest grebe was detected in three (0.4%) blocks, not unlike the five blocks in which this species was detected during BBA I. The type of Iowa wetland habitat this species prefers is mostly found on public land, and the only block in which this species was confirmed nesting (nest building) was the habitat block containing Eagle Lake WMA in Hancock County. Western Grebe had previously been reported to nest at Eagle Lake WMA in 2002, when, on 6 July, two adults with a downy young were reported by Paul Hertzel and Mark Proescholdt (J. J. Dinsmore 2002). This site is one of four locations where Western Grebe has been confirmed to nest in the state. This species nested at Rush Lake (Osceola County) in 1981, 1984, and 1988 and Silver Lake (Worth County) in 1992 (Kent and Dinsmore 1996). In 2008, at Union Slough National Wildlife Refuge in Kossuth County, it appears that several Western Grebe nests hatched young, and on 30 July, Matt Kenne and Carolyn Fischer reported seeing five adults carrying four young on their backs (J. J. Dinsmore 2008). The other two atlas blocks with records were single birds observed on public lakes in Audubon and Boone counties, respectively.

Although there were few records from which to draw conclusions, distribution of the Western Grebe appeared similar for both atlases, with confirmed nesting confined to the Des Moines Lobe region. Since Iowa is located toward the eastern end of this species' nesting range, perhaps this species cannot be expected to increase. The fact that Iowa's water quality is rated near the lowest in the United States may not bode well for this species' future in Iowa. A recent study to determine if water quality was high enough, in northern Iowa, to consider reintroduction of Common Loon found that water clarity was much too low to consider such a reintroduction endeavor (Iowa DNR unpublished). It is worth considering that Western Grebes, like loons, need to be able to see and catch the fish that they are pursuing as food (Palmer 1962). As Iowa improves the water quality of its larger prairie lakes and wetlands and as larger wetland complexes are restored, perhaps there will be more nesting Western Grebes.

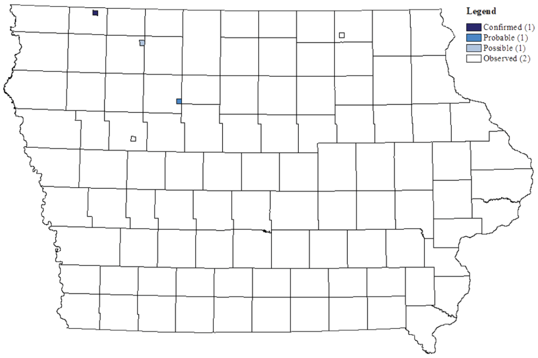
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	1	1	2
Possible	1	0	1
Probable	1	0	1
Confirmed	1	0	1
Conf & Prob	0.40%	0.00%	0.20%

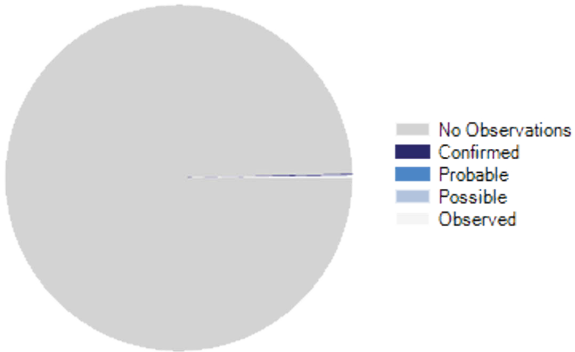
BBA I Results



BBA I



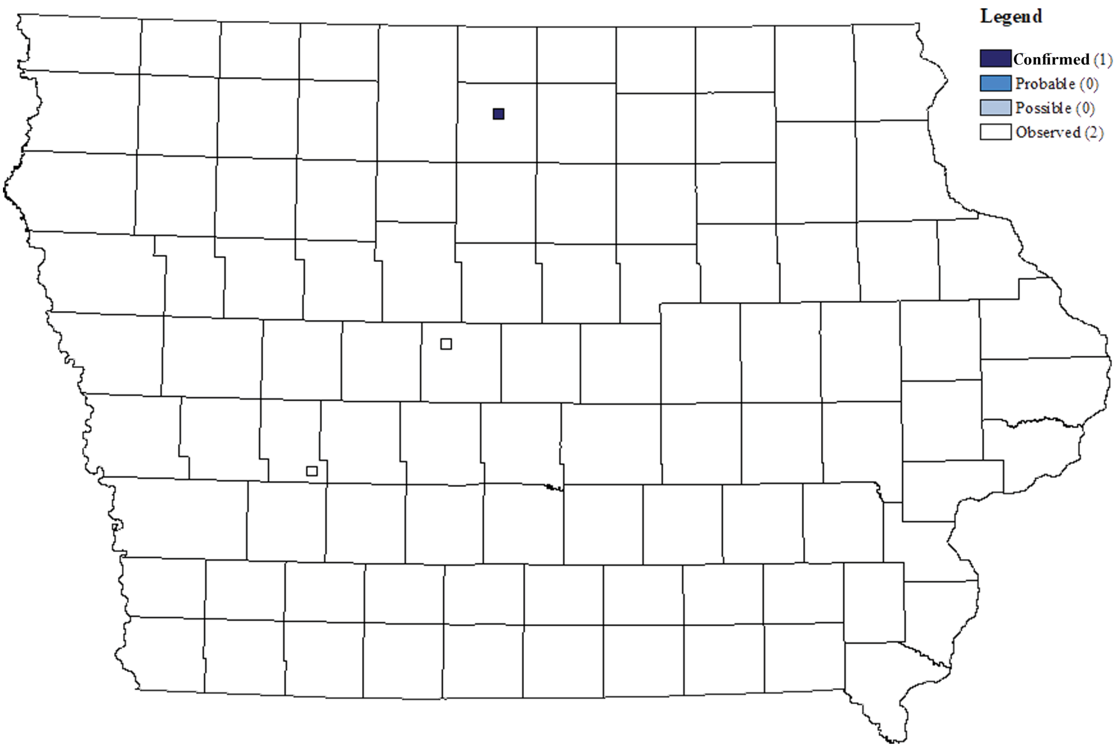
BBA II Results



BBA II (2008–2012) Breeding Evidence

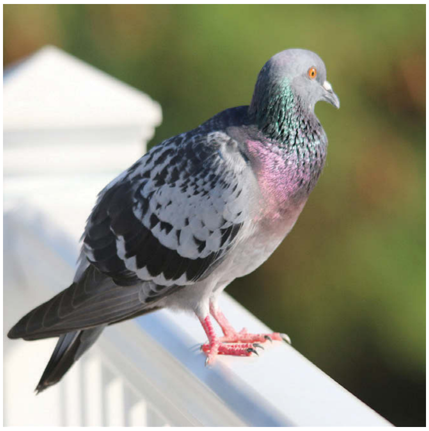
Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	2	2
Possible	0	0	0
Probable	0	0	0
Confirmed	0	1	1
Conf & Prob	0.00%	0.30%	0.10%

BBA II



Sponsored by Heath Petersen

Rock Pigeon *Columba livia*

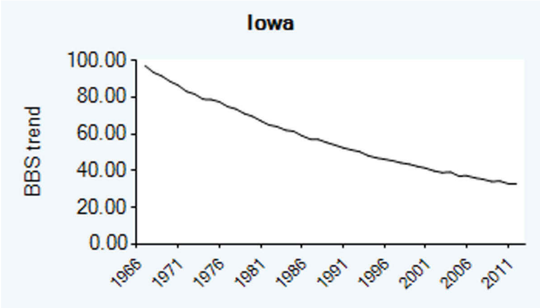


© Doug Harr

Habitat	Cliffs, ledges, urban, and rural buildings, and bridges
Breeding Dates	6 Mar (PR)–25 Sep (CO)
Nest Type	A loose platform of stems, roots, leaves, and other plant matter
Clutch Size	2 eggs
Incubation	17–19 days
Fledging	25–32 days
Status	Abundant breeding bird and year-round resident
BBS Trend	Decreasing (trend = −2.1, 95% CI is −3.3, −0.9) [Iowa]

Patterns since BBA I

The Rock Pigeon is named for its propensity to nest on rocky cliffs and ledges. Native to Eurasia and Northern Africa, it was introduced to this continent in the early seventeenth century by colonists who brought domesticated pigeons to east coast settlements. It inhabits all of Iowa's open habitats and is especially prevalent in cities and towns where nest sites and stable food sources (especially grain) are available. Particularly feral populations are found nesting on rocky bluffs of large rivers, like the Mississippi and the Upper Iowa. During this atlas, this pigeon was detected in 722 (91.3%) blocks. Because of its ability to inhabit such a great variety of habitats, it was found almost equally in habitat (49.6%) blocks and grid (50.4%) blocks. The Rock Pigeon has been known to nest in every month of the year and can produce several broods each year (Lowther and Johnston 2014). Because this species shows a tendency to nest on or in human-made structures, it is fairly easy to observe at many of its nesting sites. Nesting was confirmed in 403 (55.8%) of all blocks, while probable nesting was documented in 238 (33%) of the blocks. Perhaps because so many nests were documented under road bridges where contents of the nest could be easily seen by atlassers, several breeding evidence codes were nearly equally used to describe confirmed nesting. Similar to other species in the dove family, pair observed in suitable habitat was the code most used to describe probable nesting.

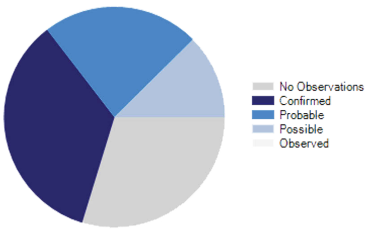


Distribution of the Rock Pigeon did not change significantly from BBA I to BBA II, and this species was found in all counties during both atlases. Even though Iowa Breeding Bird Survey data indicate Rock Pigeon numbers are decreasing at the rate of -2.1% annually and national BBS data indicate an annual average decrease of -1.3% from 1966–2011 (Sauer et al. 2012), this species was detected in 117 (16%) more blocks during the second atlas than the first, and 103 more blocks were listed with confirmed nesting. This atlasser visited 656 BBA II blocks and noted that a high percentage of the confirmed records for pigeon came from nests found under road bridges (Ehresman pers. obs.). While the number of farm buildings that typically provide nest sites for pigeons appear to be decreasing, the number of new concrete road bridges seem to be increasing, apparently providing very safe and dependable nest sites for pigeons. Since this bird now lives in association with humans on all continents except Antarctica, it appears that the future of this adaptable nonnative Rock Pigeon is secure.

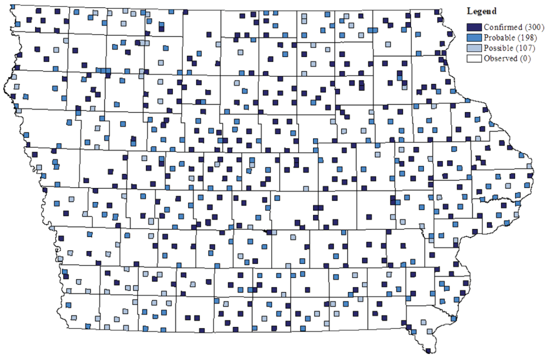
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	60	47	107
Probable	94	104	198
Confirmed	144	156	300
Conf & Prob	45.60%	65.20%	57.80%

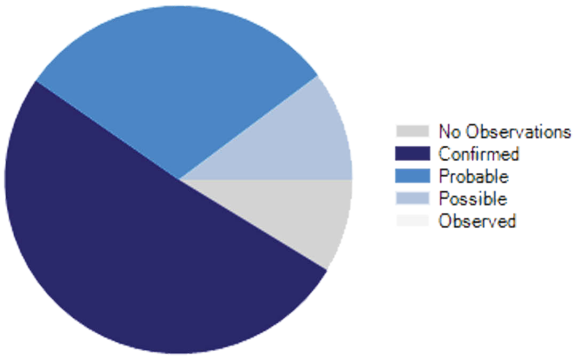
BBA I Results



BBA I



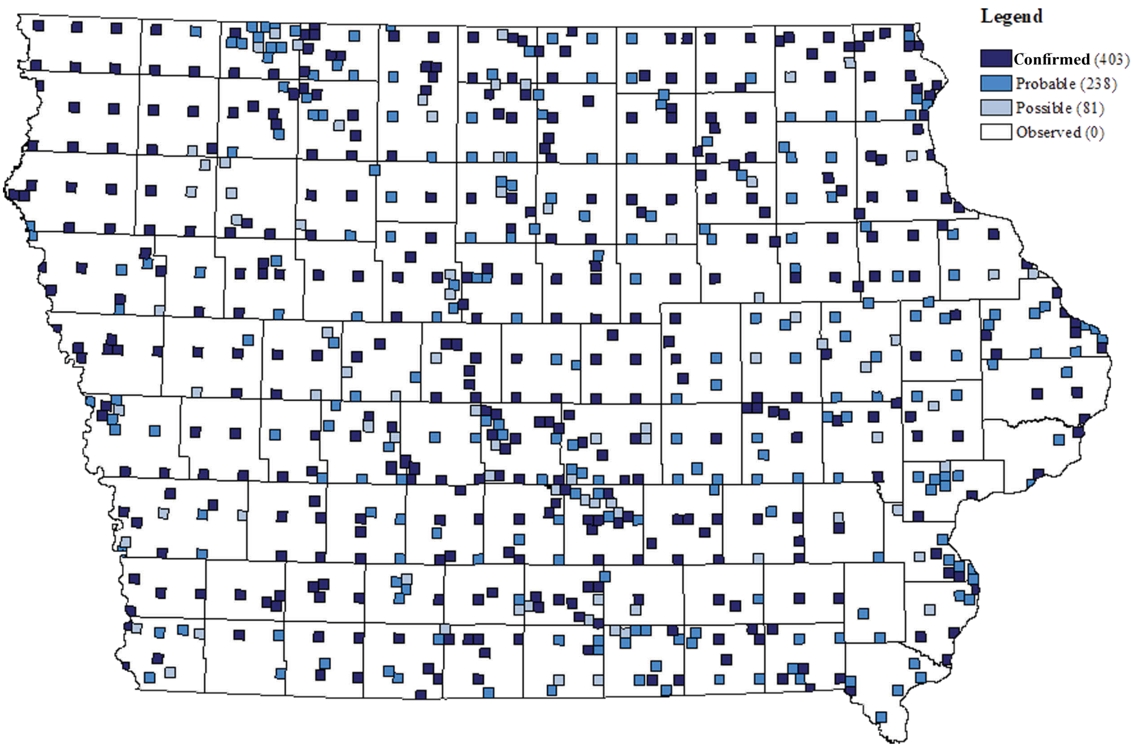
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	29	52	81
Probable	118	120	238
Confirmed	217	186	403
Conf & Prob	64.20%	76.70%	74.40%

BBA II



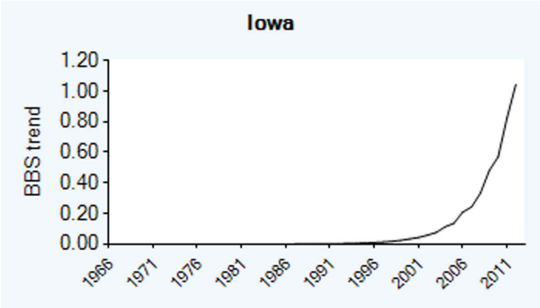
Sponsored by Lydia Somers

© Linda Petersen

Habitat	Open habitats, but particularly prevalent in small towns with grain elevators and conifer trees
Breeding Dates	6 Mar (PR)–4 Sep (PR)
Nest Type	Platform of twigs, stems, roots, and grasses; nests typically on horizontal branches of trees (especially evergreens)
Clutch Size	1–2 eggs (typically 2 eggs)
Incubation	14–15 days
Fledging	~17 days
Status	Uncommon to locally common breeding bird
BBS Trend	Increasing (trend = 33.4, 95% CI is 21.5, 46.3) [Iowa]

Patterns since BBA I

The Eurasian Collared-Dove was first released in the New World in the mid-1970s in the Bahamas, and it quickly spread across this continent. This dove was first documented in Iowa in the fall of 1997 at Grinnell (Poweshiek County), and a second report that year involved a report of a dead bird found in Marshall County (Kent 1998a). Nesting pairs quickly spread through the state (Cecil 1999, Kent 1999, Kenne 2000, Cecil and Johnson 2000, J. J. Dinsmore 2001, Brees 2003), and by 2004 this species had been reported in 29 of Iowa's 99 counties (Cecil 2004). Iowa DNR personnel also recorded this dove's colonization of the state, and by 21 August 2005, it had been documented in 42 counties (Iowa DNR unpublished report). Iowa BBS data (2001–2011) indicate this species is increasing at an annual average rate of 11.7% each year (Sauer et al. 2012).



During this second atlas, the Eurasian Collared-Dove was detected in 219 (27.7%) blocks within 90 counties. Perhaps because it seems to prefer small towns with grain elevators and evergreen trees, this species was found in more grid (56.6%) blocks than habitat (43.4%) blocks. This dove is larger than the Mourning Dove and has a distinctive call. Much like the Mourning Dove, it seems relatively easy to confirm its nesting. At sites where this species has been known to breed for several years, it is not unusual to witness flocks of 15–20 of these birds, with as many as 50 birds observed (during winter) in the small rural town of Kelley in Story County (Ehresman pers. obs.). This dove was confirmed to nest in 32.4% of all blocks where it was found, and it was listed as a probable nester in 41.4% of all blocks. Like Mourning Dove, recently fledged young was the main breeding evidence code used to describe confirmed nesting, and pair observed in suitable habitat was the code most used to describe probable nesting.

Distribution of the Eurasian Collared-Dove is statewide. It was documented in BBA II to occur in all counties bordering both the Missouri and Mississippi rivers. The area of the state where this species was least represented was northeastern Iowa, where it was not detected in five counties (Howard, Buchanan, Delaware, Jones, Henry). There also were four scattered counties (Ida, Calhoun, Page, and Union) in western Iowa where this dove was not documented. The highest incidence of detection appeared to be in south-central Iowa. Similar statewide colonization was documented in Illinois, after this species arrived in that state in the mid-1990s (Walk and Esker 2001).

As local populations have grown it appears that this species is pioneering into more rural areas of the state, as well as into suburban areas. The dove was often detected on industrial-scale farms that held numerous large grain storage bins and silos, and nesting was often confirmed when these same sites held conifer windbreaks or evergreen trees (Ehresman pers. obs.). In suburban areas, where Mourning Doves already are prevalent, it appears that Eurasian Collared-Doves also are carving out a niche of their own. While the ecologies of these two dove species seem similar, there is no conclusive evidence that one species out-competes the other (Walk et al. 2010b).

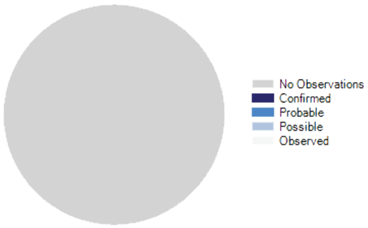
At present, it appears that there is little to limit the spread of this dove in North America. It is thriving in colder regions whenever there is year-round availability of food and where there exists adequate shelter against extreme cold temperatures.

Eurasian Collared-Dove

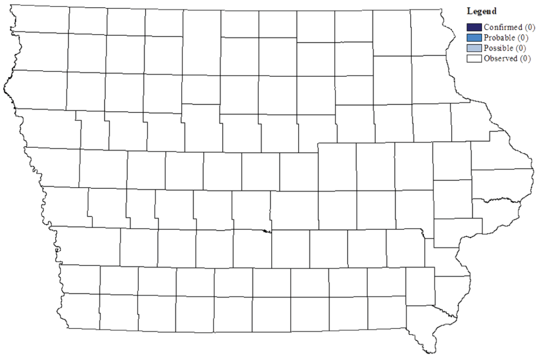
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	0	0	0
Probable	0	0	0
Confirmed	0	0	0
Conf & Prob	0.00%	0.00%	0.00%

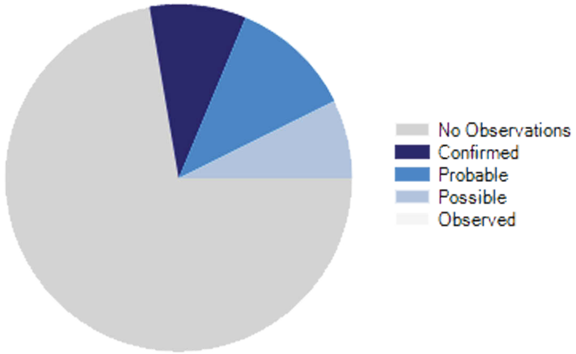
BBA I Results



BBA I



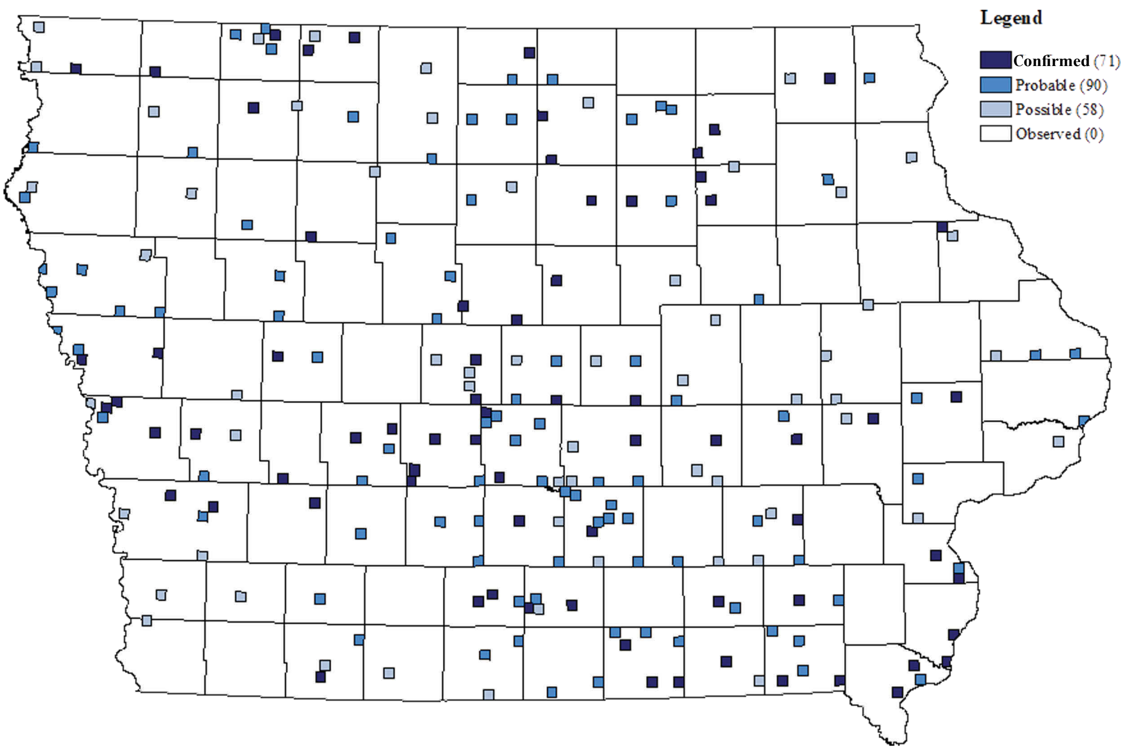
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	32	26	58
Probable	56	34	90
Confirmed	36	35	71
Conf & Prob	17.60%	17.30%	18.70%

BBA II

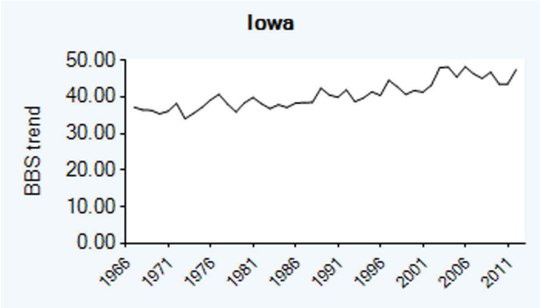


In Honor of Doug Harr, Iowa Audubon
(Pat Schlarbaum)

© Tom Schilke

Habitat	Open habitats of all types; open woodland, farm groves, suburban yards and city parks, conifer stands
Breeding Dates	24 Mar (PR)–1 Sep (CO)
Nest Type	Platform of twigs and sticks lined with grass typically on horizontal branches 10–25 ft. above ground
Clutch Size	2–4 eggs (typically 2 eggs)
Incubation	13–14 days
Fledging	13–15 days
Status	Common and abundant statewide breeding bird
BBS Trend	Stable (trend = 0.2, 95% CI is −0.4, 0.7) [Iowa]

Patterns since BBA I



The Mourning Dove inhabits all of Iowa's open habitats. This species is known as a habitat generalist and is frequently found in both urban and rural human-altered landscapes (Otis et al. 2008). During BBA II, this dove was detected in all 791 (100%) blocks. Its status during the first atlas was similar, when it was the fourth most detected species (Jackson et al. 1996). Because of its ability to inhabit very small patches of a variety of habitats, it was found equally in habitat (50%) blocks and grid (50%) blocks. The Mourning Dove has a long nesting season and can produce several broods per nesting season. This species is easy to detect, and nesting was confirmed in 634 (80.2%) of the blocks. During the first atlas, this species was confirmed nesting in 428 (61.7%) of the blocks where it was detected, and that lower confirmation rate might be the biggest difference in data collected during the two atlases. The higher confirmation rate of the second atlas was likely related to a higher effort to document nesting, and the overall status of this species in Iowa is stable, according to Sauer et al. (2012). Recently fledged young was the main breeding evidence code used to describe confirmed nesting, and pair observed in suitable habitat was the code most used to describe probable nesting. Overall results were similar for the Illinois BBA, where this dove was found in 91% of its blocks and confirmed nesting in 66.6% of all blocks (Kleen et al. 2004).

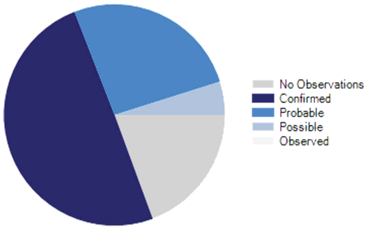
Distribution of the Mourning Dove did not change significantly from BBA I to BBA II, and this species was found in all counties during both atlases. Of 251 bird species analyzed for relative abundance throughout its distribution on 1989 North American BBS, Mourning Dove ranked eleventh (Droege and Sauer 1990). Mourning Dove is legally hunted in Iowa, and even though this is the most harvested game bird on this continent (about 20 million doves annually) (U.S. Fish and Wildlife Service 2007), hunting does not appear to cause significant adverse effects on the overall population of this species (Walk et al. 2010b).

While the future of this species seems secure, the ingestion of lead by Mourning Doves may have an adverse effect on local doves, when lead shot is ingested from fields planted to attract Mourning Doves during the hunting season (Otis et al. 2008). Results of studies in Missouri suggest that "doves feeding in fields hunted with lead shot may succumb to acute lead toxicosis and thus become unavailable to harvest, resulting in an underestimate of lead shot ingestion rates" (Schulz et al. 2009). Schultz et al. (2009) further state, "We recommend that management agencies initiate development of a long-term strategic plan aimed at implementing a non-toxic shot regulation for Mourning Dove hunting."

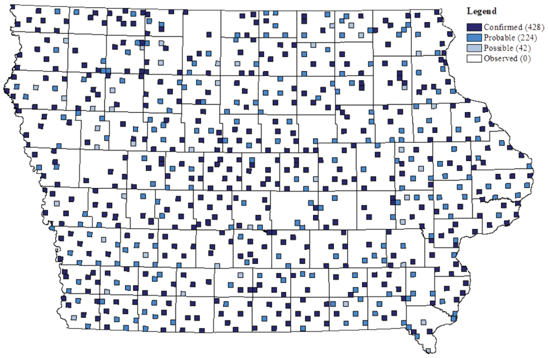
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	32	10	42
Probable	130	94	224
Confirmed	193	235	428
Conf & Prob	61.90%	82.50%	75.70%

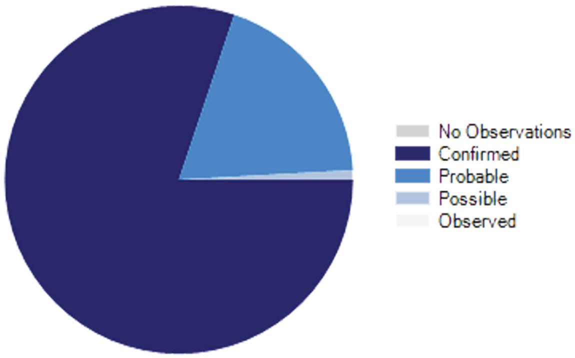
BBA I Results



BBA I



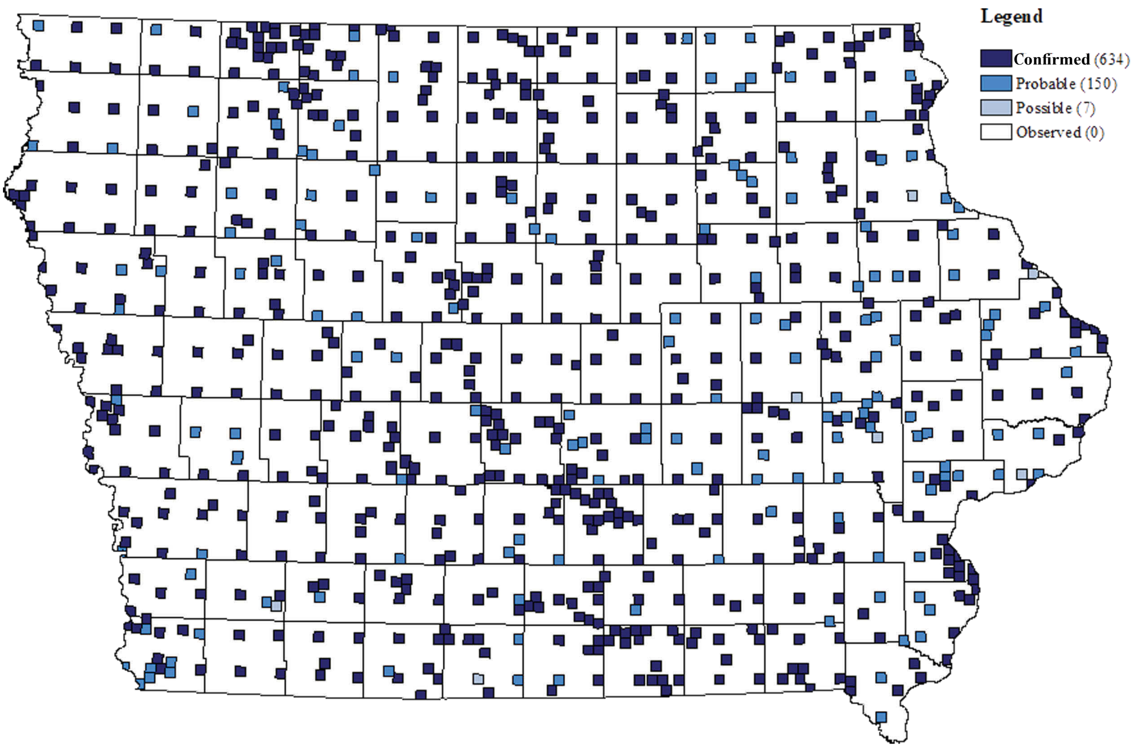
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	5	2	7
Probable	84	69	153
Confirmed	309	326	635
Conf & Prob	75.30%	99.00%	91.50%

BBA II



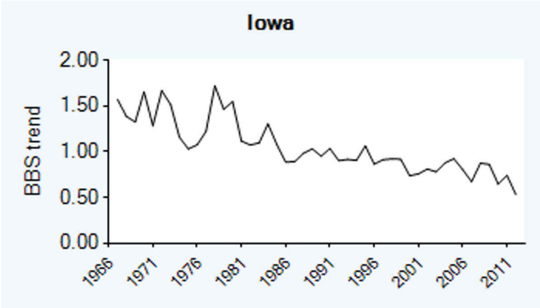
In Honor of Dave Miller, Amber Wiewel, and family (Paul Skrade)

© Reid Allen

Habitat	Shrubby woodlands and farm groves, dense thickets along rivers and streams
Breeding Dates	22 May (CO)–26 Sep (CO)
Nest Type	Flimsy platform of sticks and twigs lined with grass and rootlets on horizontal branches of small trees or shrubs, 4–8 ft. above ground
Clutch Size	1–5 eggs (typically 2–3 eggs)
Incubation	9–11 days
Fledging	Leaves nest by 7–9 days; flies by 21 days
Status	Common statewide nester
BBS Trend	Decreasing (trend = −1.7, 95% CI is −3.0, −0.5) [Iowa]

Patterns since BBA I

The Yellow-billed Cuckoo is a woodland edge shrub species that was considered a common breeder statewide, prior to the first atlas (J. J. Dinsmore et al. 1984). While this species is known to be erratic in its distribution and abundance over time (Walk et al. 2010b), data from the current atlas appear quite similar to the data collected during the first atlas. During the second atlas, this cuckoo was detected in 466 (58.9%) blocks, and it was recorded in 456 (53%) blocks in the first atlas. Most BBA II records (71.7%) were within habitat blocks, and it appears that records were most strongly associated with riparian corridors and public areas with lakes, rivers, and streams. Nesting was confirmed in 47 (10.1%) of the blocks, and 72% of those were habitat blocks. The largest difference in data collected during the two atlases was a higher proportion (43%) of probable BBA II records, compared to 23% probable BBA I records. The fact that there were more than four times as many probable records as those confirmed (during BBA II) is likely attributable to how difficult it is to find this cuckoo's nest within its favored dense shrubby habitat.



Iowa BBS data indicate this species is decreasing at an average annual rate of 1.7% (Sauer et al. 2012). A similar decreasing trend is seen from BBS and other survey data in Illinois, where Yellow-billed Cuckoos are declining across the state in a pattern like that of other shrubland birds like Northern Bobwhite and Brown Thrasher (Walk et al. 2010b). The Yellow-billed Cuckoo appears to continue to be more abundant than the Black-billed Cuckoo, although both species show significant declines in the long-term BBS trend (Sauer et al. 2012).

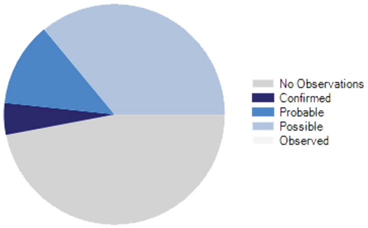
Distribution of the Yellow-billed Cuckoo did not change significantly from BBA I to BBA II, and this cuckoo continues to occur statewide. There did, however, appear to be a decrease in the number of blocks with records in extreme northwestern Iowa during BBA II. For instance, there were no records for either Sioux or Osceola counties, both of which had block records during the first atlas. This change may be related to a decrease in shrubby habitat within that highly tilled area of the state. Two more northwestern Iowa counties where no atlas records were found, include Ida and Calhoun. The fifth county with no atlas records is Grundy, which is another highly tilled landscape. While the Black-billed Cuckoo is better known for its association with riparian habitat than is Yellow-billed Cuckoo, it appears that much of Iowa's best remaining habitat for cuckoos lies along riparian corridors and on public owned lands.

Factors affecting the status of this Iowa species are the same as those mentioned by Jackson et al. (1996) after the first atlas was completed. Annual reproductive success can be highly variable, and outbreaks of various species of caterpillars or periodical cicadas often provide the food availability necessary for high nesting success (Hughes 2015). Since the nesting success of this species is tied closely to an abundance of insect prey, if Iowa continues to be one of the leading states in its use of insecticides for row-crop farming operations, the impacts of that will not bode well for the future of this species. Similarly, continued widespread elimination of hedgerows, brushy fields, and shrubby edge habitat will likely maintain a declining trend in Iowa's Yellow-billed Cuckoo population.

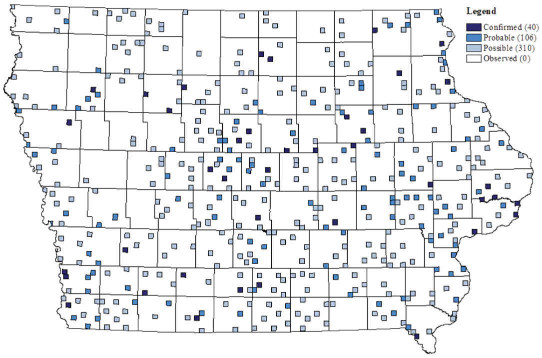
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	139	171	310
Probable	37	69	106
Confirmed	14	26	40
Conf & Prob	9.80%	23.80%	17.00%

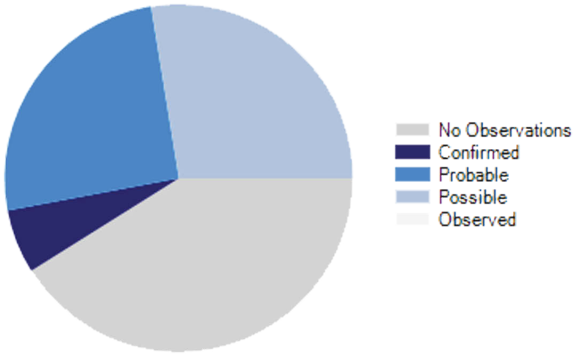
BBA I Results



BBA I



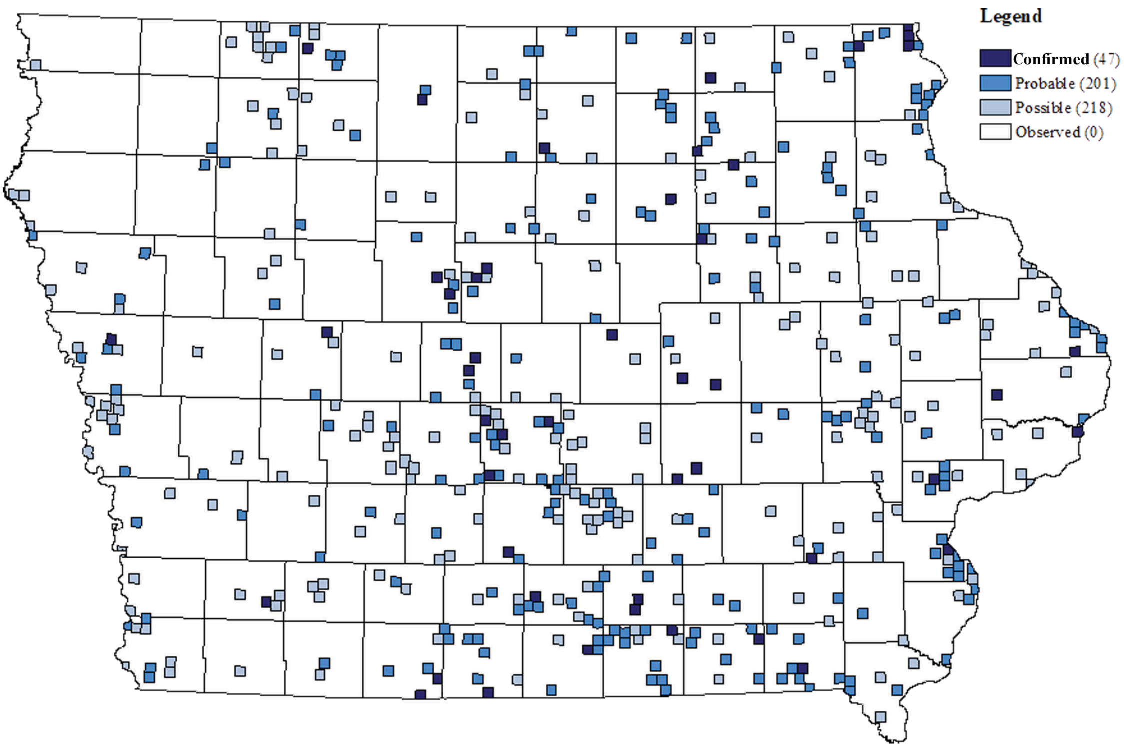
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	91	127	218
Probable	38	163	201
Confirmed	13	34	47
Conf & Prob	9.80%	49.40%	28.80%

BBA II



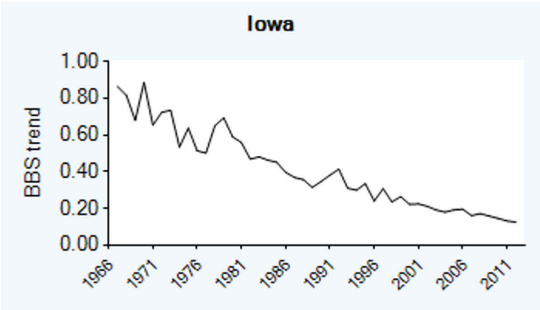
Sponsored by Karen Viste-Sparkman

© Paul Roisen

Habitat	Shrubby woodlands, edge of large forests, especially along rivers and streams
Breeding Dates	24 May (PR)–18 Aug (PR)
Nest Type	Flimsy platform of sticks and twigs lined with grass and rootlets; in shrubs or small cedar trees, usually ~6 ft. above ground
Clutch Size	2–5 eggs (typically 2–3 eggs)
Incubation	10–13 days
Fledging	21–24 days
Status	Regular but uncommon nester
BBS Trend	Decreasing (trend = −3.2, 95% CI is −5.3, −1.5) [Iowa]

Patterns since BBA I

The Black-billed Cuckoo is a forest shrubland species that was considered a common breeder prior to the first atlas (J. J. Dinsmore et al. 1984). By the mid-1990s, this species was listed as an uncommon summer resident by Kent and Dinsmore (1996). Data from the current atlas indicate this species has become a much more uncommon nester in Iowa. The Black-billed Cuckoo was detected in 124 (15.7%) blocks, with most records (73%) within habitat blocks. Similarly, 67% of BBA I records came from priority blocks. Like the Yellow-billed Cuckoo, most records for this species were strongly associated with public areas that include wooded riparian corridors and public areas with reservoirs and lakes. Nesting was confirmed in only seven (6%) of the blocks, compared to 16 (7%) of the blocks in BBA I; with no confirmed records in the western one-third of the state and no confirmed records east of Waterloo. Iowa BBS data (2001–2011) indicate this species is significantly declining at the rate of 3.2% annually (Sauer et al. 2012), and national BBS data reflect a similar trend.



Distribution of the Black-billed Cuckoo did not significantly change from BBA I to BBA II, and this cuckoo still occurs statewide. There was, however, a 47% decrease in the number of blocks (233 in BBA I and 124 during BBA II) in which this species was found. While the nesting range for this species is more northerly than it is for the Yellow-billed Cuckoo (Hughes 2001), probable BBA nesting occurred in most areas of the state, with southern Iowa counties well represented. This evidence suggests that Black-billed Cuckoos are as likely to nest in southern Iowa counties as those in the north. The data seem more reflective of where Iowa's best nesting habitat occurs. Similar results appeared to be reflected by BBA data collected throughout Missouri (Jacobs and Wilson 1997). The declining amount of shrubby habitat is probably why fewer records were found in Iowa. This seemed apparent on privately owned lands of eastern Iowa where shrubby edges have been removed and where row crops now are planted right up to the forest edge (Ehresman pers. obs.).

While caterpillars seem to be a favored prey for Black-billed Cuckoos, its diet can be variable, focusing on different prey items when they become abundant (Hughes 2001). Populations seem somewhat regulated by food availability, and the annual variations of abundance for this species, indicate this species may not nest if its local food supply is lacking on the breeding grounds (Nolan and Thompson 1975, Hughes 2001).

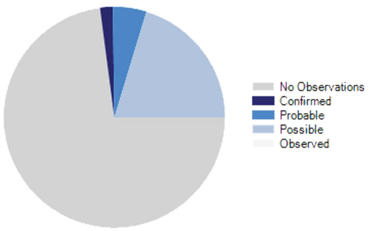
Yellow-billed Cuckoos outnumbered Black-billed Cuckoos six to one in heavily wooded areas of Coralville Reservoir (Kent et al. 1994). While both species use a variety of habitats, Black-billed Cuckoos are less likely to be found in densely wooded habitats than Yellow-billed Cuckoos (Kent and Dinsmore 1996). In Wisconsin, this is a species of both deciduous forest and shrubby wetlands and seems to favor hawthorn and willow thickets (Robbins 1991). This species is listed as High Priority concern on Audubon Watch Lists for 16 states (Hughes 2001) and is listed as state threatened in Illinois (Walk et al. 2010b).

This cuckoo may be highly susceptible to pesticide-residue accumulation, due to reliance on noxious caterpillars (Hughes 2001). Management efforts for this species should focus on creating and maintaining both upland and lowland shrub communities and maintaining forested riparian corridors that are required by this attractive and beneficial cuckoo species.

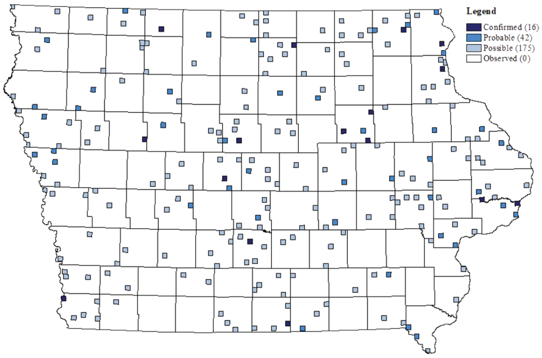
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	59	116	175
Probable	13	29	42
Confirmed	5	11	16
Conf & Prob	3.40%	10.00%	6.70%

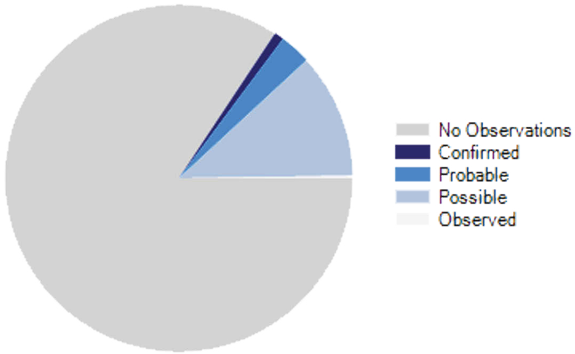
BBA I Results



BBA I



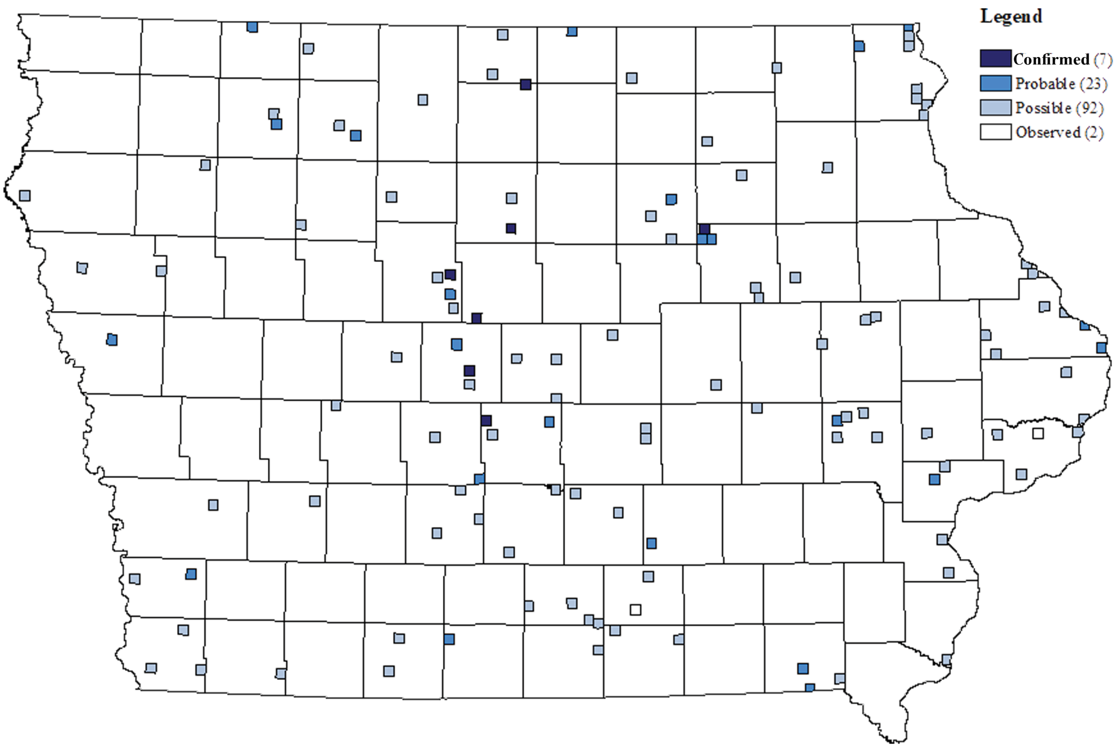
BBA II Results



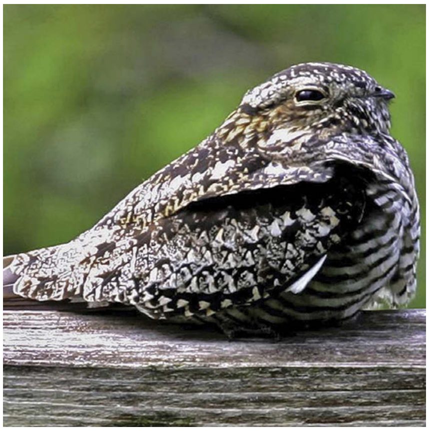
BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	1	1	2
Possible	28	64	92
Probable	3	20	23
Confirmed	1	6	7
Conf & Prob	0.80%	6.50%	3.50%

BBA II



Common Nighthawk *Chordeiles minor*



© Reid Allen

Habitat Nests on flat gravel-covered rooftops in towns; historically nested on open ground of prairies and savanna or on sandbars of rivers

Breeding Dates 25 May (PR)–16 Aug (CO)

Nest Type Lays eggs directly on flat gravel rooftop, on open ground or on rock outcrops in prairie, and sometimes on parking lots

Clutch Size 2 eggs

Incubation 17–19 days

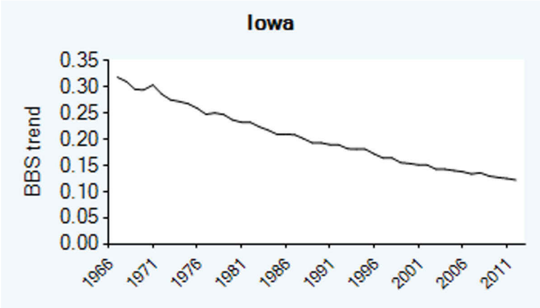
Fledging 17–18 days and feed independently at 25 days

Status Common nesting species

BBS Trend Stable (trend = −1.7, 95% CI is −3.9, 0.3) [Iowa]

Patterns since BBA I

While the Common Nighthawk may not be as common as it once was, it continues to be found across Iowa wherever adequate habitat exists. It seems especially prevalent in towns that have buildings with flat rooftops (Kent and Dinsmore 1996). This particularly urban goatsucker was documented in 157 (19.8%) of BBA II blocks; down from the 198 (23%) blocks in which it was located during BBA I. While National BBS data show a decreasing trend for this species from 2001–2011, Iowa BBS data indicate this species may be stable (Sauer et al. 2012).



The overall distribution of Common Nighthawk changed little since the first atlas, and it continues to be found statewide. There were significantly fewer blocks with records in east-central Iowa during the second atlas than there were during BBA I. This species was not detected in several towns in blocks along the Mississippi River, where it appeared that suitable nest sites (flat topped buildings) occur. While this species was confirmed nesting in just 13 (6.5%) of BBA I blocks where it was documented, however, confirmation of nesting during BBA II occurred in 44 (28%) of the blocks where it was found. This larger number of confirmed nesting records during BBA II is almost certainly related to the fact that there was increased effort to document nesting of this species, particularly in the larger towns and cities containing rivers or lakes. Illinois, which has completed only one Breeding Bird Atlas, confirmed this species nesting in 43 (14.1%) blocks where it was found (Kleen et al. 2004). Similar to results from Iowa's first atlas, Missouri confirmed nesting in just 11 (5%) of the blocks where it was found (Jacobs and Wilson 1997). While the confirmation rate of nesting was low, Jacobs and Wilson (1997) stated "This species likely nested in most blocks in which it was observed, especially those near towns and cities."

It appears that most land cover in grid blocks is row crops, where nighthawk habitat is lacking. Because this species feeds on flying insects, it can be impacted negatively by the effects of insecticide use (Wedgwood 1991, Brigham et al. 2011). Particularly for agricultural purposes, Iowa is one of the leading states in terms of tonnage of pesticides applied annually, and in 1996 Iowa applied (on corn and bean crops) 24,176 tons of insecticides and herbicides (USDA 1996). So, it should not be surprising to see that 59.9% of the records for this nighthawk were documented in habitat blocks. This finding is almost identical to the first atlas results when 59.3% of all records were documented in priority blocks (Jackson et al. 1996).

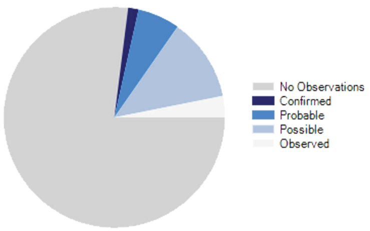
During the first atlas, "Almost all blocks within cities had nighthawks" (Jackson et al. 1996). Comparing observations made from participation in both Iowa atlases, during BBA II, Common Nighthawks were not detected in many of the smaller towns (especially those smaller than 350 people), where they were detected during BBA I (Ehresman pers. obs.). As older buildings with flat roofs are destroyed to make room for more modern buildings with pitched roofs, Common Nighthawks will likely experience a reduction in available nest sites. At least for now, most Iowa city dwellers should be able to continue to experience, especially on warm summer nights, the delightful sound of peenting nighthawks—on the wing and bugging—as they have done for thousands of years.

Common Nighthawk

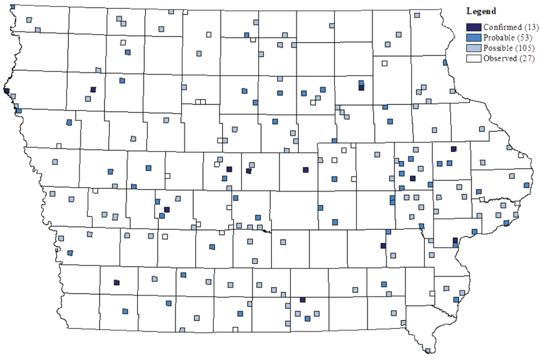
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	14	13	27
Possible	39	66	105
Probable	22	31	53
Confirmed	5	8	13
Conf & Prob	5.20%	9.80%	7.70%

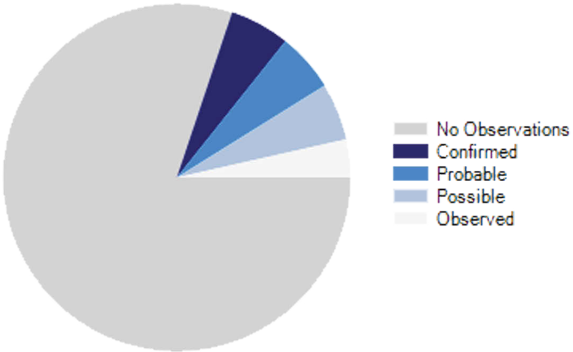
BBA I Results



BBA I



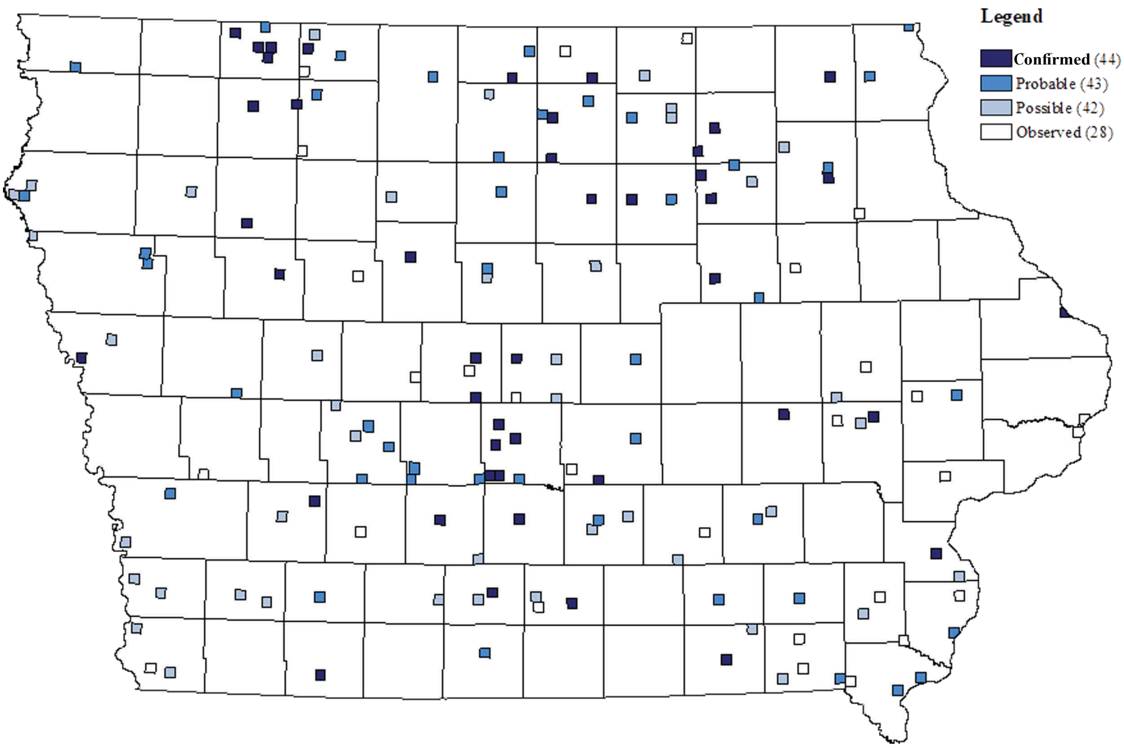
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	8	21	29
Possible	17	25	42
Probable	19	24	43
Confirmed	19	25	44
Conf & Prob	7.30%	12.30%	10.10%

BBA II



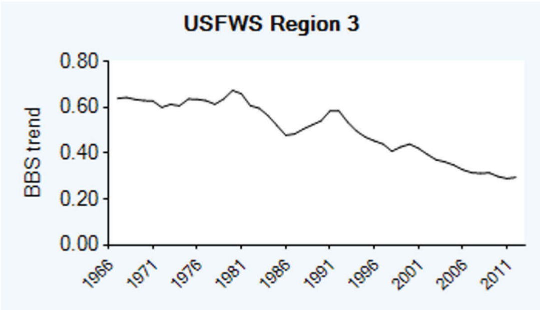
Chuck-will's-widow *Antrostomus carolinensis*

© Jim Rathert

Habitat	Open oak-hickory and pine woodlands, savannas, and woodland edge; mostly in uplands
Breeding Dates	27 May (PR)–9 Jul (PR)
Nest Type	No nest built; lays eggs directly on leaf litter of woodland floor
Clutch Size	2 eggs
Incubation	~20 days
Fledging	~17 days
Status	Rare summer resident in southern Iowa
BBS Trend	Decreasing (trend = −1.6, 95% CI is −2.1, −1.0) [Central US]

Patterns since BBA I

The Chuck-will's-widow is at the northern edge of its nesting range in southern Iowa, so it is not surprising that only four records were documented in blocks across the southern two tiers of counties. Three out of four records were in habitat blocks, where public forests exist. These data are similar to that of BBA I when five out of six records were in priority blocks. These data also compare well to Illinois BBA data, where 29 of 32 records were from priority blocks (Kleen et al. 2004). While BBA I records occurred in five counties, BBA II records were documented in four counties. The only county with a block record during each atlas is Fremont. During BBA I, this large goatsucker was confirmed nesting in two blocks, while a territorial male in both Fremont and Lucas counties was the most nesting evidence during BBA II.



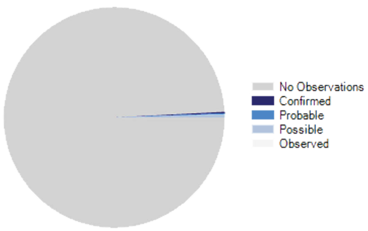
The distribution of Chuck-will's-widow changed little since the first atlas; but the confirmed nesting evidence from BBA I, in the more northern counties of Mahaska and Louisa (Jackson et al. 1996), may indicate this species has retracted its range a bit further south during the last twenty years. The BBS data from the Central U.S. Region indicate this species is declining at the rate of 1.4% annually between the years 2001–2011 (Sauer et al. 2012). During the Missouri Breeding Bird Atlas, there were no confirmed or probable nesting records for this species in the upper three tiers of counties, and the vast majority of the 324 records were found in the southern half of the state (Jacobs and Wilson 1997). The fact that this species was documented in two blocks in Lucas County, one block in Henry County, and a different area in Fremont County than it was during BBA I may reflect this nightjar's ability to pioneer into appropriate habitat. While there is good evidence that this species returns to nest in the same area in successive years (Jacobs and Wilson 1997, Straight and Cooper 2012), the type of habitat in which Chuck-will's-widow prefers to nest, dense shrubby cover near forest edge (Peterjohn and Rice 1991), will likely change over time. This change in habitat can cause this nightjar to seek more appropriate places to nest. During 2013 after the last BBA II field season, 16 Chuck-will's-widows were documented singing in Fremont County by Keith Dyche, a bird was heard singing in Decatur County by Denny Thompson and Gene and Eloise Armstrong, and a single bird was noted singing in Page County by Karen Viste-Sparkman and Stuart Sparkman.

Because of the nocturnal nature of this nightjar and because most hours spent atlassing were during daylight hours, it is likely some records for this species were missed. Overall, this species was found in the type of habitat where it would be expected. The large landscape approach to land management that Iowa DNR and other conservation agencies and organizations are implementing should benefit Chuck-will's-widow and other species that have specific habitat requirements. This (large contiguous block of habitat) management approach ensures that there is a variety of habitat available that suits the needs of each group of habitat specialists.

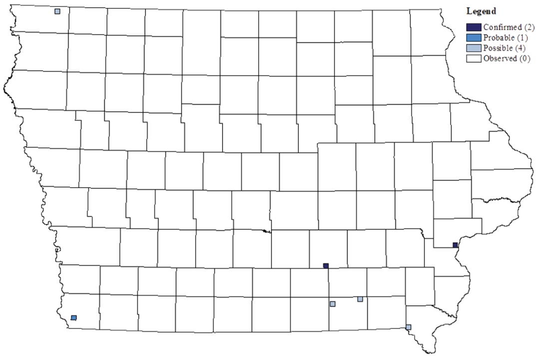
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	1	3	4
Probable	0	1	1
Confirmed	1	1	2
Conf & Prob	0.20%	0.50%	0.30%

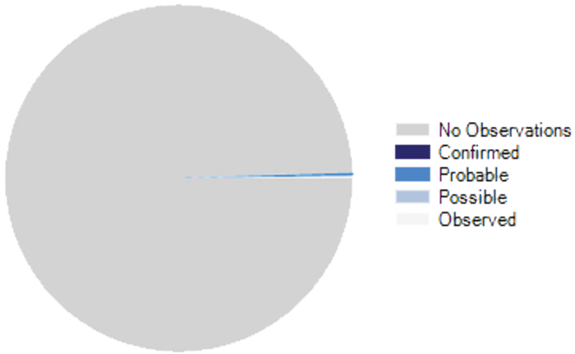
BBA I Results



BBA I



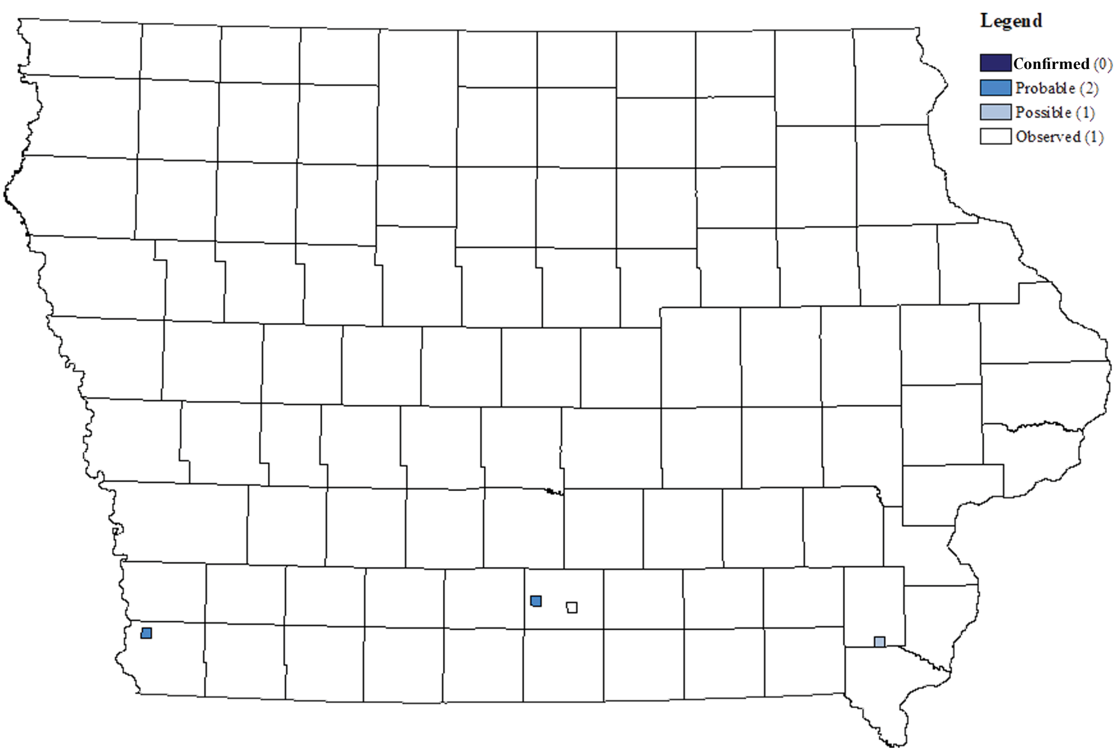
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	1	1
Possible	1	0	1
Probable	0	2	2
Confirmed	0	0	0
Conf & Prob	0.00%	0.50%	0.20%

BBA II

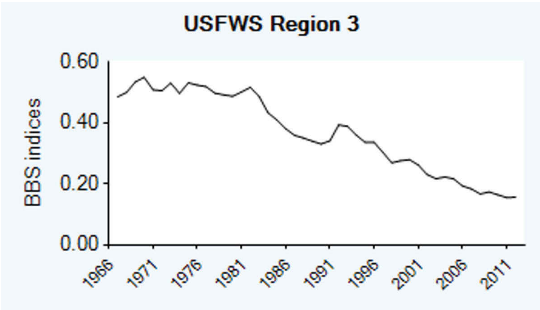


Sponsored by Candace Havely

© James Durbin

Habitat	Oak and mixed decidusous woodlands with open understory and leaf litter
Breeding Dates	5 May (PR)–3 Aug (PR)
Nest Type	No nest built; eggs laid directly on leaf litter on forest floor
Clutch Size	2 eggs
Incubation	19–21 days
Fledging	15–20 days
Status	Regular summer resident
BBS Trend	No Trend Available

Patterns since BBA I



The Eastern Whip-poor-will is an elusive forest bird of the night that is more often heard than seen. It was not found as readily in the second atlas as it was the first. Documented in 97 (12.3%) BBA II blocks, this is significantly down from the 167 (19.4%) blocks where it was located during BBA I. As evidence that Missouri has much more appropriate habitat for Eastern Whip-poor-will than does Iowa, that state's BBA data showed this species present in 57.3% of all blocks (Jacobs and Wilson 1997). While Iowa BBS data show too few records for a trend, national BBS data indicate a 2% annual decrease for this species from 2001–2011 (Sauer et al. 2012). The number of confirmed records differed little between Iowa's two atlases, with seven confirmed during BBA I and six (6%) during BBA II. Another similarity between atlas results is that most (77.3%) records were documented in habitat blocks during BBA II, compared to 70.7% of records from priority blocks in BBA I. During both atlases, records were especially found along wooded riparian corridors, where much of Iowa's public land occurs.

The overall distribution of Eastern Whip-poor-will did change since the first atlas. One noticeable difference is a lack of records in northwestern and north-central Iowa during BBA II. This was particularly true in forested areas along the upper reaches of the Little Sioux, Des Moines, and Winnebago rivers. There were more block records in the Loess Hills of western Iowa, during BBA II, which probably reflects the increasing amount of woodland (i.e., Loess Hills State Forest) that is quickly replacing prairie habitat in this landform. During both atlases, records were found in similar locations along both the Big Sioux and the Missouri rivers. South Dakota's BBA records for whip-poor-will were documented along both watersheds, as well (Peterson 1995). This species was found in significantly fewer blocks in eastern Iowa during the second atlas than it was during BBA I. Specifically, there were far fewer records for forested blocks along both the Mississippi and Cedar rivers.

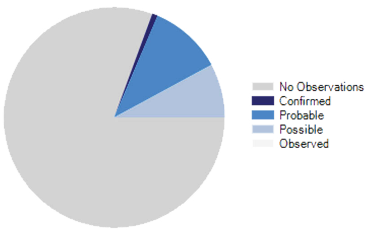
Most forested land in Iowa is privately owned, and it can be argued that, overall, the type of management occurring on private land is not as attractive to nesting whip-poor-wills as the management practices that are implemented on public forested land. For instance, in eastern Kansas, Cink (2002) found that Eastern Whip-poor-will is completely absent from grazed woodlands. Many Iowa landowners still graze their woodlands with cattle, and this activity is probably decreasing usable habitat for whip-poor-wills. Castrale et al. (1998) pointed out that maturing forest and reduction in understory vegetation by white-tailed deer make forest conditions less suitable for whip-poor-wills. Because this nightjar feeds especially on moths (Cink 2002), any decrease in availability of moths during nesting season may have negative impacts on the population of this species. Jackson et al. (1996) point out that Iowa's whip-poor-will population seems to fluctuate over time in direct relationship with the quality of woodland and forest habitats.

Eastern Whip-poor-wills can produce two broods of young each year (Cink 2002), so there is the potential for this species to rebound given the right habitat conditions. Regarding this nightjar's potential for recovery, the degree of openness in forest understory appears to be more important than forest composition (Wilson 1985). Because this is a Species of Greatest Conservation Need that is targeted to benefit from Iowa's current savanna and open woodland restoration efforts, it is important for Iowa to monitor this species to see if it responds favorably to these management techniques.

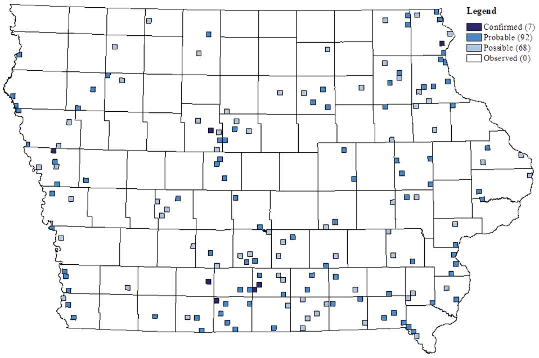
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	23	45	68
Probable	25	67	92
Confirmed	1	6	7
Conf & Prob	5.00%	18.30%	11.50%

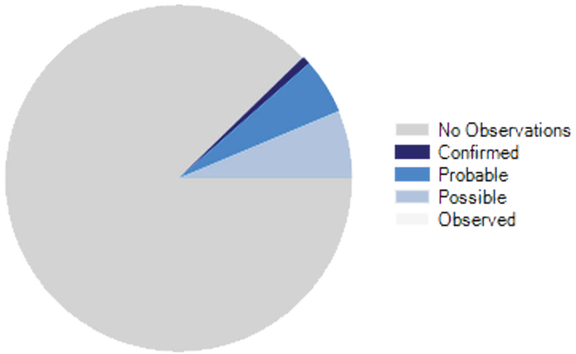
BBA I Results



BBA I



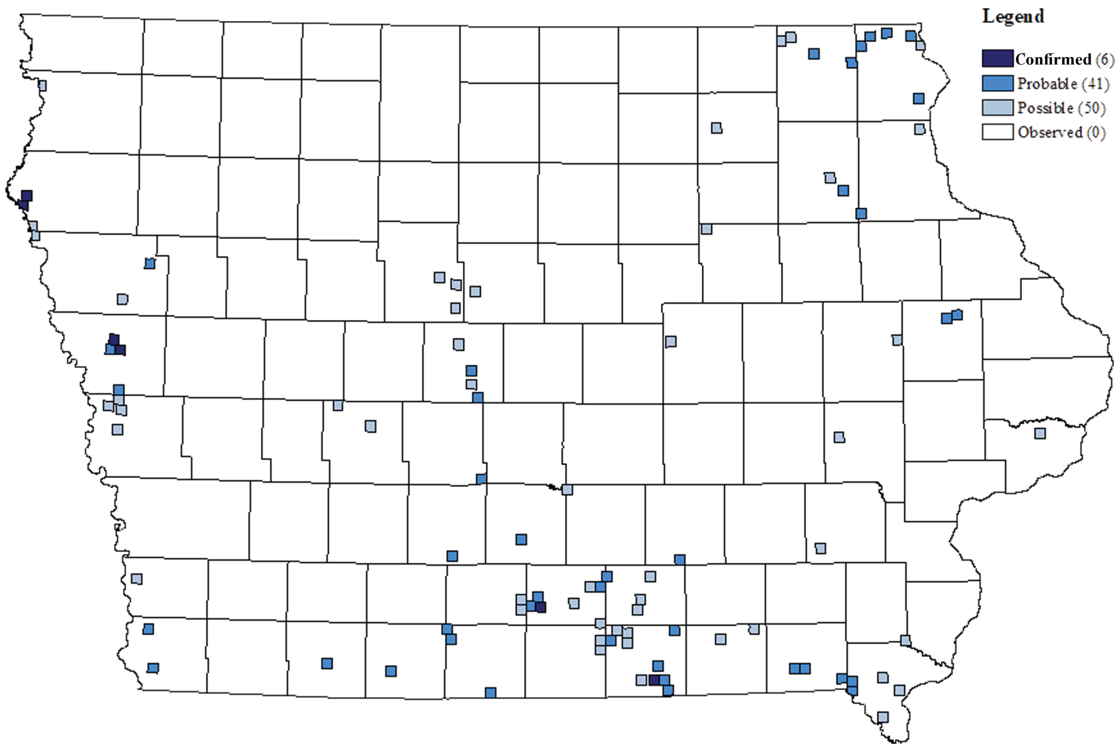
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	13	37	50
Probable	8	33	41
Confirmed	1	5	6
Conf & Prob	1.70%	9.50%	5.50%

BBA II

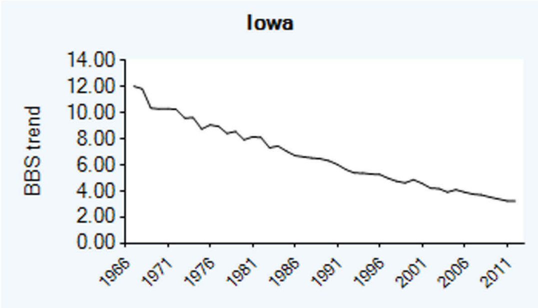


© Jim Mason

Habitat	Nests inside chimneys in urban areas; historically nested inside scattered hollow trees of old-growth forests
Breeding Dates	30 Apr (PR)–26 Aug (CO)
Nest Type	Pair builds a cup-shaped nest of small twigs, cemented together and to the chimney wall or tree-trunk interior with the birdís glue-like saliva
Clutch Size	3–6 eggs (avg. 4 eggs)
Incubation	16–21 days (avg. 19 days)
Fledging	28–30 days
Status	Common nesting species
BBS Trend	Decreasing (trend = −2.4, 95% CI is −3.3, −1.5) [Iowa]

Patterns since BBA I

The Chimney Swift continues to be distributed across Iowa wherever adequate nesting, roosting, and feeding areas exist. This species now seems especially tied to cities and towns, where it relies on chimneys for its nesting and roosting sites, and it is apparently less common now than several decades ago, in both rural and urban areas (Steeves et al. 2014). This swift was documented in 577 (72.9%) of BBA II blocks, compared to 509 (59.1%) BBA I blocks. The lack of observations in more than 25% of blocks is most likely due to a shortage of adequate nesting sites, especially in the highly agricultural areas. The BBA data for Illinois reflected trends similar to Iowa's, and swifts were documented in 76.4% of that state's sampled blocks, with an even higher frequency of the records (84.4%) in priority blocks (Kleen et al. 2004). Missouri also found this swift in most (68.3%) of that state's BBA blocks (Jacobs and Wilson 1997).



There appears to be no significant distribution change for Chimney Swift since the first atlas. There was, however, a very significant change in the number of blocks where this cigar-shaped bird was confirmed nesting. For instance, during BBA I, this swift was confirmed nesting in 63 (12.4%) blocks, while that number of confirmed nesting blocks more than doubled to 131 (22.7%) during BBA II.

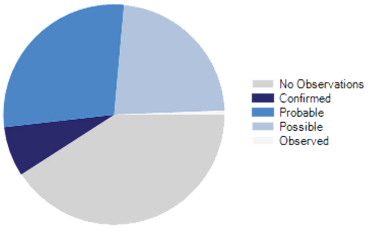
One of the biggest factors to affect Chimney Swift nesting opportunities is the loss of open chimneys on buildings (Steeves et al. 2014). This is especially true in rural areas, where most chimneys have either been replaced by insulated sheet metal flues, or they have been capped by metal grates to exclude animal pests and rain. A high percentage of old farmhouses that had open chimneys have been torn down (perhaps related to the Iowa farm crisis of the 1980s), also decreasing the number of available nest sites. While there appear to be fewer uncapped chimneys in towns and cities than during the first atlas, nesting evidence for swifts was still found in most towns visited within blocks (Ehresman pers. obs.). Fortunately, Chimney Swifts continue to nest in large hollow trees, as they have for centuries. They were confirmed nesting in natural tree cavities in blocks in Stephens State Forest (Lucas County), Ledges State Park (Boone County), and Yellow River State Forest (Allamakee County) (Ehresman pers. obs.).

The BBS trends for this species today indicate it is significantly declining at both national and more local levels. In Iowa, the Chimney Swift is decreasing at an average annual rate of 2.4% each year (Sauer et al. 2012), and it is now listed as an Iowa Species of Greatest Conservation Need. Because of the downward population trends, this swift is receiving more attention nationally and locally. Conservation groups, like Jackson County Conservation Board and Audubon Society groups, are constructing chimneys, solely for the purpose of providing nesting habitat for this species. Iowa's original "swift tower" was a creation of Althea Sherman (Sherman 1952) and that tower has been repaired and is being resurrected to add another secure nesting site for this species. Because Chimney Swifts were nesting in hollow trees before there were chimneys, retaining a portion of forested land in old-growth stands is another good reason to provide nesting habitat for this species, as well as for many others.

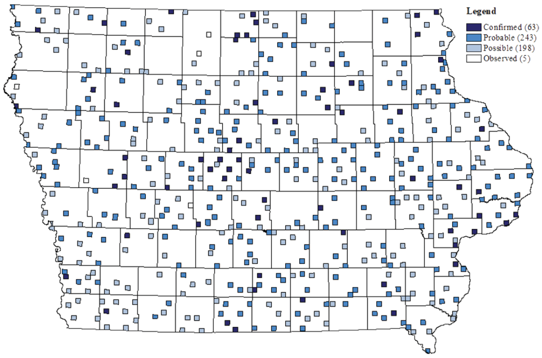
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	2	3	5
Possible	90	108	198
Probable	112	131	243
Confirmed	31	32	63
Conf & Prob	27.40%	40.90%	35.50%

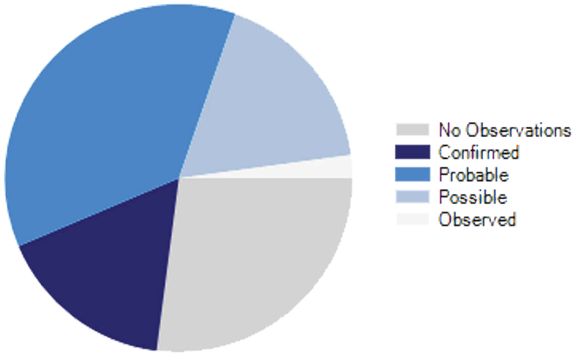
BBA I Results



BBA I



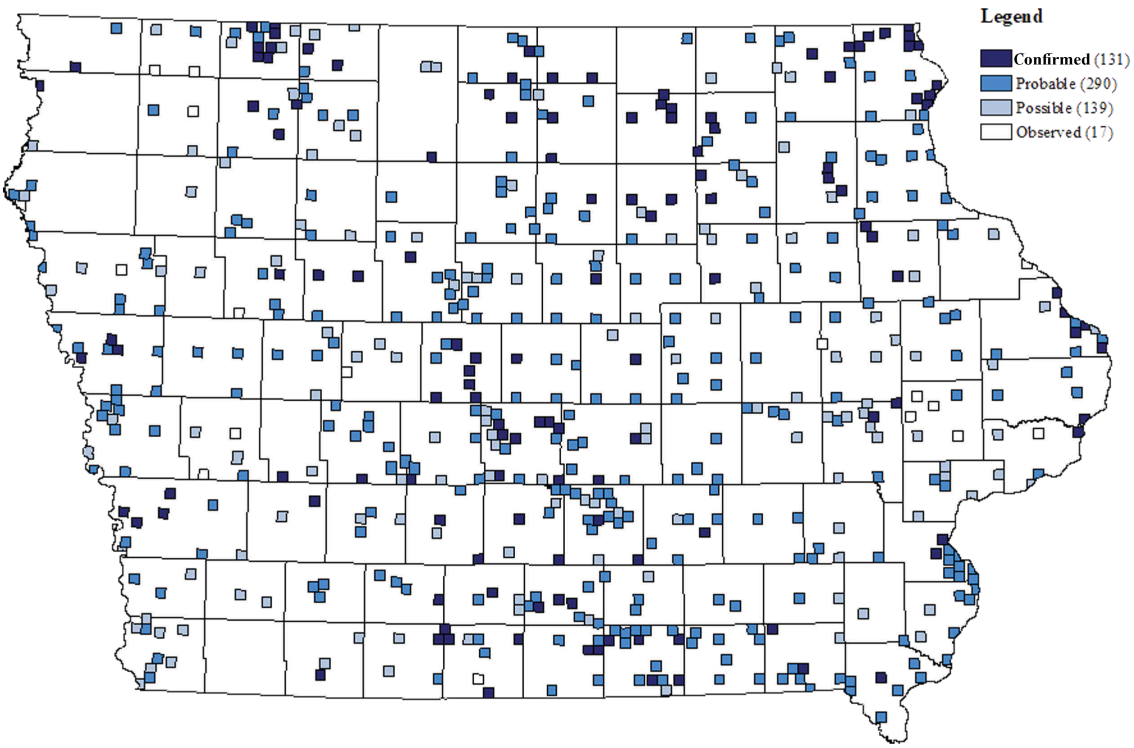
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	11	6	17
Possible	60	79	139
Probable	124	166	290
Confirmed	55	76	131
Conf & Prob	34.30%	60.70%	48.90%

BBA II



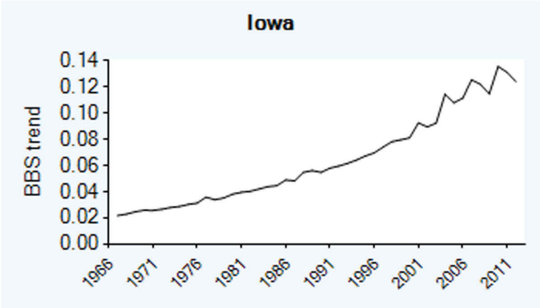
In Honor of Jim Walters (Christopher Caster)

© Linda Rudolph

Habitat	Deciduous woodlands, mixed deciduous-coniferous woodlands, savannas, parks, and wooded yards with flowers
Breeding Dates	20 May (PR)–19 Aug (PR)
Nest Type	Small cup constructed of plant fibers, plant down, and bud scales attached to branch with spider silk; exterior lined with lichens
Clutch Size	2 eggs avg.
Incubation	15–22 days
Fledging	18–20 days
Status	Common statewide nesting species
BBS Trend	Increasing (trend = 7.4, 95% CI is 4.5, 11.8) [Iowa]

Patterns since BBA I

The Ruby-throated Hummingbird is a popular bird of the backyard, where city and country dwellers alike encourage its presence by erecting hummingbird feeders and planting flowers to attract it. The BBS data indicate this species is increasing at a substantial rate at the national level, and even more so in Iowa, where it is increasing at an average annual rate of 7.4% (Sauer et al. 2012). Perhaps as a reflection of that increase in the population, there were 504 (63.7%) BBA II records for this feisty hummingbird. This species was found in more than twice as many blocks than it was during the first atlas, when it was found in 227 (26.4%) of the blocks. Missouri's BBA results were similar to Iowa's results from the second atlas, with Ruby-throated Hummingbird recorded in 64.7% of blocks visited (Jacobs and Wilson 1997). Like Iowa's first atlas, nearly two-thirds of all records were logged in habitat blocks (priority blocks in BBA I). This result is not surprising, given the lack of appropriate habitat for this bird in a high percentage of grid blocks. Illinois, another highly agricultural state, found even more striking results during their BBA, with almost 92% of their 457 hummingbird BBA records from priority blocks (Kleen et al. 2004).



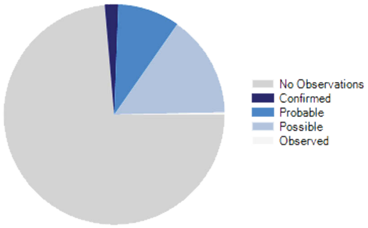
The largest difference in the data collected for the two atlas periods was the total number and proportion of blocks with confirmed nesting. During the first atlas, there were 17 (7.5%) confirmed nesting records, while atlassers confirmed 108 (21.4%) nesting records in BBA II blocks. There was more effort directed to document nesting of this species during this second atlas, and it appeared that many backyards with hummingbird feeders may have provided increased opportunity to do so. The overall distribution of the Ruby-throated Hummingbird was similar for both atlases, even with the increased number of records for BBA II. Most records for both atlases were found in the eastern half of Iowa, where the majority of Iowa's forested land occurs. There were, however, several areas where a significant increase in records was noted during BBA II. The Loess Hills region of extreme western Iowa is one such place, perhaps related to a 7% increase in wooded land cover from 1992 to 2006 (The Loess Hills Alliance 2011). This apparent increase in records for extreme western Iowa is of significance, since the Missouri River corridor is quite near the western edge of the Ruby-throated Hummingbird's range (Weidensaul et al. 2013). The Iowa Great Lakes area, highly populated by both Bur Oak savannas and a growing suburban population with bird feeders, particularly reflected a high number of blocks with nesting confirmations. Similarly, the suburbanized reservoir areas of south-central Iowa also reflected a high concentration of blocks with confirmed or probable nesting evidence for this diminutive high-energy species. Both Missouri (Jacobs and Wilson 1997) and Illinois (Kleen et al. 2004) noted the importance of hummingbird feeders as easy locations for atlassers to document presence of this aerial acrobat.

The Ruby-throated Hummingbird does not appear to be threatened in any part of its range and does not appear in need of management (Weidensaul et al. 2013). It was noted after Iowa's first atlas that the future of the Ruby-throated Hummingbird appears secure (Jackson et al. 1996). Happily, that assessment still holds true today.

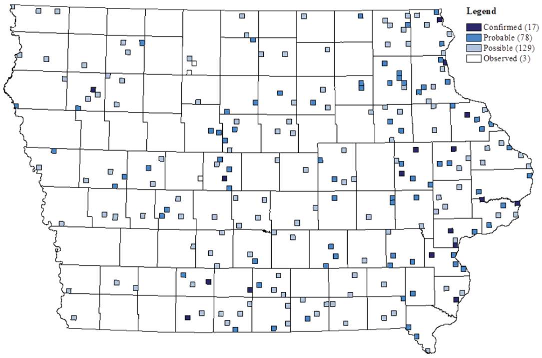
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	2	1	3
Possible	50	79	129
Probable	30	48	78
Confirmed	2	15	17
Conf & Prob	6.10%	15.80%	11.00%

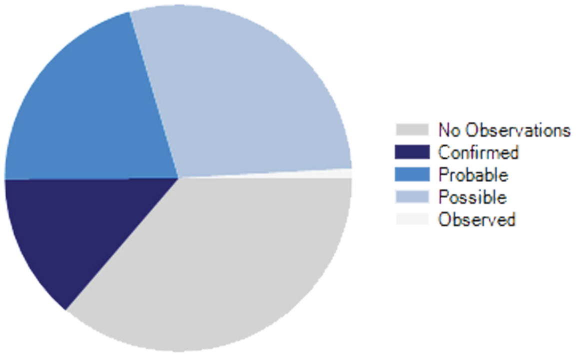
BBA I Results



BBA I



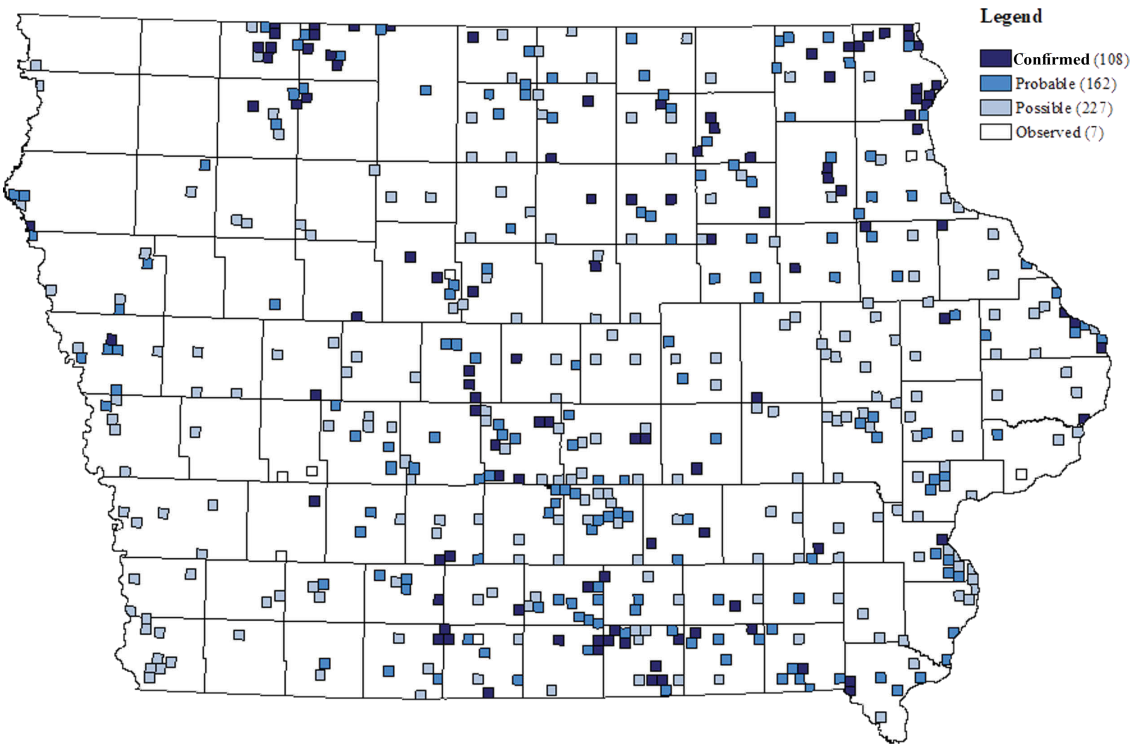
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	4	3	7
Possible	108	120	228
Probable	46	116	162
Confirmed	29	79	108
Conf & Prob	14.40%	48.90%	31.40%

BBA II



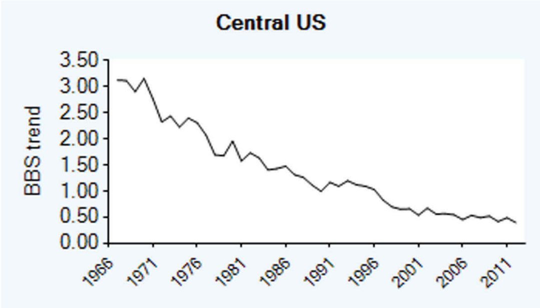
Sponsored by Lena E. Dinsmore

© Jay Gilliam

Habitat	Tidal, brackish, and freshwater marshes
Breeding Dates	NA
Nest Type	Deep cup of dried grasses and sedges on a mound of dead aquatic plants, with surrounding emergent vegetation pulled over as a canopy
Clutch Size	8–11 eggs
Incubation	21–24 days
Fledging	63 days
Status	Uncommon to rare Iowa breeding bird
BBS Trend	Decreasing (trend = −3.3, 95% CI is −6.3, −1.0) [Central US]

Patterns since BBA I

The King Rail is an uncommon nesting species in wetland habitats across Iowa. It is generally encountered on glacial wetlands of north-central Iowa or along the Missouri and Mississippi rivers and the lower reaches of their largest tributaries. King Rails were detected in only eight (2%) of the habitat blocks, and none were detected in grid blocks. Because of their secretive nature and well-concealed nests, it is likely that a small number of nests went undetected in this atlas project, as well as in the first atlas project. Distribution changes are negligible since BBA I, with only a very slight shift of observations from Mississippi River floodplain wetlands to north-central Iowa marshes.

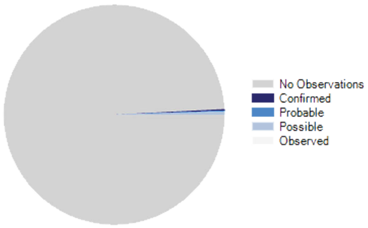


Although the BBS data indicate a continuing decline of this species nationally, especially in the northern part of its range, Iowa BBS data are insufficient to determine any local trend. Observations during BBA II, however, appear to indicate Iowa may host a small but relatively stable King Rail population. This might be attributed to very little net loss of wetland acres between the two project periods. The slight shift in observations to north-central Iowa may reflect substantial wetland restorations on both public and private lands since BBA I. The change in distribution may also be related to the fact that four of the records for north-central Iowa came from an Iowa State University research project, which used rail call-back surveys (Harms and S. J. Dinsmore 2012). This project intentionally focused on finding cryptic marsh birds, and some research sites happened to be located within BBA II survey blocks.

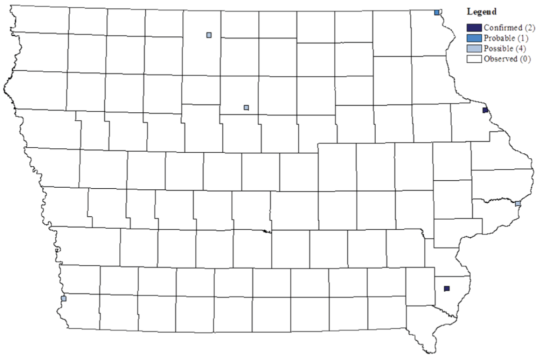
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	1	3	4
Probable	0	1	1
Confirmed	0	2	2
Conf & Prob	0.00%	0.80%	0.30%

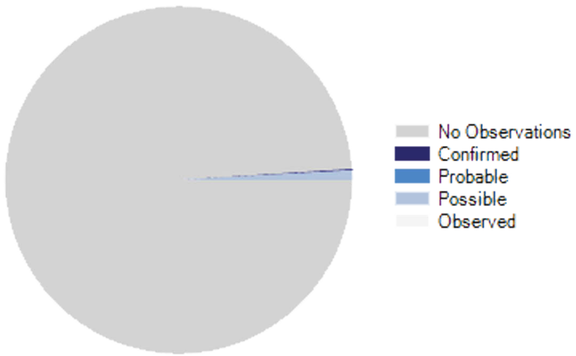
BBA I Results



BBA I



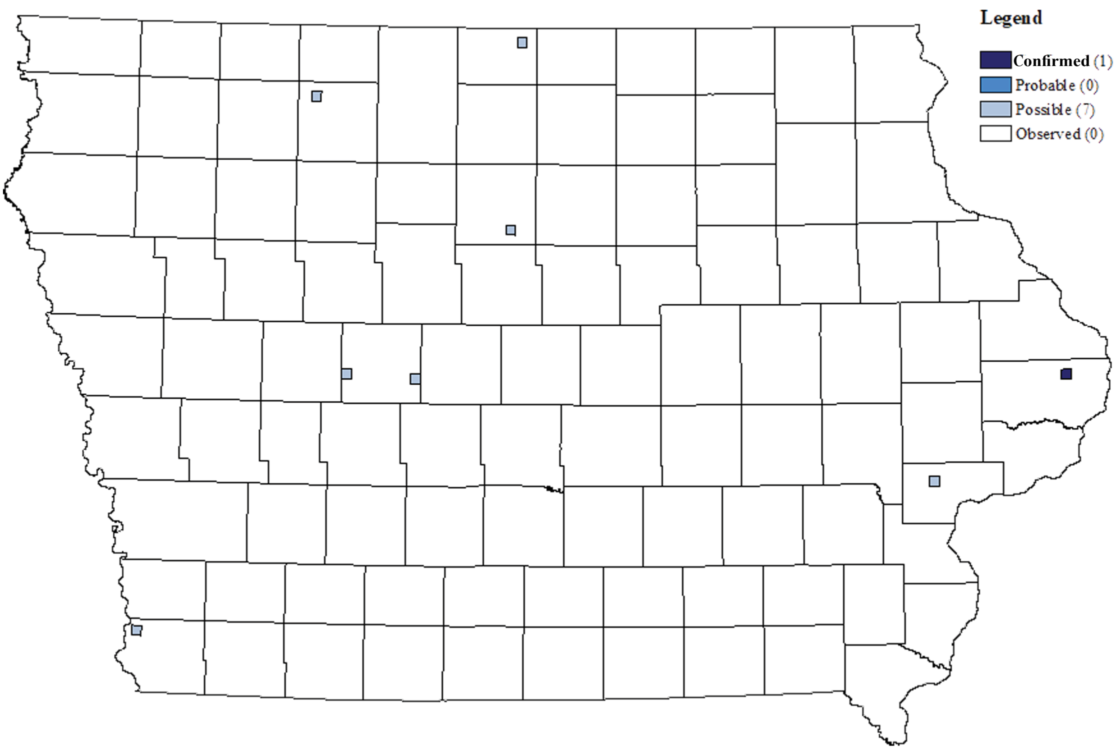
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	0	7	7
Probable	0	0	0
Confirmed	0	1	1
Conf & Prob	0.00%	0.30%	0.10%

BBA II



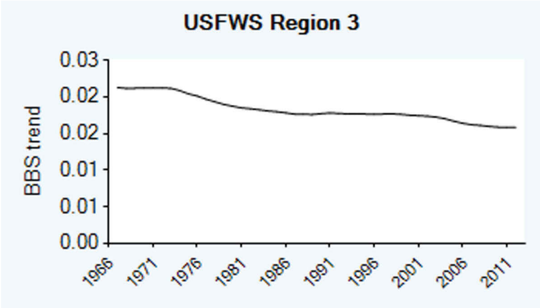
Sponsored by Jay Gilliam

© Jacob Newton

Habitat	Freshwater and brackinsh marshes
Breeding Dates	17 May (PR)–2 Aug (PR)
Nest Type	Cup of coarse vegetation on a mound of dead acquatic plants with surrounding vegetation pulled over as a canopy
Clutch Size	7–12 eggs
Incubation	18–20 days
Fledging	25 days
Status	Uncommon nester found mainly in NW and NC Iowa
BBS Trend	Increasing (trend = 3.9, 95% CI is 1.8, 6.9) [Central US]

Patterns since BBA I

Like several of its relatives in the family Rallidae, Virginia Rail is a secretive nester in Iowa wetlands, uncommonly encountered but perhaps more common than previously believed. The species is distributed primarily across the northern two-thirds of the state, in floodplain wetlands of major rivers and especially in glaciated wetlands of northern and north-central Iowa. Overall distribution has not changed appreciably since BBA I, although the observations within that similar distribution have increased. Virginia Rails were detected in 14.1% of the habitat blocks and 2.3% of the grid blocks during BBA II, both significant increases from BBA I. Nationally, the species remains essentially stable, based on BBS data.



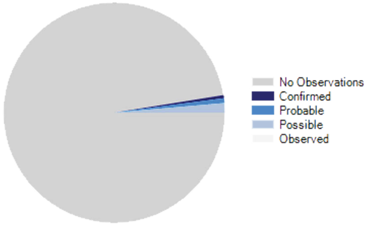
While the annual Iowa BBS detects too few Virginia Rails for local assessment, detections in BBA II indicate that these rails may be increasing, or that ability of project participants to detect these rails has improved; most probably it is a combination of both.

Increased preservation, restoration, and improvement of both public and private wetlands within the glaciated Des Moines Lobe, along with permanent wetland easements on our river floodplains, almost certainly have contributed at least to stabilizing, if not allowing for increase, of Iowa's Virginia Rail population.

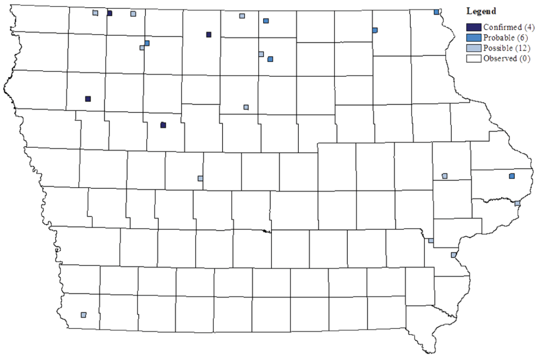
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	3	9	12
Probable	0	6	6
Confirmed	1	3	4
Conf & Prob	0.20%	2.30%	1.20%

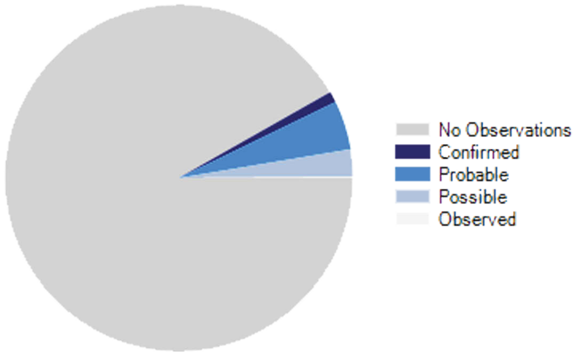
BBA I Results



BBA I



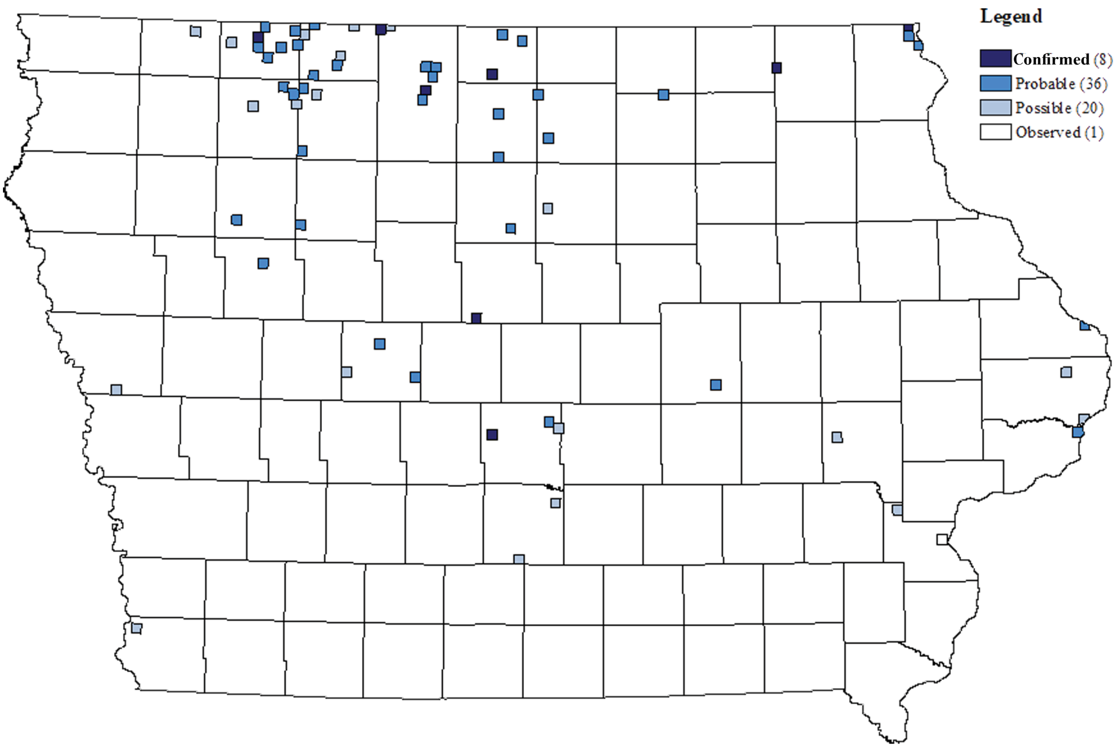
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	1	1
Possible	4	16	20
Probable	4	32	36
Confirmed	1	7	8
Conf & Prob	1.00%	9.80%	5.10%

BBA II



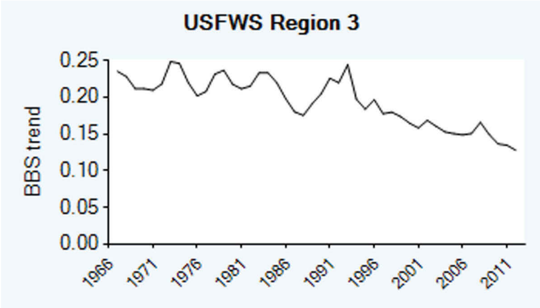
Sponsored by Tyler M. Harms

© Larry Dau

Habitat	Freshwater and brackish marshes
Breeding Dates	29 Apr (PR)–15 Aug (CO)
Nest Type	Basket of dead acquatic plants, supported by and with a canopy of surrounding emergent vegetation
Clutch Size	8–12 eggs
Incubation	16–20 days
Fledging	35–36 days
Status	Common nesting species especially in glaciated wetland of NW and NC Iowa
BBS Trend	Stable (trend = 1.7, 95% CI is 0.0, 3.1) [Central US]

Patterns since BBA I

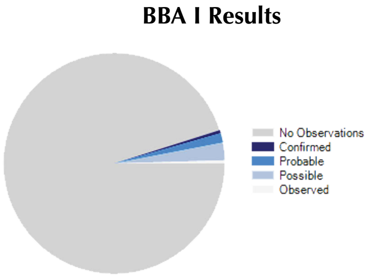
Soras are secretive but relatively common nesters in Iowa wetlands, much more frequently heard than seen. The loud, distinctive call makes this member of the rail family among the most easily identifiable. Its distribution is like that of the Virginia Rail, along major river floodplains and especially in wetlands of northern and central Iowa. A close look at the BBA II map of observations reveals concentrations that essentially outline the Des Moines Lobe, where most natural and restored glacial wetlands are located. This distribution is very similar to that found in BBA I. Soras were detected in 18.2% and 2.0 %, respectively, of habitat and grid blocks. The total number of detections in BBA II was nearly twice those in BBA I.

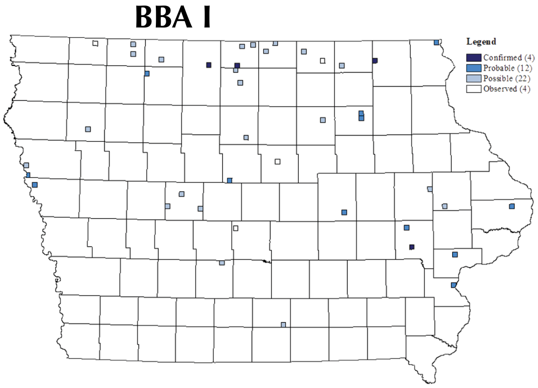


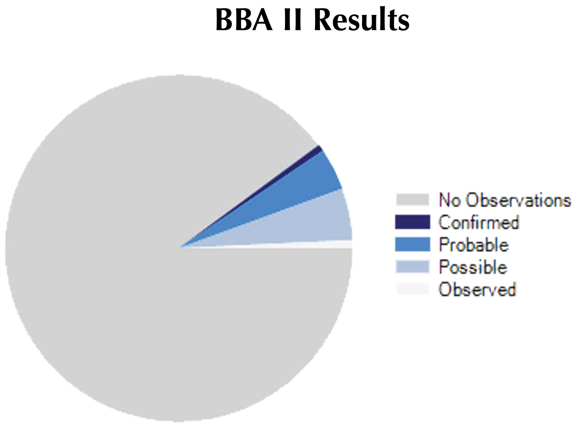
The species remains stable across its North American range, but the randomly placed Iowa BBS routes do not intersect with many wetlands, so confidence in that data is unreliable. The BBS data for the Central Region, of which Iowa is part, however, might indicate our local population probably is fairly stable. Evidence of the species, based on BBA II detections, appears to indicate Soras may be realizing a small increase in Iowa. Habitats used by Soras can vary somewhat more in type, size, and quality than preferred by their less common rail cousins, and the currently stable to slightly increasing number of wetlands preserved or restored in Iowa may be benefiting them. Likewise, with less lead now available in their foraging substrates (lead shot use for waterfowl hunting over wetlands was banned nationwide during BBA I), reduced lead poisoning might also be helping this small rail realize a slow increase in population.

BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	1	3	4
Possible	4	18	22
Probable	1	11	12
Confirmed	2	2	4
Conf & Prob	0.60%	3.30%	1.90%

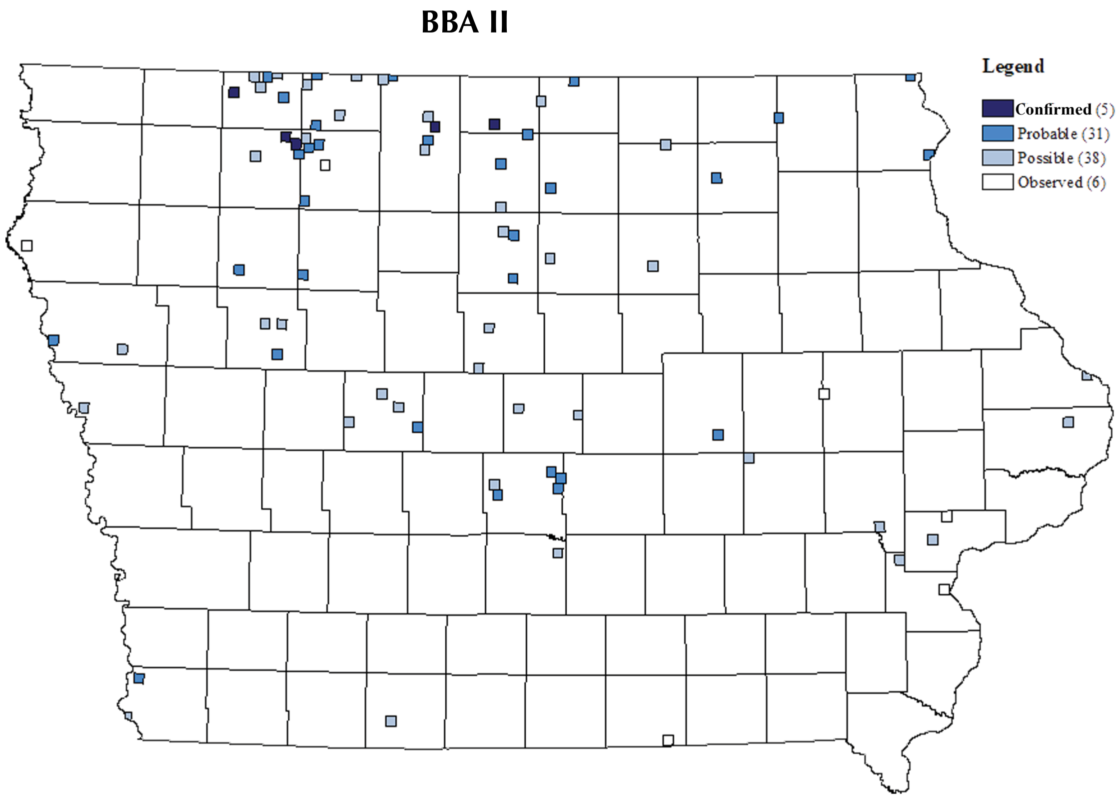






BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	6	6
Possible	5	33	38
Probable	2	29	31
Confirmed	1	4	5
Conf & Prob	0.60%	8.30%	4.20%



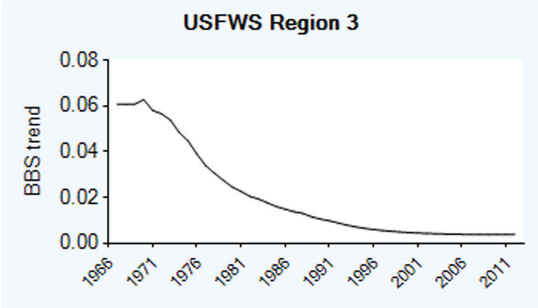
In Honor of Tyler, Ashley, & Graham Harms
(Paul Skrade)

© Doug Harr

Habitat	Freshwater lakes and marshes with abundant emergent vegetation
Breeding Dates	18 May (PR)–24 Aug (CO)
Nest Type	On mound of vegetation in emergents usually near the edge of open water
Clutch Size	5–11 eggs
Incubation	19–22 days
Fledging	42–49 days
Status	Uncommon Iowa breeding species, probably in decline
BBS Trend	Stable (trend = −0.7, 95% CI is −3.2, 1.5) [Central US]

Patterns since BBA I

Following publication of BBA I, the Common Moorhen of North American and Eurasia was split into two distinct species, based on new evidence of differences in mitochondrial DNA, vocalizations, and bill and shield morphology. The North American species was renamed Common Gallinule (Bannor and Kiviat 2002).



Common Gallinules are secretive, coot-like birds of marshes with dense emergent vegetation. Across the Midwestern range, this species can sometimes be found in relative abundance and sometimes only sparsely scattered. Populations of Common Gallinules remain stable across its U.S. range, according to BBS national data, and the species also appears to be stable in the Central Region. No BBS data are available specifically for Iowa, but the total number of detections fell from 20 in BBA I to 12 in BBA II, a significant decrease of 40%. Total confirmed and probable detections remained essentially the same in BBA I and BBA II, at nine and ten respectively. In the current project, 11 detections were in habitat blocks (2.8%), while only one was recorded in a grid block (0%).

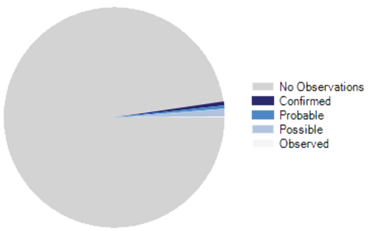
Because Common Gallinule populations are essentially stable nationwide, it is difficult to determine reasons for its probable decline locally. With a relatively stable number of wetlands in Iowa at present and considering that some other Rallidae appear to have increased in our marshes, additional information is needed. It might be speculated that the gradual decrease in emergent aquatic vegetation required by gallinules could be partially to blame.

With increased carp numbers in many Iowa wetlands, loss of suitable emergent aquatic plant life has been a growing problem. Although natural resource agencies and conservation organizations have begun restoration and enhanced management of several important Iowa marshes, it may require much more such effort and many years before our wetlands can provide enough habitat improvements to suit the needs of Common Gallinules.

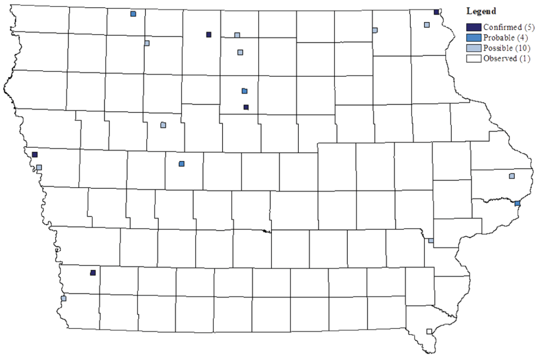
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	1	1
Possible	1	9	10
Probable	1	3	4
Confirmed	1	4	5
Conf & Prob	0.40%	1.80%	1.00%

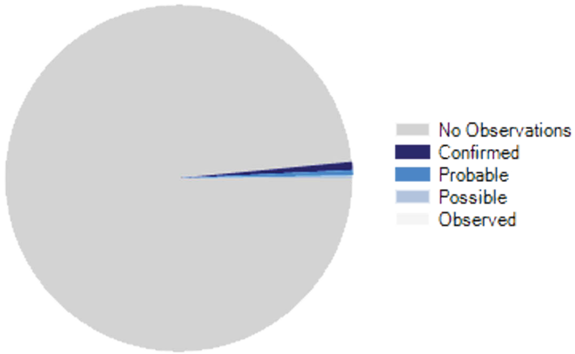
BBA I Results



BBA I



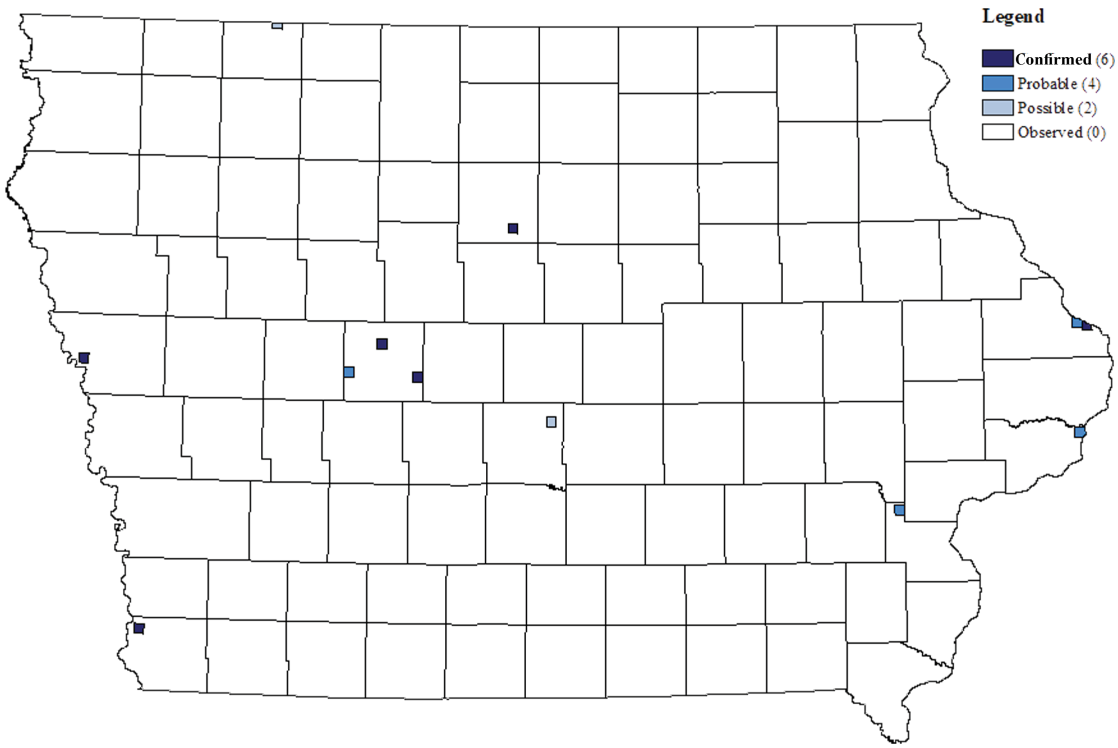
BBA II Results



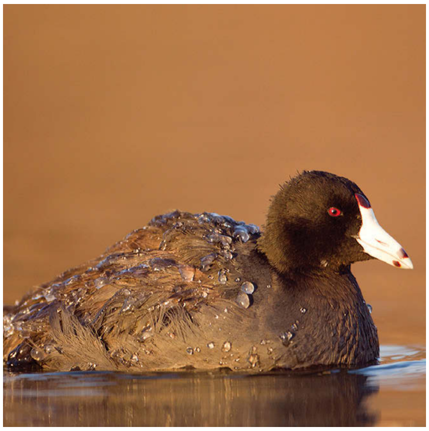
BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	0	2	2
Probable	1	3	4
Confirmed	0	7	7
Conf & Prob	0.20%	2.50%	1.30%

BBA II



Sponsored by Stephen J. Dinsmore

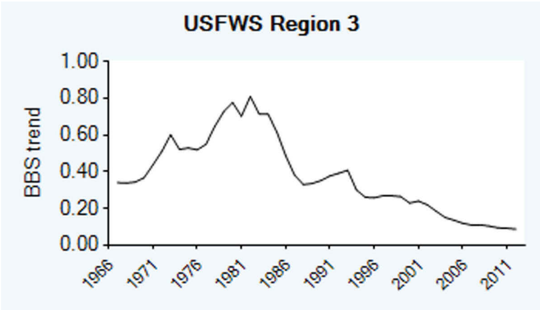


© Stanley Buman

Habitat	Freshwater lakes, marshes, ponds, and rivers
Breeding Dates	14 Apr (PR)–19 Aug (CO)
Nest Type	On a pile of floating and emergent vegetation within stands or clumps of emergent vegetation
Clutch Size	6–9+ eggs
Incubation	21–25 days
Fledging	41–46 days
Status	Very common nesting species statewide most abundant in NW and NC Iowa
BBS Trend	Stable (trend = 1.4, 95% CI is –0.9, 3.3) [Central US]

Patterns since BBA I

American Coots are among the most widespread, adaptable, and easily recognized residents of wetlands in Iowa and across the continent. North American BBS data indicate that coot numbers remain stable continent-wide. Iowa BBS data are unreliable because of the small number of detections on the state's survey routes, but Central Region BBS data indicate coots are stable to slightly increasing, and this is likely to reflect the situation in Iowa, as well. For the BBA projects, coots were detected in 15.3% of all blocks in BBA I and 18.5% of all blocks in BBA II. In the latest project, detections occurred in 29% of habitat blocks and 7.8% of grid blocks. These figures might also appear to indicate a stable, or perhaps even slightly increasing, coot population in Iowa. The greatest number of detections during BBA II came from glaciated wetlands of the northwest and north-central region, where extensive marsh restoration work has been accomplished over the past two decades.

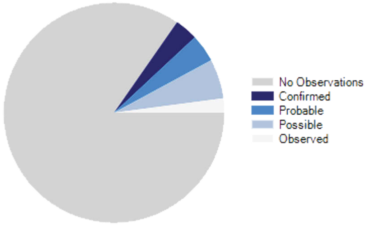


Because coots are much more generalist in their habitat selection than related gallinules and all rails except Soras, it is reasonable to expect a measurable response of this species to wetlands restored or created by various federal, state, and county agencies, or through nongovernmental organization wetland programs. Wetland restoration should focus on larger bodies of water managed to produce a good distribution of open water and emergent vegetation, thereby improving opportunities to increase coot numbers in Iowa. Overall, widespread distribution of American Coots across the state remains basically unchanged between the two BBA projects. In summary, coots should remain relatively common in any suitable wetland habitat statewide for the foreseeable future.

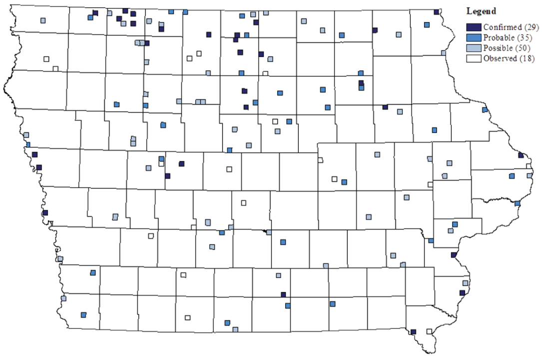
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	8	10	18
Possible	15	35	50
Probable	7	28	35
Confirmed	4	25	29
Conf & Prob	2.10%	13.30%	7.40%

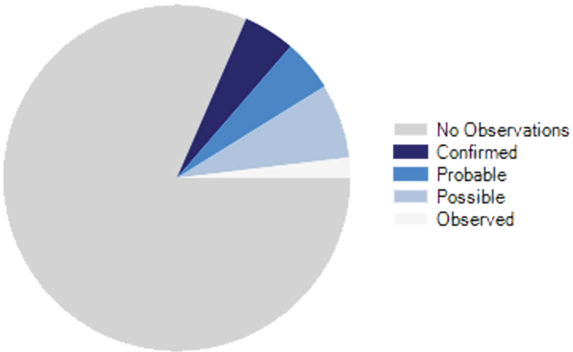
BBA I Results



BBA I



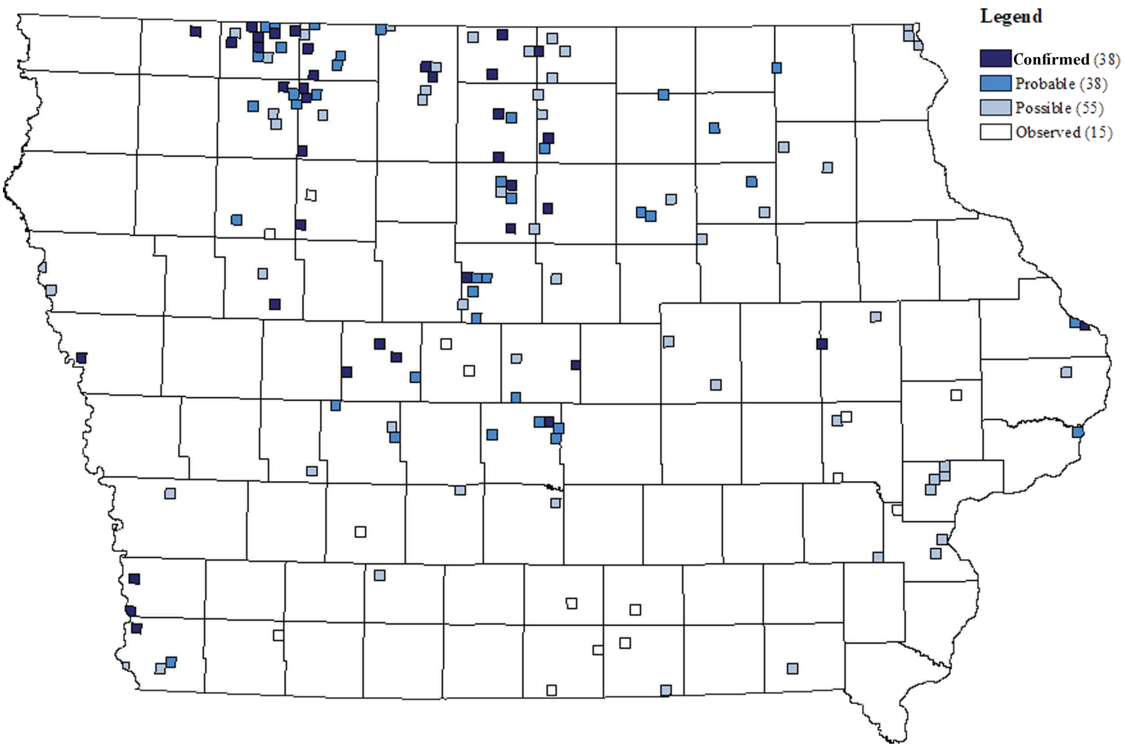
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	5	10	15
Possible	13	42	55
Probable	8	30	38
Confirmed	5	33	38
Conf & Prob	2.50%	15.80%	8.80%

BBA II



Sponsored by James Dinsmore

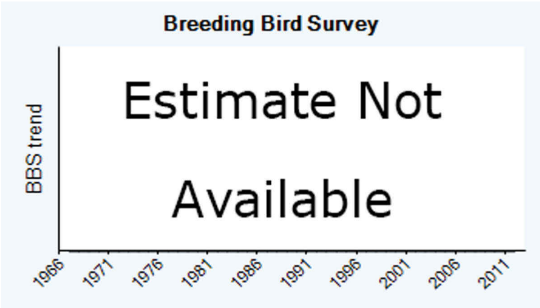
Black Rail *Laterallus jamaicensis*

© David Seibel/BirdsInFocus

Habitat	Freshwater and brackish marshes, occasionally in wet savanna
Breeding Dates	NA
Nest Type	Deep cup, a woven coil of soft grasses and sedges with surrounding vegetation pulled over as a canopy
Clutch Size	6–10 eggs
Incubation	17–20 days
Fledging	Unknown
Status	Extremely rare nesting species
BBS Trend	No Trend Available

Patterns since BBA I

No Black Rails were detected during BBA I. This species is one of the smallest, most secretive, and least understood of all wetland wading birds. Even the BBS turns up almost no individuals during its continent-wide, annual assessment. Therefore, no reliable estimate of the species' status or distribution in Iowa is possible; it might even be unexpected that one individual was detected during the five-year BBA II project period.



This most cryptic, sparrow-sized rail has two recognized subspecies in North America, with Iowa at the heart the breeding range of the eastern subspecies, *L. j. jamaicensis*. Its U.S. distribution appears unusually disjunct, scattered in pockets across the continent but normally found in expansive saltmarsh habitats (Wells 2007). The single breeding season observation in Iowa's latest five-year project period was made in suitable, but freshwater, marsh habitat along Coralville Reservoir.

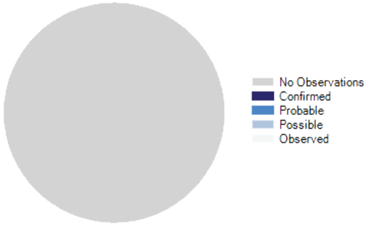
Often described as "mouse-like," Black Rails dart though their preferred sedge or grass habitat at wetland edge, only very rarely flushing into a short, weak, fluttering flight with legs dangling, then dropping silently back into cover. Inland nest sites are generally located in wet meadows dominated by fine grasses, sedges or rushes. Deep, cup-like nests are completely concealed in a clump of vegetation and constructed as a woven coil of fine, soft grasses or sedges. Green grasses are arched over the nest to securely hide it from overhead observation. A path or tunnel leading from the nest occasionally may be evident. Nests sometimes can be constructed directly on damp ground but more typically on a mat of dead grasses from the previous year. Typically, six (occasionally up to 13) eggs are laid in May and June, with incubation thought to take 17–20 days (Baicich and Harrison 2005). Time to fledging is essentially unknown (Eddleman et al. 1994). Food and foraging habits also remain mostly unknown, although one Arizona study indicates that terrestrial and aquatic invertebrates and bulrush seeds predominate in the diet (Eddleman et al. 1994). Other anecdotal accounts or museum records tend to agree with this assessment.

Degradation and loss of suitable habitat pose the greatest threat to this species because its preferred shallow water marshes and sedge meadows are the wetland types most subject to drainage and conversion to agriculture or other development. Water level management may play a key role to habitat conservation on public wildlife lands, but much research is still necessary to determine most aspects of Black Rail biology, ecology, and population distribution. Until more information is revealed, the best means for conservation of this species is increased protection, restoration, and improved management of its preferred wetland habitat.

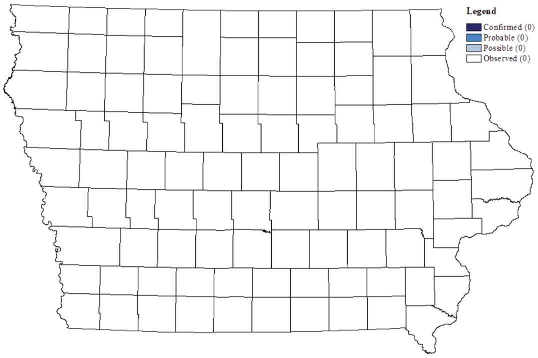
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	0	0	0
Probable	0	0	0
Confirmed	0	0	0
Conf & Prob	0.00%	0.00%	0.00%

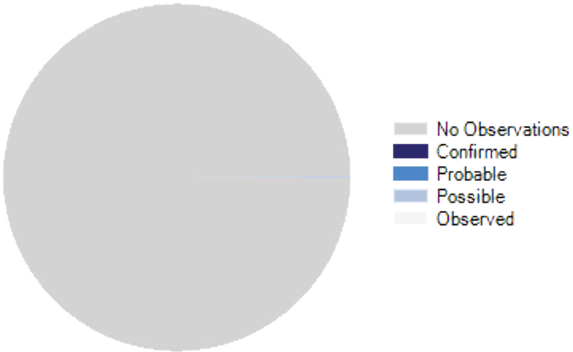
BBA I Results



BBA I



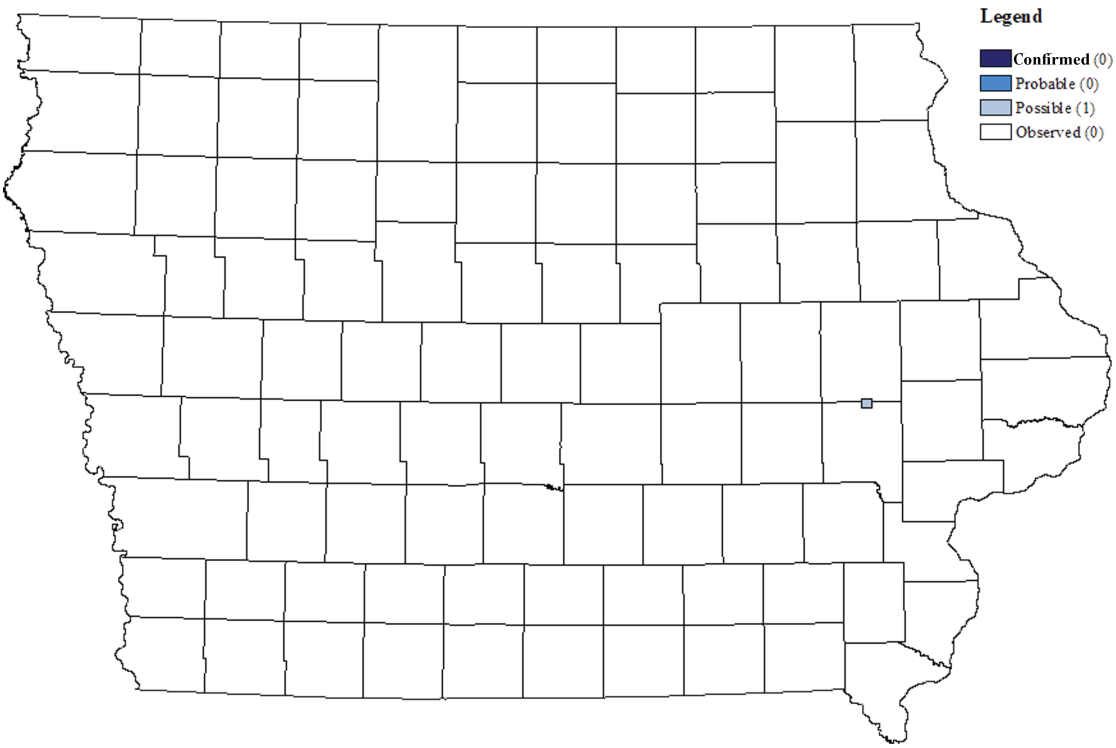
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	0	1	1
Probable	0	0	0
Confirmed	0	0	0
Conf & Prob	0.00%	0.00%	0.00%

BBA II

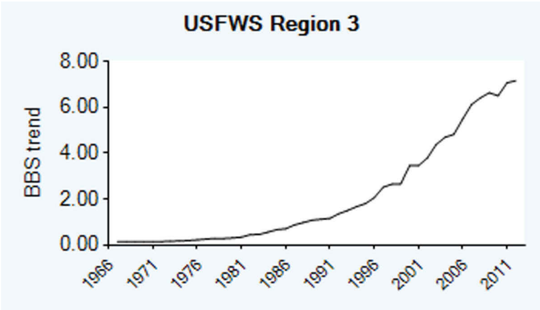


© Kip Ladage

Habitat	Shallow marshes and freshwater meadows
Breeding Dates	13 Mar (PR)–4 Aug (CO)
Nest Type	A bulky pile of dead wetland vegetation, sometimes concealed and usually surrounded by shallow water in undisturbed areas
Clutch Size	1–3 eggs
Incubation	30–32 days
Fledging	65–70 days
Status	Rare to uncommon Iowa nesting species
BBS Trend	Increasing (trend = 7.7, 95% CI is 5.8, 11.8) [Central US]

Patterns since BBA I

Common resident breeding birds at the time of Iowa's European settlement, Sandhill Cranes disappeared from the state by the late 1880s, a result of overhunting, egg collecting, and wetland drainage. Since the 1980s, however, this Greater Sandhill Crane subspecies (*G. c. tabida*) has spread across the Midwest from a growing core eastern population in the nearby Great Lakes States (Kruse et al. 2012). The BBA I recorded only seven detections in 0.8% of all survey blocks, no possible or confirmed nesters. Numbers notably increased to 60 detections in BBA II (7.6% of all blocks), with 45 possible or confirmed nesting. The North American BBS data also indicate a very solid increase nationwide and in the Central Region, although the Iowa BBS has not yet encountered enough cranes on the state's limited number of survey routes to provide useful, Iowa-specific data.

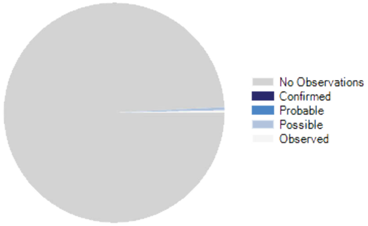


Sandhill Cranes obviously have taken advantage of significant increases in their preferred habitat: emergent vegetation in marshes, swamps, and wet meadows. Particularly important has been restoration of habitat in eastern Iowa's river floodplains, where the greatest numbers of cranes now occur. Massive, historic flooding in 1993 and subsequent major floods have resulted in much retirement of cropland, especially in floodplains of the Mississippi, Wapsipinicon, and Iowa rivers. Permanent, private, conservation easements along with acquisition of public wildlife lands by county, state, and federal natural resource agencies, have resulted in tens of thousands of acres now in prime condition for crane nesting. There is little doubt the species has found this situation perfect for a relatively rapid expansion back into the cranes' historic Iowa breeding habitats. Population recovery and expansion might be predicted to continue until all available habitat is saturated.

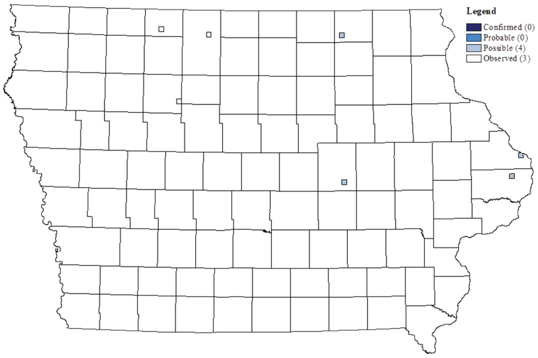
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	2	1	3
Possible	1	3	4
Probable	0	0	0
Confirmed	0	0	0
Conf & Prob	0.00%	0.00%	0.00%

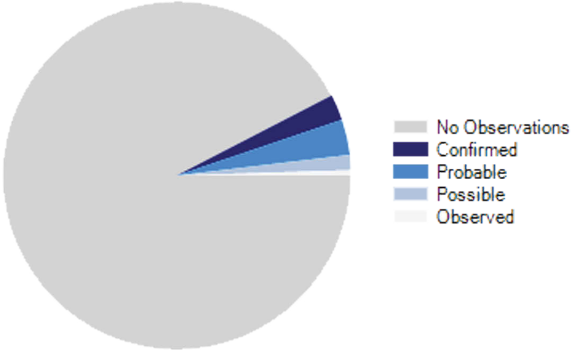
BBA I Results



BBA I



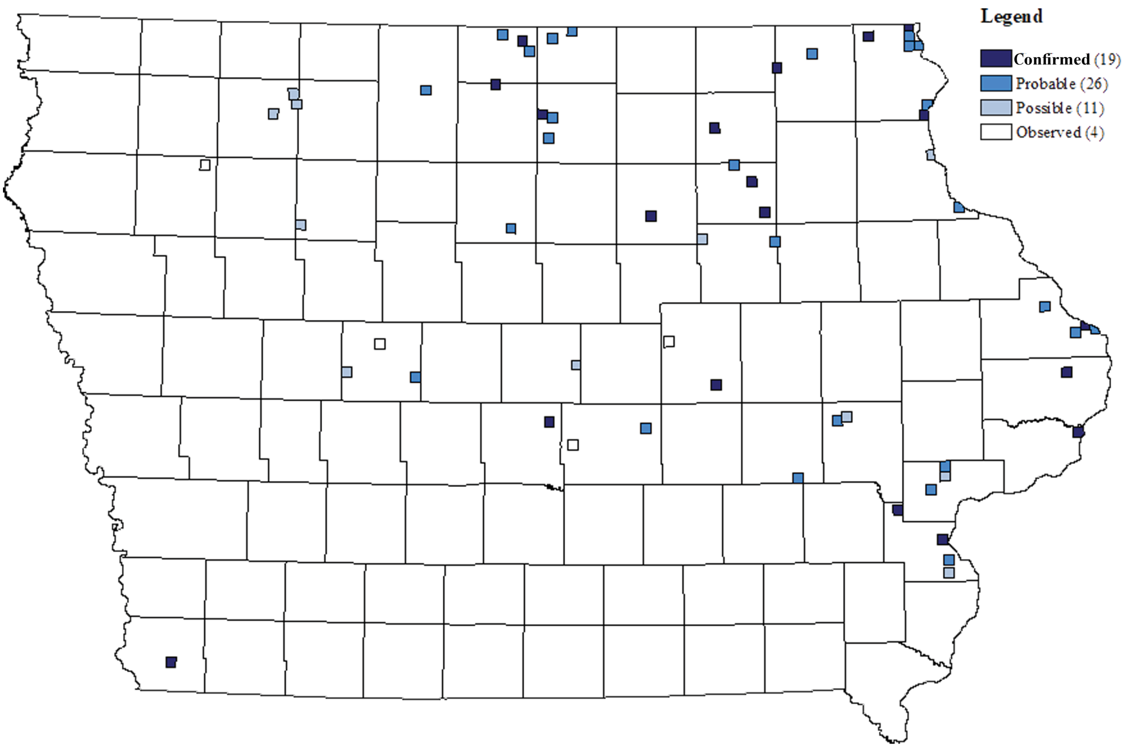
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	4	4
Possible	1	10	11
Probable	4	22	26
Confirmed	2	17	19
Conf & Prob	1.10%	9.80%	5.20%

BBA II

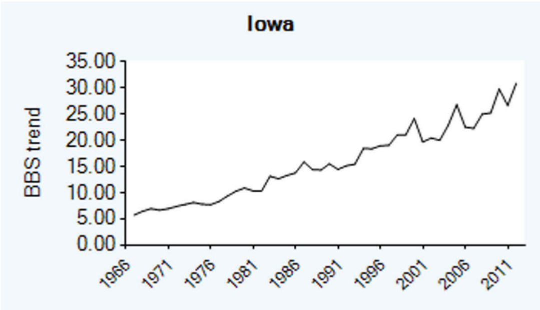


In Memory of Aldo Leopold (Kirsten Winter)

Habitat	A wide range of open habitats, often near water
Breeding Dates	22 Mar (PR)-26 Aug (CO)
Nest Type	Shallow scrape on ground, lined with small pebbles, driftwood, or other debris
Clutch Size	4 (rarely 3-5)
Incubation	24-26 days
Fledging	~40 days
Status	Common migrant and breeding bird
BBS Trend	Increasing (trend = 3.9, 95% CI is 3.0, 4.7) [Iowa]

Patterns since BBA I

The Killdeer is the most common shorebird in Iowa, where it is a familiar bird of wetland edges, roadsides, agricultural fields, and even urban environments (Jackson et al. 1996). The BBS data suggest Killdeer are increasing in Iowa, and indeed the trend shows a slow but steady increase since the 1960s (Sauer et al. 2012). Nationally, however, this species is in a slow but steady decline (Sauer et al. 2017). It is likely that this species has increased historically, and evidence suggests it was once limited to coastal areas, beaches, and larger rivers with suitable sand and gravel nesting habitat (Jackson and Jackson 2020). This species readily nests on gravel parking lots, rooftops, gravel access roads developed for wind energy (Gillespie 2013, Jackson and Jackson 2020), and in tilled agricultural fields. Indeed, the Killdeer may be one of the more numerous nonpasserine breeders in Iowa given the vast amount of suitable nesting habitat. A recent study in south-central Nebraska estimated that as many as 100,000 Killdeer bred in the Rainwater Basin, suggesting that this species may be far more numerous in agricultural habitats than previously thought (Jorgensen et al. 2009). This same study noted the species' preference for fields planted to soybeans the previous year, which suggests that Iowa contains plenty of suitable nesting habitat each year.



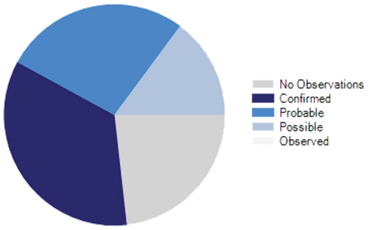
Killdeer were encountered in all but six blocks during BBA II (99% occurrence), a significant increase from a mere 77% occurrence rate in blocks during BBA I (Jackson et al. 1996). Indeed, there are probably few sizeable areas of Iowa that lack Killdeer nesting habitat, and most are in the Driftless Region in northeastern Iowa. This increase from BBA I may reflect a distribution change in this species, but more likely it is the result of less complete coverage during the first BBA effort. This species is relatively easy to confirm nesting because of its preference to nest along roadsides where nests and broods are easily detected. Indeed, it was confirmed in more than 70% of the blocks where it was detected; breeding was probable in an additional 22% of blocks. This species exhibited a statewide distribution during both atlas projects with no discernable differences.

The Killdeer is considered a shorebird of Moderate Concern with respect to its conservation status in the United States (U.S. Shorebird Conservation Plan Partnership 2016), although it is one of the most widespread and familiar in North America. This species' close association with humans, especially in agricultural settings, increases its risk to pesticide exposure. Indeed, several studies have demonstrated or suggested the negative effects of an array of chemicals on Killdeer (Fisk 1976, Fair et al. 1995, Warnock and Schwarzbach 1995, Jackson and Jackson 2020), although no recent work has addressed this topic. The Killdeer is likely to remain a familiar Iowa breeding bird if open habitats with ready access to gravel areas for nesting exist.

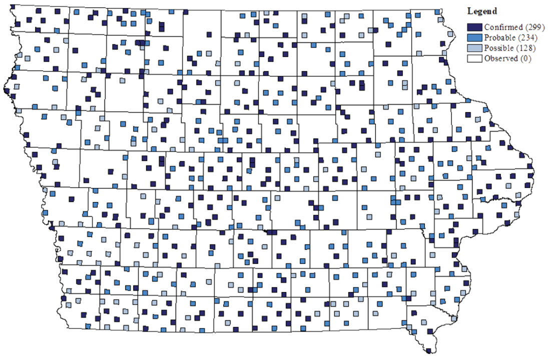
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	80	48	128
Probable	128	106	234
Confirmed	125	174	299
Conf & Prob	48.50%	70.20%	61.90%

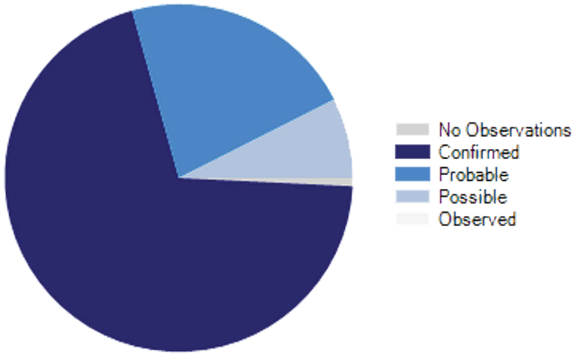
BBA I Results



BBA I



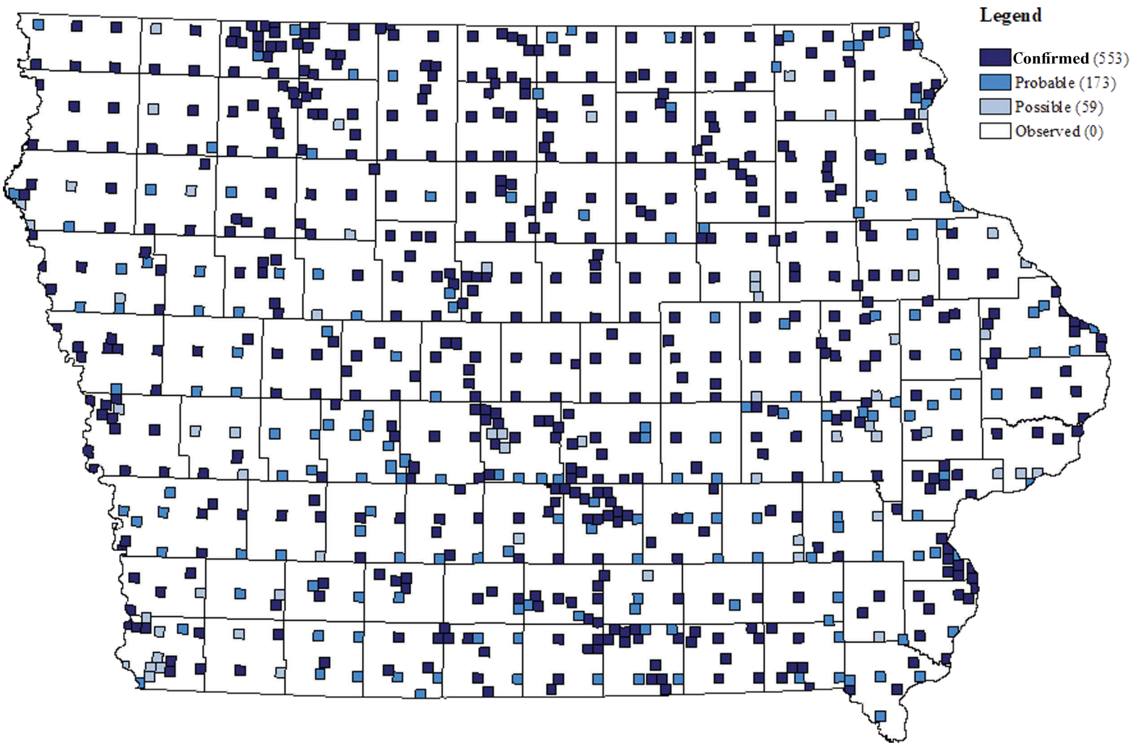
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	33	26	59
Probable	98	75	173
Confirmed	263	293	556
Conf & Prob	69.20%	92.20%	84.70%

BBA II

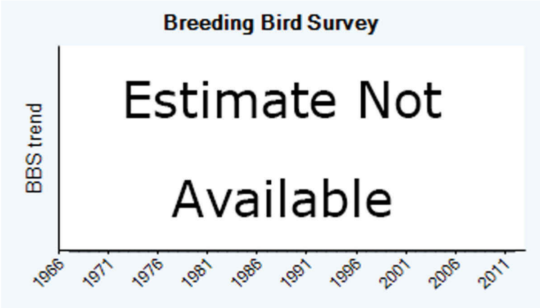


Sponsored by Stephen J. Dinsmore

© Reid Allen

Habitat	Open sandy beaches
Breeding Dates	18 May (PR)–18 May (PR)
Nest Type	Shallow scrape on ground, lined with small pebbles or driftwood
Clutch Size	4 (rarely 3–5)
Incubation	27 days
Fledging	30–35 days
Status	Rare migrant and breeding bird
BBS Trend	No Trend Available

Patterns since BBA I



The Piping Plover is a rare migrant and breeding bird in Iowa. The species prefers to nest on open sandbars and beaches along the Missouri River, where it was historically more common (Elliott-Smith and Haig 2020). Alterations to the Missouri River have removed most of the natural sandbars, and the few that remain are quickly overgrown with vegetation after flood events. Birds nesting in Iowa are part of the large Northern Great Plains population (Elliott-Smith and Haig 2020). The last historical Iowa nesting records on natural habitat occurred at DeSoto National Wildlife Refuge in Harrison County in the late 1960s and early 1970s (Brown 1971, J. J. Dinsmore et al. 1984). Since then the only nesting has occurred on fly-ash deposits at power plants at Council Bluffs, Pottawattamie County and at Sioux City, Woodbury County (J. J. Dinsmore et al. 1999). At Council Bluffs they first nested in 1983 (Wilson et al. 1983) and nested most years through 2015; the most was eight nests in 1986 (J. J. Dinsmore et al. 2004). They nested less often and in smaller numbers at Sioux City beginning in 1984 (J. J. Dinsmore et al. 2004). Since 2018 the fly-ash deposits have been covered and this nesting habitat is no longer found in Iowa (S. J. Dinsmore pers. obs.). The BBS data are inadequate for estimating population trends of this species. This species often co-occurs with the Least Tern, although the tern can use smaller sites for nesting.

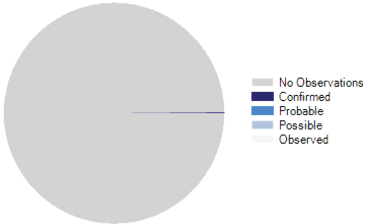
The Piping Plover has probably never been common in Iowa, and too few occur now to estimate annual population trends. The Sioux City site was a priority block in BBA I and plovers were documented nesting in multiple years (Jackson et al. 1996). During BBA II there were no confirmed breeding records and just a single probable record from Brown's Lake in Woodbury County, adjacent to the Sioux City nesting site. A single observed record was from July along the Mississippi River in Muscatine County.

The Piping Plover is likely to remain a rare to absent breeding bird in Iowa. Its only hope is that major Missouri River flood events will scour the main channel and leave large sand and gravel bars and islands where it might nest. The Piping Plover is federally listed as Endangered under the U.S. Endangered Species Act and is therefore a shorebird of important conservation status in the United States (U.S. Shorebird Conservation Plan Partnership 2016). It is also Endangered in Iowa and a Species of Greatest Conservation Need (Iowa DNR 2015). The Missouri River Recovery Program (MRRP; U.S. Army Corps of Engineers 2020) offers some hope that this river will be managed for periodic major flood events that could benefit the plover and other riverine species such as the Least Tern. Only time will tell if this will materialize.

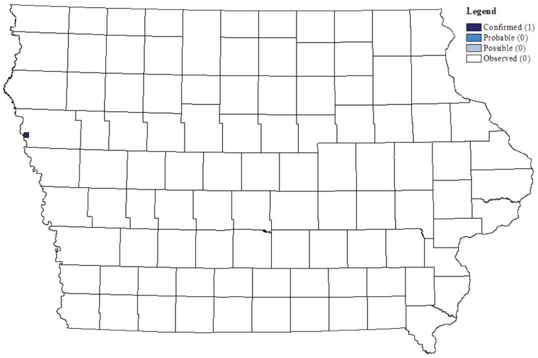
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	0	0	0
Probable	0	0	0
Confirmed	0	1	1
Conf & Prob	0.00%	0.30%	0.10%

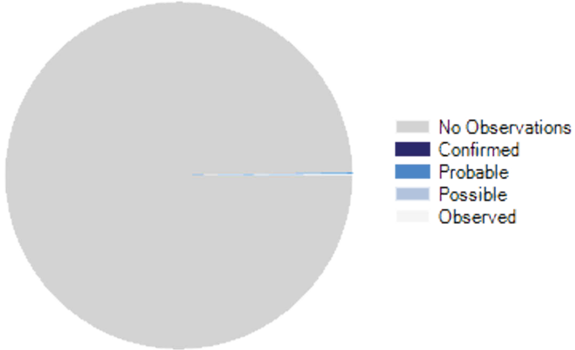
BBA I Results



BBA I



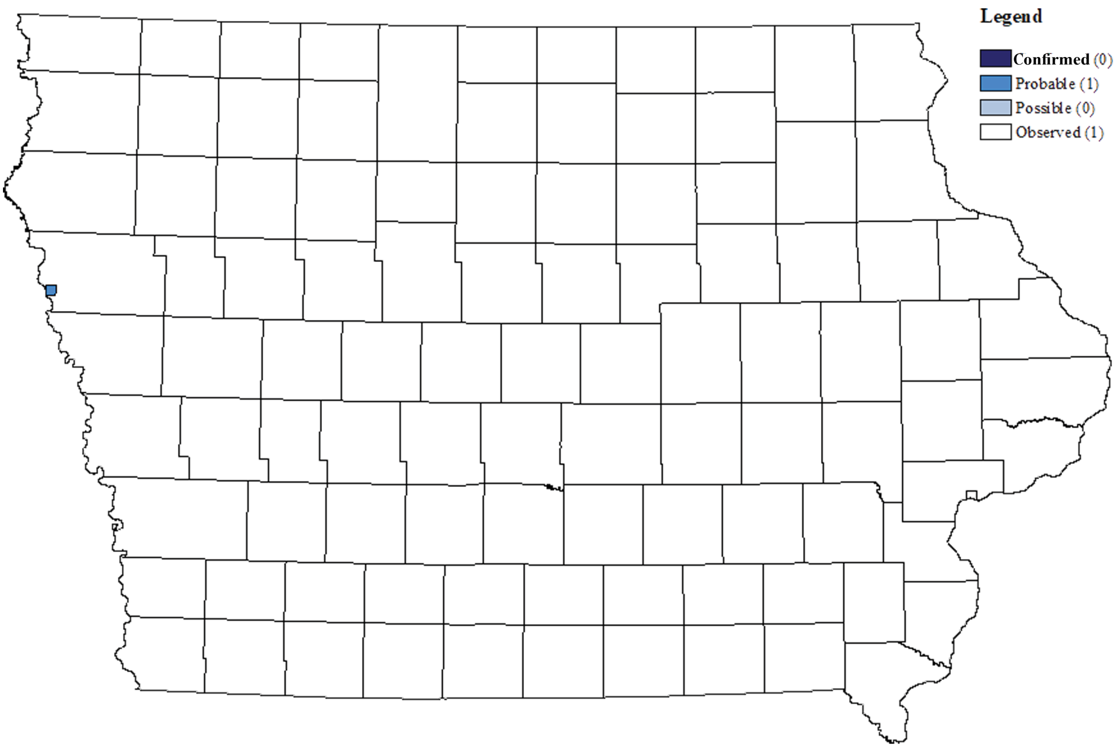
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	1	1
Possible	0	0	0
Probable	0	1	1
Confirmed	0	0	0
Conf & Prob	0.00%	0.30%	0.10%

BBA II

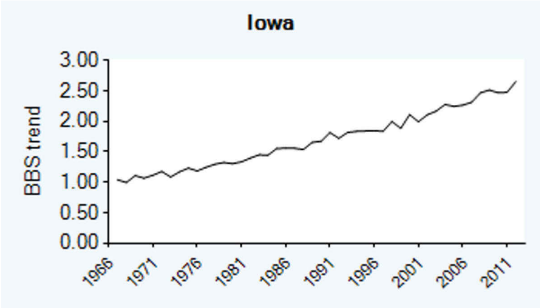


© Mark Brown

Habitat	Grasslands, wet meadows, and agricultural fields (often soybeans in Iowa)
Breeding Dates	3 May (PR)–11 Aug (PR)
Nest Type	Shallow depression lined with grass, often covered by surrounding grass
Clutch Size	3–4 eggs
Incubation	21 days
Fledging	~30 days
Status	Uncommon migrant and breeder
BBS Trend	Stable (trend = 1.4, 95% CI is −0.2, 3.0) [Iowa]

Patterns since BBA I

The Upland Sandpiper is an uncommon and local terrestrial shorebird of grasslands and agricultural lands throughout Iowa. Indeed, it was formerly called the Upland Plover, a reference to its occurrence in drier grasslands that were also frequented by American Golden-Plovers. Its loud, distinctive whistled call is the most common clue to its presence. It is often considered an obligate grassland bird and an indicator species for native prairie (Houston et al. 2020). This species is known to nest in large grasslands and pasture areas, but also frequents planted soybean fields in intensive agricultural regions (S. J. Dinsmore pers. obs.). It is a long-distance migrant, wintering in southern South America. Post-breeding birds begin to gather in July and most have departed Iowa by the end of August. The BBS data suggest a slight increase in Iowa (Sauer et al. 2012) and nationally (Sauer et al. 2017). It has been suggested that the BBS may be an adequate monitoring tool for this species (Bart et al. 2005).



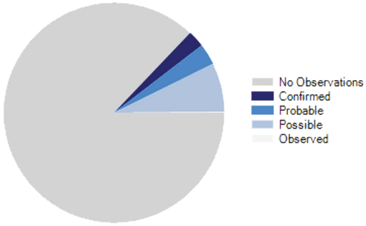
The Upland Sandpiper was found in 126 (16%) blocks during BBA II, a slight increase from 111 (13%) blocks during BBA I. Occurrence was statewide during both efforts, although the pattern differed. In BBA II there were clusters of sightings in parts of south-central Iowa, scattered reports from eastern Iowa, and more widespread reports from throughout the Des Moines Lobe region. This differed from BBA I, which had more reports from south-central Iowa and fewer from the Des Moines Lobe. Interestingly, this species was more commonly found in grid (21.3% of total) than habitat (10.6% of total) blocks during BBA II, an indication of its ability to nest in areas with intensive agriculture. Nests of this species are difficult to find, but it is easier to detect adults with chicks. The confirmation rate was 19% during BBA I, but increased to 29% in BBA II, possibly because it was easier to detect broods in the agricultural regions of north-central Iowa. The species is a scarce breeder in southeastern, northeastern Iowa, and the Loess Hills where forested habitats predominate.

The Upland Sandpiper is considered a shorebird of Least Concern with respect to its conservation status in the United States (U.S. Shorebird Conservation Plan Partnership 2016). It is also a Species of Greatest Conservation Need in Iowa (Iowa DNR 2015). This species was formerly hunted in Iowa and the Midwest, although probably never in great numbers (J. J. Dinsmore 1994). Efforts to increase core areas of grassland, such as those within the Kellerton Grasslands Bird Conservation Area in south-central Iowa (Iowa Department of Natural Resources 2020a), offer the best hope of preserving high quality habitat for this species (Audubon Minnesota 2014d). Houston et al. (2020) summarized the primary conservation needs as preserving a mosaic of suitable grassland habitat and implementing management actions such as controlled burns, grazing, and delayed mowing activities. Despite these challenges, the Upland Sandpiper persists in Iowa, where on-going grassland restoration efforts continue to benefit this species.

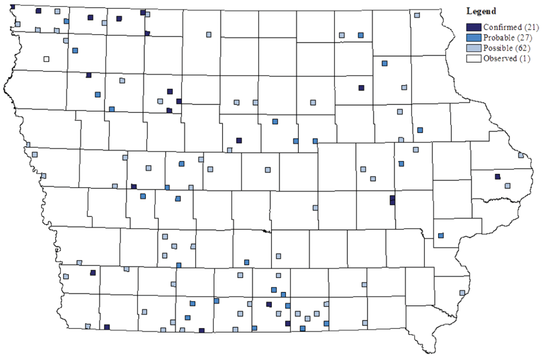
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	1	0	1
Possible	46	16	62
Probable	11	16	27
Confirmed	12	9	21
Conf & Prob	4.40%	6.30%	5.60%

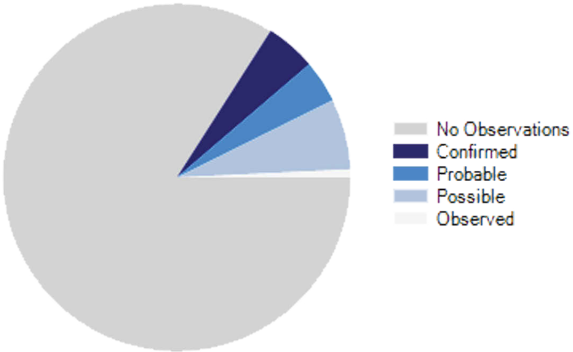
BBA I Results



BBA I



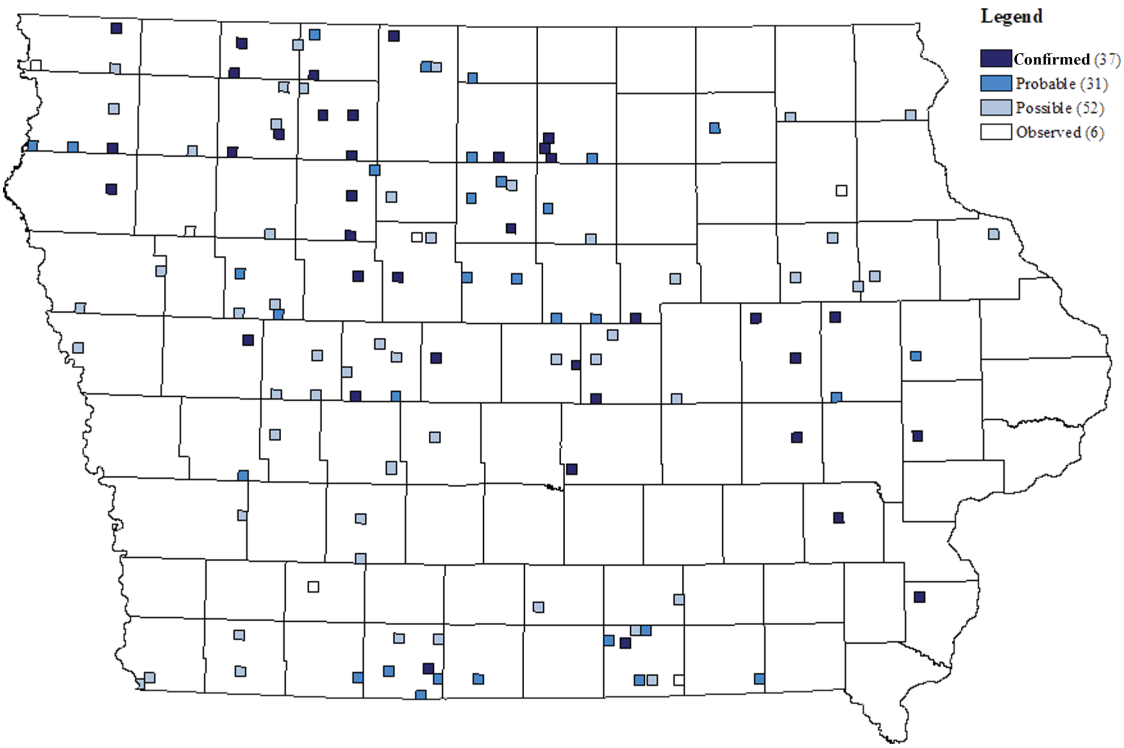
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	3	3	6
Possible	35	17	52
Probable	21	10	31
Confirmed	25	12	37
Conf & Prob	8.80%	5.50%	7.90%

BBA II

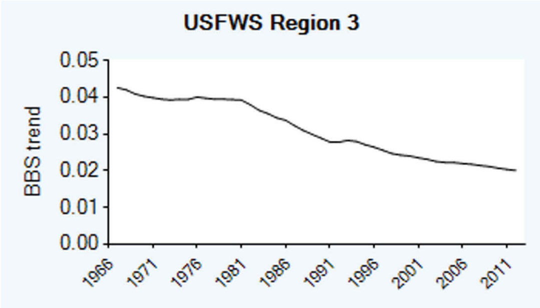


Sponsored by Kirsten Winter

Habitat	Edges of wooded or scrubby habitats, often near water
Breeding Dates	16 Mar (PR)–1 Jul (CO)
Nest Type	Shallow depression lined with leaves or other plant material
Clutch Size	4 (rarely 3–5)
Incubation	20–21 days
Fledging	~25 days
Status	Uncommon migrant and breeding bird
BBS Trend	Stable (trend = 0.6, 95% CI is –5.2, 6.6) [Central US]

Patterns since BBA I

The American Woodcock, also known as the "timberdoodle," is a plump, forest- and edge-dwelling shorebird that is known for its spring courtship displays (McAuley et al. 2020). The species occurs throughout eastern North America and retreats to the southeastern United States in winter. It is among the earliest shorebird arrivals in Iowa in spring, sometimes appearing in late February but more typically in mid-March and is most common in eastern Iowa (Kent and Dinsmore 1996). The earliest nest record for Iowa is 21 March (J. J. Dinsmore et al. 1984), so it is among the earliest of Iowa's nesting birds. Woodcock have declined regionally and nationally according to the BBS (Sauer et al. 2012, Sauer et al. 2017), and anecdotal evidence suggests this is mirrored in Iowa.



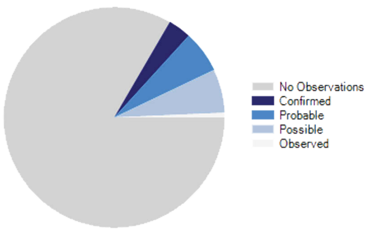
The American Woodcock was found throughout Iowa during BBA II, although they were most often found in the eastern half of Iowa; there were few records in the western quarter of Iowa away from the Missouri River Valley. This pattern generally matched what was found during BBA I with this species conspicuously absent from the Loess Hills and intensively managed agricultural areas immediately to their east (Jackson et al. 1996, Kent and Dinsmore 1996). This species is difficult to confirm because of its early nesting season, cryptic coloration, and tendency not to flush. Woodcock were found in 92 (12%) blocks during BBA II, compared to 143 (17%) blocks sampled during BBA I. The confirmation rate during BBA II was 11% of blocks where it was detected, which was lower than the 20% during BBA I. The species was found in 19% of habitat blocks but just 4% of grid blocks during BBA II. This suggests that its preference for large areas with the appropriate mix of forest and edge occurs mostly on public lands throughout much of Iowa.

Woodcock are a hunted species, although they are not hunted extensively in Iowa where their popularity as a game species has declined (J. J. Dinsmore 1994). Their national popularity as a gamebird declined from an estimated harvest of 1.1 million birds by 400,000 hunters (Sauer and Bortner 1991) to 330,000 shot in 2010–2011 (McAuley et al. 2020). Iowa data show that an estimated 1,900 woodcock were harvested in 2017, the most recent year data were available (Raftovich et al. 2019). Kelley et al. (2008) identified the loss and degradation of early successional forest habitat as the primary cause of population declines and suggested that 8.4 million ha of new woodcock habitat needed to be created to return to population levels of the 1970s. The American Woodcock is a shorebird of High Concern with respect to its conservation status in the United States (U.S. Shorebird Conservation Plan Partnership 2016) and is a Species of Greatest Conservation Need in Iowa (Iowa DNR 2015). The woodcock is likely to remain an iconic shorebird of forested regions in eastern Iowa, although it is certainly not as common as the more familiar Killdeer.

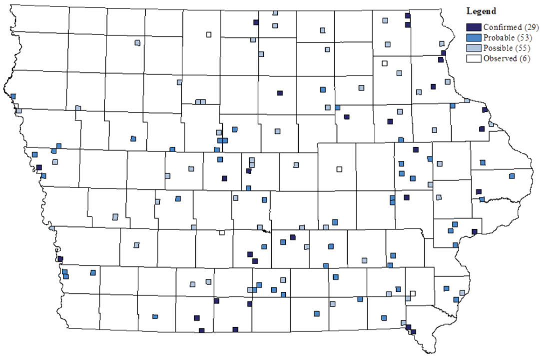
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	3	3	6
Possible	15	40	55
Probable	10	43	53
Confirmed	5	24	29
Conf & Prob	2.90%	16.80%	9.50%

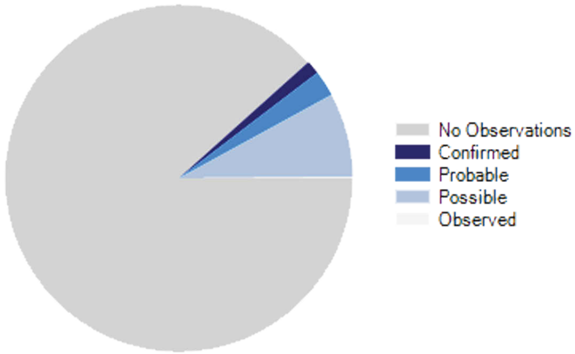
BBA I Results



BBA I



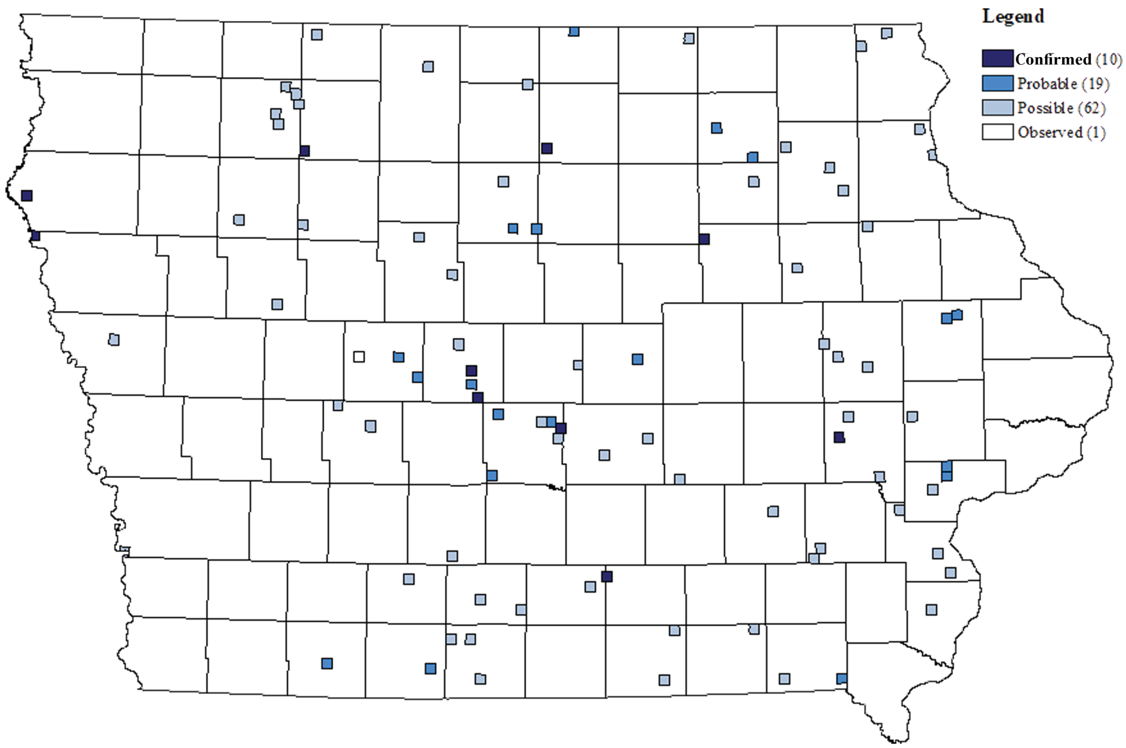
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	1	0	1
Possible	9	53	62
Probable	5	14	19
Confirmed	2	8	10
Conf & Prob	1.30%	5.50%	3.40%

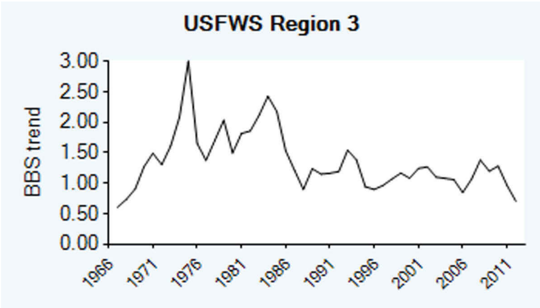
BBA II



© Linda Rudolph

Habitat	A wide range of moist sites, often near prairie pothole wetlands in Iowa
Breeding Dates	3 May (PR)–21 Jul (PR)
Nest Type	Shallow depression lined with grass
Clutch Size	3–4 eggs
Incubation	18–20 days
Fledging	19–20 days
Status	Fairly common migrant and rare breeder
BBS Trend	Increasing (trend = 3.9, 95% CI is 2.9, 4.9) [Central US]

Patterns since BBA I



The Wilson's Snipe is a common and widespread shorebird in North America (Mueller 2020). Iowa lies on the southern edge of the species' breeding range, where it is a fairly common migrant but scarce and probably under-reported breeding bird. There are surprisingly few definite nesting records from Iowa. J. J. Dinsmore et al. (1984) listed three pre-1975 nesting records and Kent and Dinsmore (1996) listed five records since 1978, the most recent in Dickinson County in 1994. All but one of these records was from north-central and northeastern Iowa. One explanation for the paucity of records may be their early nesting habits: displays are most pronounced in April and May and the few egg dates are in May. Nests are not easy to find because they are hidden in dense vegetation and adults flush only at close range. The BBS data cannot estimate a trend for Iowa; the species has slowly declined regionally (Sauer et al. 2017). Wilson's Snipe have a notable flight display that is performed during migration and on a breeding territory and consists of a tremulous series of notes ("winnowing") that are produced by air flow passing over the outer rectrices (Mueller 2020).

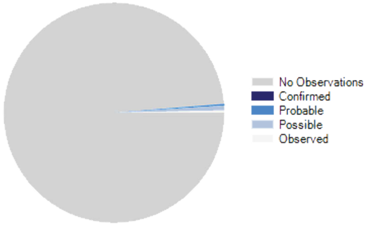
The Wilson's Snipe was reported from 41 (5.2%) blocks during BBA II, a striking increase from just 11 (1.3%) blocks during BBA I (Jackson et al. 1996). There were no confirmed reports during either atlas effort. During BBA II, however, there were 12 probable and 14 possible reports, almost all from north-central Iowa. Most of the probable records were of territorial males doing spring display flights, which does not provide definite evidence of nesting (Mueller 2020). During BBA II, this species was more often detected in habitat (8.6% of total) than grid (1.8% of total) blocks, suggesting wetland areas used for nesting are scarce outside of habitat blocks. Targeted surveys for displaying birds in northern Iowa in May, followed by focused nest searches, might produce more nest records in Iowa.

The Wilson's Snipe is considered a shorebird of Least Concern with respect to its conservation status in the United States (U.S. Shorebird Conservation Plan Partnership 2016). It is also a Species of Greatest Conservation Need in Iowa (Iowa DNR 2015). Snipe are a gamebird in Iowa and have been hunted since the early settlement period (J. J. Dinsmore 1994). They are still hunted, although data are too sparse to estimate a precise harvest; the Iowa harvest was <50 birds in 2018 (Raftovich et al. 2019). The entire U.S. snipe harvest was an estimated 83,600 birds in 2018 (Raftovich et al. 2019), a sharp decline from estimated harvests of >500,000 in the 1960s and 1970s (Mueller 2020). Snipe are a difficult species to study because of their broad distribution in low densities. As such, effective conservation measures are elusive. Eliminating the loss of wetlands, researching possible negative effects of pesticides and other contaminants, and linking harvest data to population trends may be effective conservation measures to reverse snipe population declines.

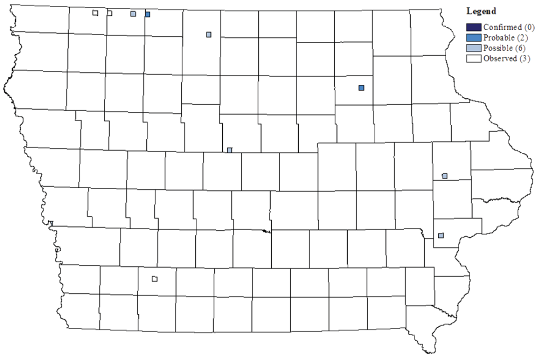
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	1	2	3
Possible	3	3	6
Probable	0	2	2
Confirmed	0	0	0
Conf & Prob	0.00%	0.50%	0.20%

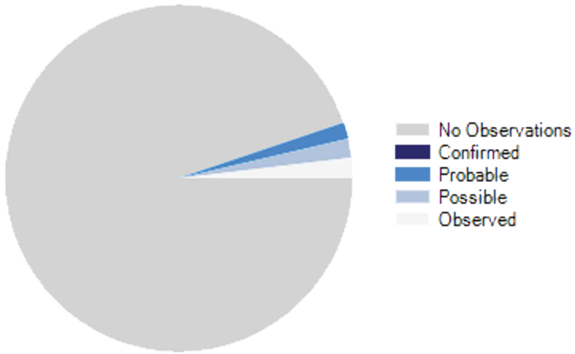
BBA I Results



BBA I



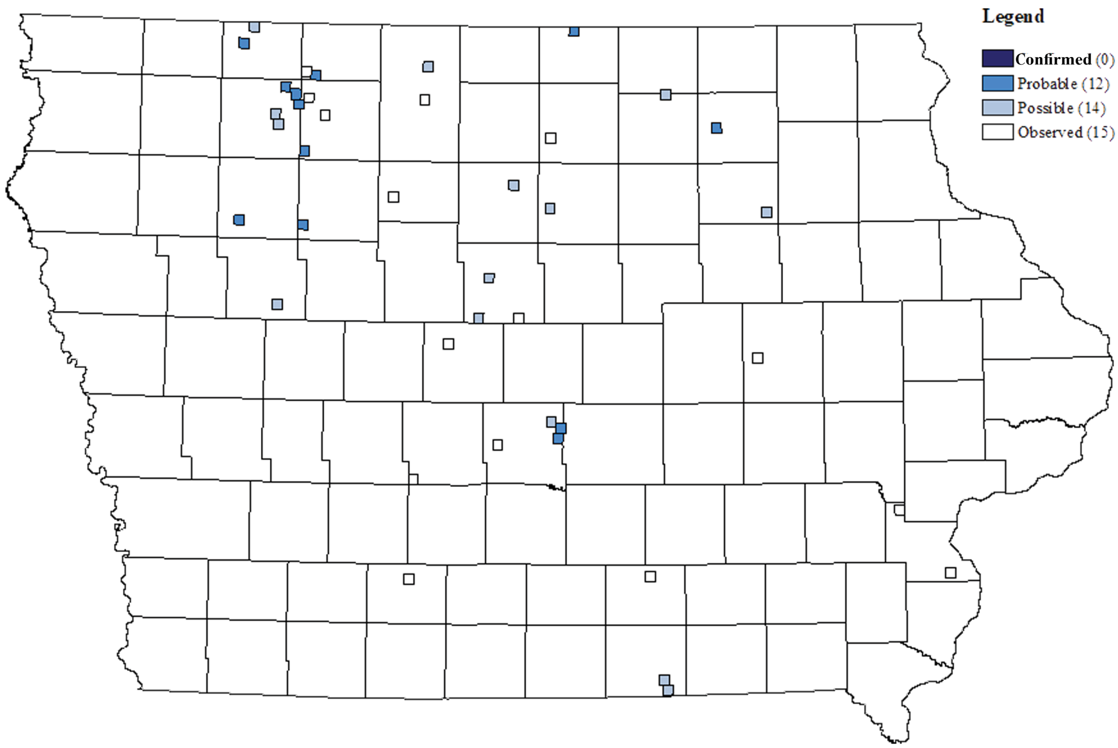
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	3	12	15
Possible	2	12	14
Probable	2	10	12
Confirmed	0	0	0
Conf & Prob	0.40%	2.50%	1.40%

BBA II

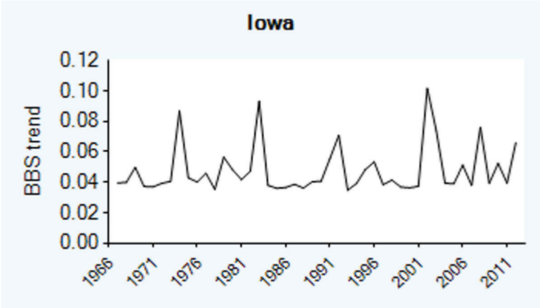


In Honor of David Otis (Karen Kinkead)

© Mark Brown

Habitat	Edges of large lakes, ponds, rivers, streams, and human-made reservoirs
Breeding Dates	5 May (PR)–3 Aug (PR)
Nest Type	Grass-lined depression in thick vegetation, often stinging nettles in Iowa
Clutch Size	4 (rarely 3–5)
Incubation	20–24 days
Fledging	16–18 days
Status	Fairly common migrant and uncommon breeder
BBS Trend	Stable (trend = 0.3, 95% CI is −5.6, 5.7) [Iowa]

Patterns since BBA I



The Spotted Sandpiper is a familiar and uncommon nesting shorebird throughout Iowa where it is often seen singly. Its continuous teetering behavior and conspicuous spotted breeding plumage make this species easy to identify. This sandpiper frequents a wide range of aquatic habitats but is most common at the larger lakes and rivers; it prefers nesting on islands when available. They have a variable mating system with some individuals practicing monogamy while others are polyandrous where a female may simultaneously mate with up to four males (Reed et al. 2020). Although this species is assumed to be an uncommon nesting bird throughout Iowa, there are few published nest or brood observations (J. J. Dinsmore et al. 1984, Jackson et al. 1996, Kent and Dinsmore 1996). The BBS data are not the best way to monitor this species but showed a steady to slightly declining trend in Iowa (Sauer et al. 2012); national BBS data show a clear declining trend (Sauer et al. 2017).

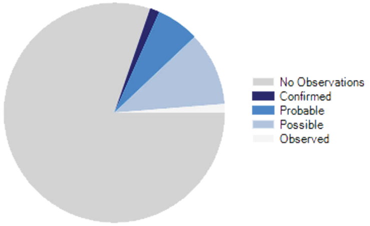
Spotted Sandpipers were found in 280 (35%) blocks during BBA II, up from 170 (20%) blocks during BBA I (Jackson et al. 1996). The distribution pattern during BBA II revealed that most reports were from the eastern three quarters of Iowa with notable gaps in portions of western Iowa. There also were no reports from the Mississippi River in far southeastern Iowa, which is odd given the seemingly abundant habitat. A careful look at their distribution reveals that most occurred in blocks that intersected the major river corridors (especially in eastern Iowa) and natural lakes in north-central Iowa. This species was much more likely to be found in habitat (49.7% of total) than grid (21% of total) blocks during BBA II, probably because the former are more likely to include wetlands favored for nesting. Like many other shorebird species, nests are difficult to find, even more so because of their preference for nesting in dense stands of nettle (U*rtica* sp.; Reed et al. 2020). Thus, the confirmation rate was low in both BBA I (7%) and BBA II (12%). As expected, there were many more reports in the probable category, which comprised 30% of reports in BBA II and 32% of reports in BBA I.

The Spotted Sandpiper is considered a shorebird of Least Concern with respect to its conservation status in the United States (U.S. Shorebird Conservation Plan Partnership 2016) but has no special conservation status in Iowa. No major threats have been identified and the species is widespread and not thought to suffer from human disturbance. Reed et al. (2020) suggest that pesticide risk may be high, but more data are needed. In Iowa it has no special designation under the Iowa Wildlife Action Plan (Iowa Department of Natural Resources 2015).

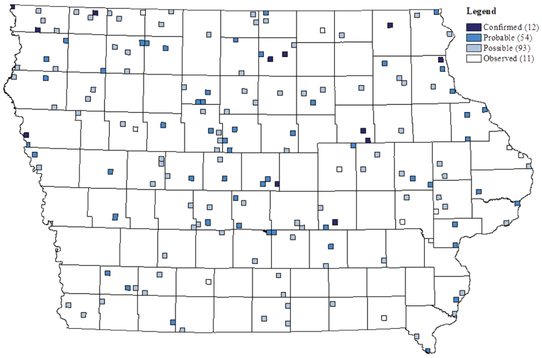
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	1	10	11
Possible	28	65	93
Probable	13	41	54
Confirmed	4	8	12
Conf & Prob	3.30%	12.30%	7.70%

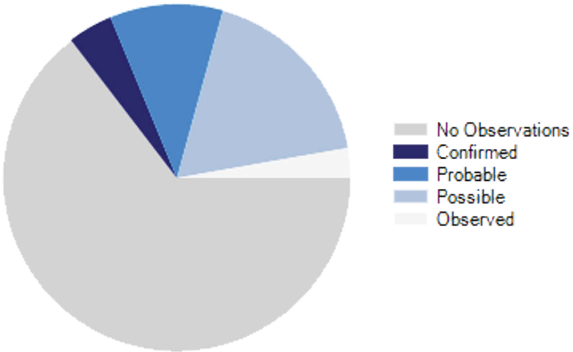
BBA I Results



BBA I



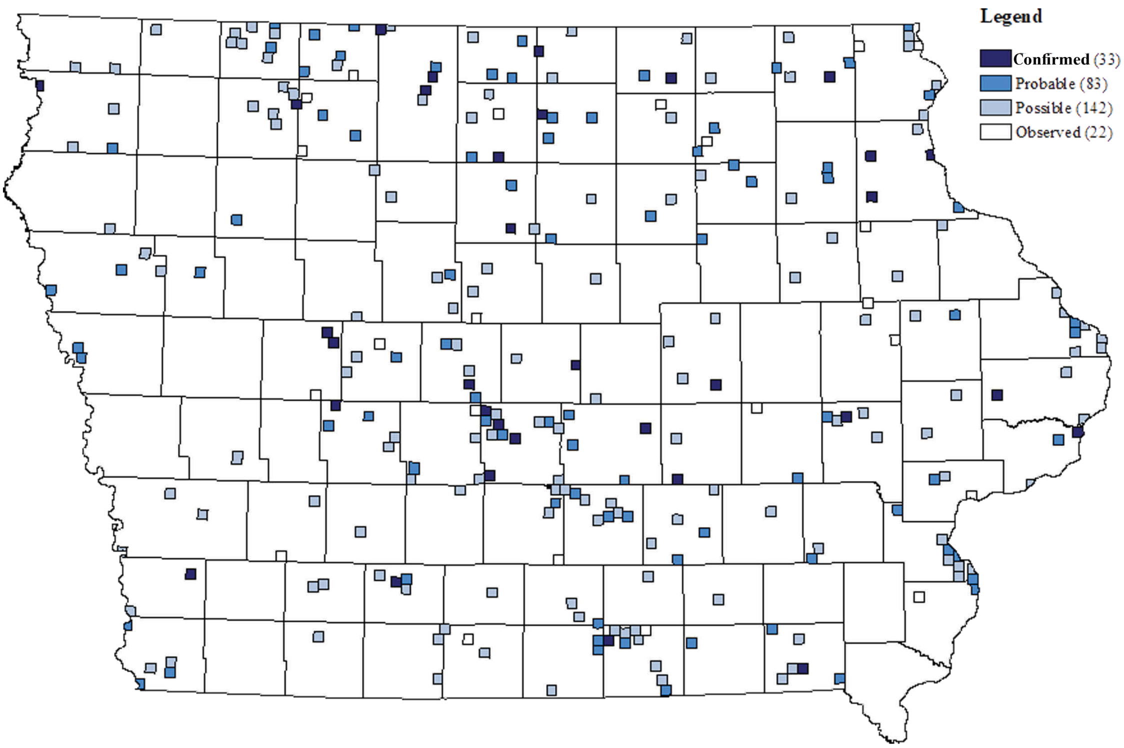
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	6	16	22
Possible	50	92	142
Probable	18	65	83
Confirmed	9	24	33
Conf & Prob	5.20%	22.30%	13.50%

BBA II



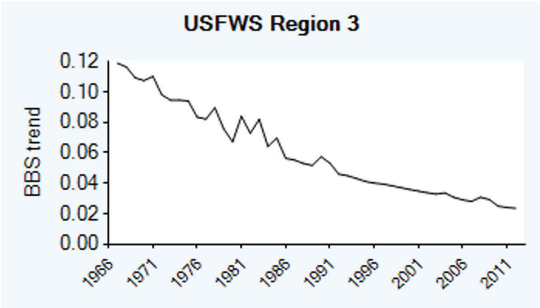
Sponsored by Kevin Murphy

© Wolf Oesterreich

Habitat	Shallow depressional wetlands surrounded by grassland
Breeding Dates	NA
Nest Type	Shallow depression lined with fine grass
Clutch Size	3–4 eggs
Incubation	20–21 days
Fledging	~20 days
Status	Uncommon migrant and very rare breeder
BBS Trend	Stable (trend = 0.0, 95% CI is –1.5, 1.7) [Central US]

Patterns since BBA I

The Wilson's Phalarope is an uncommon migrant and very rare breeding bird in the prairie pothole region of Iowa. Nesting records are erratic and often just a single pair will use a site for one year. Iowa is at the southeastern edge of this species' breeding range, which includes a broad area of the Northern Great Plains and western U.S. (Colwell and Jehl 2020). It was a common nesting bird of the Iowa prairie potholes in the late 1800s (Anderson 1907) but declined rapidly during settlement. Little is known about this decline, but it was a rare nesting species by the 1900s (Kent and Dinsmore 1996). Kent and Dinsmore (1996) summarized five nesting records since 1965 and this pattern has continued with an additional four records (one in Boone and three in Kossuth) since 1995, the most recent from Kossuth County in 2015 (J. J. Dinsmore 2015). Most nesting records are from north-central Iowa, although there are records from other regions of the state. Most of the recent nesting reports are from newly restored wetlands, which appear to provide the preferred mix of dense vegetation near shallow water. The BBS data cannot estimate a trend for Iowa; the species has declined regionally (Sauer et al. 2017). The phalaropes, including Wilson's Phalarope, are well known for their reversed sex-role mating systems, where the female is larger and more brightly colored while the duller male provides all parental care (Colwell and Jehl 2020).



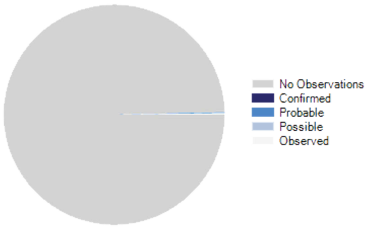
The Wilson's Phalarope was reported from eight blocks during BBA II, and all but one report was in the observed category. The single possible report was from Kossuth County, which is where this species has nested since the 1990s. A similar pattern occurred in BBA I with three total reports, one of which was a probable record from Clinton County (Jackson et al. 1996). Nesting in Iowa probably begins in mid-May with young fledging by early to mid-July; migrants are widely reported from nonbreeding areas by late July (Kent and Dinsmore 1996). Nests are difficult to locate, and documenting nesting is further hampered because nests and young are cared for solely by the male (Colwell and Jehl 2020).

The Wilson's Phalarope is considered a shorebird of Least Concern with respect to its conservation status in the United States (U.S. Shorebird Conservation Plan Partnership 2016). It is also a Species of Greatest Conservation Need in Iowa (Iowa DNR 2015). There is no evidence this species was hunted commercially, unlike many other shorebirds. Population declines are instead linked to the loss and alteration of prairie wetlands (Dahl and Johnson 1991, Colwell and Jehl 2020), and there is evidence this species is mobile and readily discovers new breeding sites (Skagen and Knopf 1993) such as those in Iowa. The future of this species as an Iowa breeding bird probably rests on continued wetland restoration efforts in the prairie pothole region.

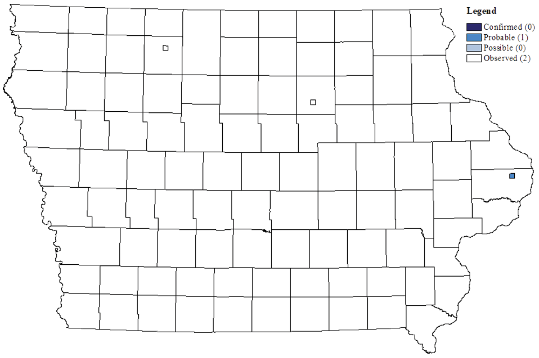
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	1	1	2
Possible	0	0	0
Probable	0	1	1
Confirmed	0	0	0
Conf & Prob	0.00%	0.30%	0.10%

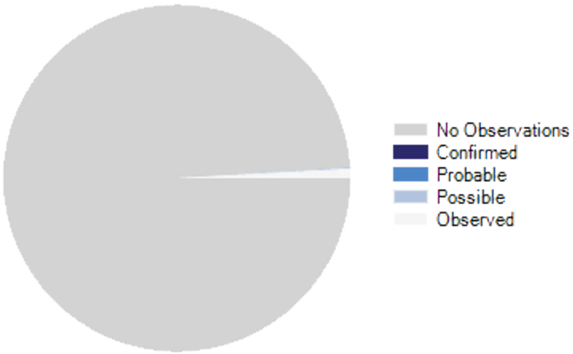
BBA I Results



BBA I



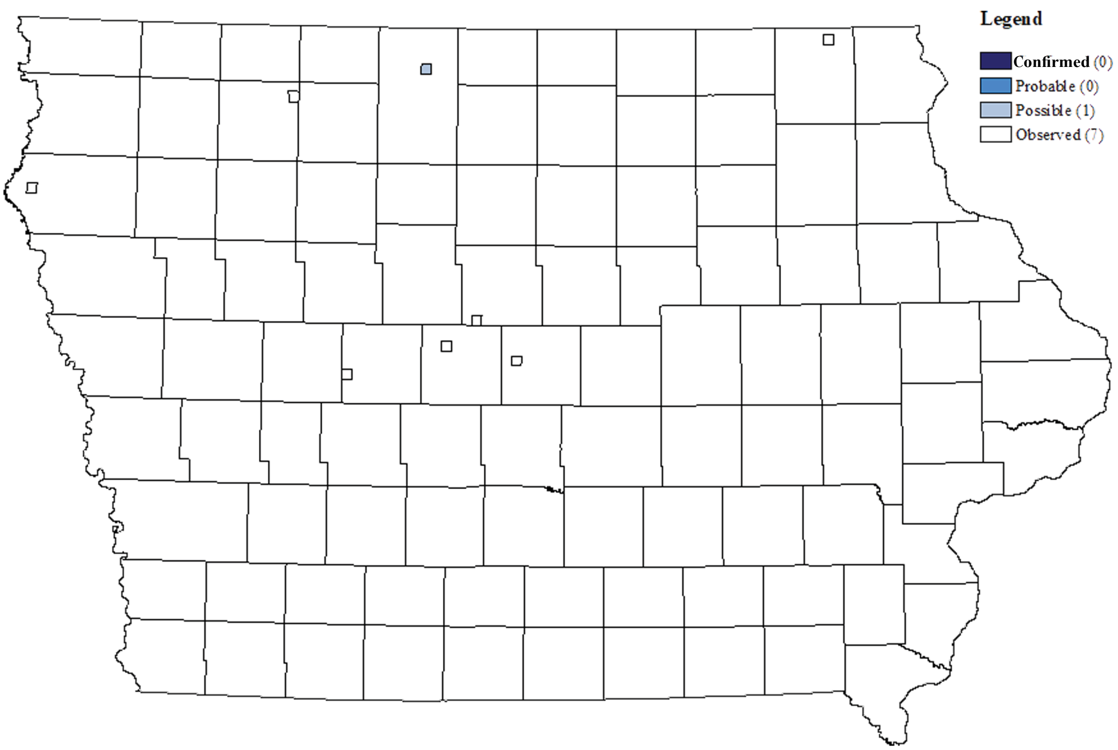
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	4	3	7
Possible	0	1	1
Probable	0	0	0
Confirmed	0	0	0
Conf & Prob	0.00%	0.00%	0.00%

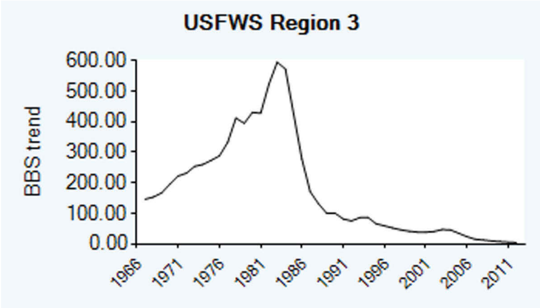
BBA II



Sponsored by Stephen J. Dinsmore

Habitat	Wide range of aquatic habitats, but prefers wetlands with stands of emergent vegetation for breeding
Breeding Dates	NA
Nest Type	Floating mass of vegetation with a central hollow
Clutch Size	2–3 eggs
Incubation	24–25 days
Fledging	28–33 days
Status	Fairly common migrant, rare summer visitor, one breeding record
BBS Trend	Stable (trend = −1.7, 95% CI is −5.8, 0.2) [Central US]

Patterns since BBA I



The Franklin's Gull is common migrant and uncommon, local, and erratic summer nonbreeding wanderer to Iowa. It is an iconic bird of large prairie wetlands in North America, and its massive nesting colonies of >10,000 individuals may represent one of the region's most impressive avian encounters (Burger and Gochfeld 2020). Most Iowa summer reports are from the Great Lakes Region (J. J. Dinsmore et al. 1984, Jackson et al. 1996), although increasingly small numbers are seen statewide. Iowa's only nesting record is from 1940 when a small colony containing three nests was found at Barringer Slough in Clay County (Low 1941). This species nests irregularly at Heron Lake in Jackson County, Minnesota, just 20 miles north of the Iowa Great Lakes in a colony estimated to contain up to 50,000 pairs some years (Kent and Dinsmore 1996, Audubon Minnesota 2014c). The BBS are too sparse to estimate an Iowa trend but regionally and nationally this species is in decline (Sauer et al. 2017).

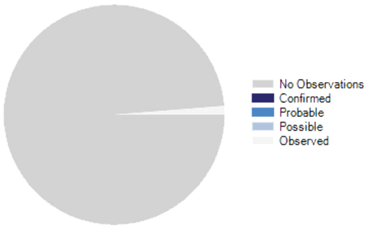
The Franklin's Gull was sparsely reported during both atlas efforts. It was found in 23 (2.9%) blocks during BBA II, up from 11 (1.3%) blocks in BBA I. All reports were in the observed and possible categories. During BBA II the two possible reports were from Clay and Woodbury counties, both at locales where nesting is unlikely. Most reports were from the northwestern quarter of Iowa with few reports from elsewhere. During BBA II most reports came from habitat blocks that included many of the larger wetlands favored by this species. Some consider it surprising that Iowa does not have more nesting records (Jackson et al. 1996, Kent and Dinsmore 1996). Recent wetland restoration efforts in the Iowa Great Lakes Region raise the possibility that this species could nest in the future, although it seems unlikely that nesting will occur regularly.

The Franklin's Gull is a Species of Greatest Conservation Need in Iowa (Iowa DNR 2015) but has no special designation nationally. Conservation efforts have focused on maintaining suitable nesting wetlands, minimizing human disturbance during the nesting period, and learning more about possible pesticide effects (Burger and Gochfeld 2020). A management concern is that their nesting habitat can be degraded by wetland drawdowns to benefit waterfowl and other species, resulting in changing water levels that can result in temporary or permanent colony abandonment (Littlefield and Thompson 1981, Audubon Minnesota 2014c). Iowa has always been outside this species' normal breeding range (Burger and Gochfeld 2020), and it would be a tribute to wetland restoration efforts if a colony were to become established in the future.

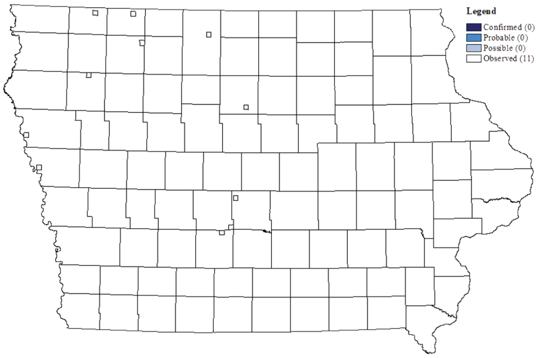
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	5	6	11
Possible	0	0	0
Probable	0	0	0
Confirmed	0	0	0
Conf & Prob	0.00%	0.00%	0.00%

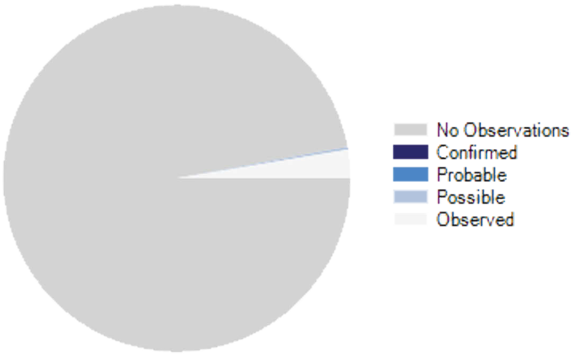
BBA I Results



BBA I



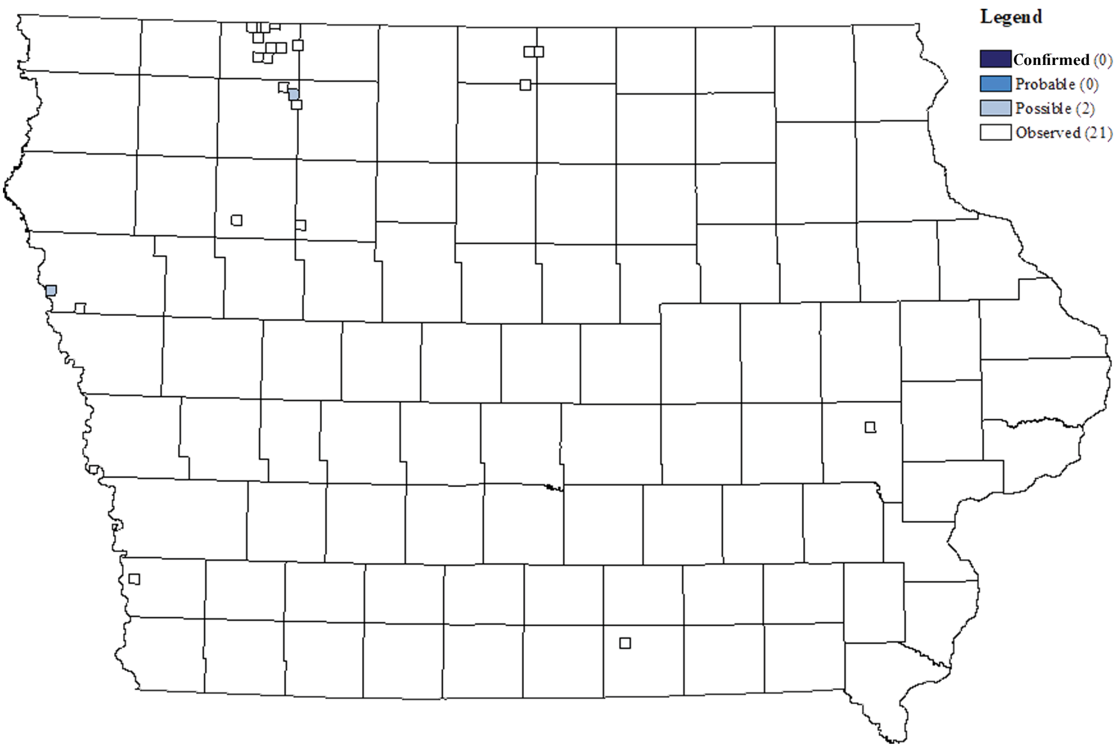
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	1	20	21
Possible	0	2	2
Probable	0	0	0
Confirmed	0	0	0
Conf & Prob	0.00%	0.00%	0.00%

BBA II

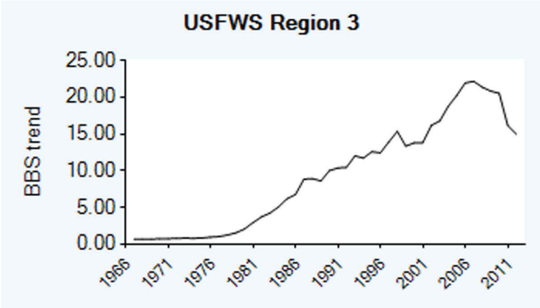


© Linda Petersen

Habitat	Aquatic habitats, but prefers large wetlands with islands for nesting
Breeding Dates	NA
Nest Type	Shallow depression lined with live or dead plant material, feathers, and trash
Clutch Size	3 (rarely 2–4)
Incubation	21 days
Fledging	~35 days
Status	Common migrant, uncommon summer visitor, rare breeder
BBS Trend	Stable (trend = 0.6, 95% CI is −1.1, 2.0) [Central US]

Patterns since BBA I

The Ring-billed Gull is the most familiar gull in Iowa and North America where it easily co-exists with humans and populations. It has increased by as much as 250% since 1990 (Pollet et al. 2020). It is a familiar Iowa bird, occurring in huge numbers on the larger human-made reservoirs in late fall, but it is also widespread on smaller lakes and wetlands, along rivers, and even landfills and city parking lots. This species is a relatively recent addition to Iowa's breeding avifauna with the first nesting record at Meinking Marsh in Dickinson County in 1994 (Waltz 1994), where it has nested most years since. The only other nesting record is from Pool 13 of the Mississippi River in Clinton in 2010 (J. J. Dinsmore 2010, S. J. Dinsmore and M. Griffin 2010). Both Iowa nesting records were from islands, one in a small wetland and the other in a large river; islands are the most common sites used for nesting by this species (Pollet et al. 2020). The BBS results are too sparse to estimate an Iowa trend, but this species is increasing regionally and is stable nationally (Sauer et al. 2017).



The Ring-billed Gull is a regular summer visitor to Iowa, but with few nesting records. It was found in 108 (13.7%) blocks during BBA II, up from eight (0.9%) blocks in BBA I. All reports were in the observed and possible categories, except for a single confirmed report in Dickinson County in BBA II. Reports during BBA II were scattered throughout Iowa but tended to occur in blocks along the major rivers and at natural wetlands in the Prairie Pothole Region. During BBA II most reports (86%) were from habitat blocks that included many of the larger water bodies favored by this species. The apparent increase from BBA I to BBA II is real, although it may have been inflated because Ring-billed Gull was not listed on the atlas field card (Jackson et al. 1996).

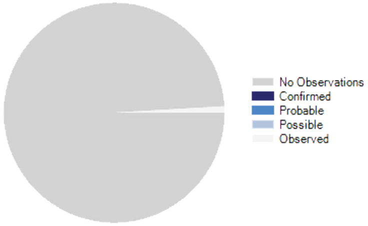
The Ring-billed Gull has no special conservation designation in Iowa or nationally. A major limitation to nesting in Iowa is the unavailability of low elevation, sparsely vegetated, and undisturbed islands for nesting (Pollet et al. 2020). The Meinking Marsh site consists of two islands created for nesting waterfowl while the Pool 13 site is a dredge spoil island created by channel maintenance activities (S. J. Dinsmore pers. obs.). Gulls also like to feed at landfills (Pollet et al. 2020), and the close proximity of the Meinking Marsh site to an active landfill may explain why that colony has been occupied for many years. Degradation of nesting islands by water and wind erosion is a concern at some sites (Scharf 1981). Conservation efforts have focused on protecting nesting islands from human disturbance during the nesting season; pesticide contamination is no longer an issue for this species (Pollet et al. 2020). In some regions the Ring-billed Gull is considered a pest and measures are taken to deter nesting, remove eggs, and sometimes kill adults (Blokpoel and Tessier 1987). Despite these concerns, the species seems likely to remain a familiar Iowa bird that nests locally when conditions are optimal.

Ring-billed Gull

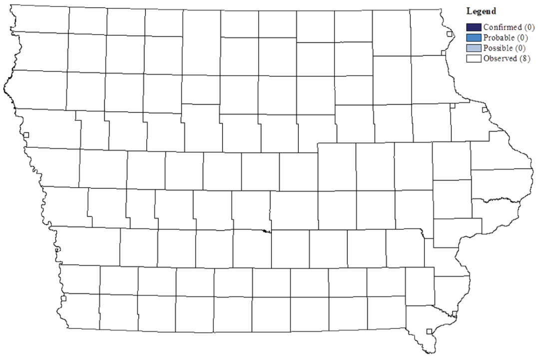
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	8	8
Possible	0	0	0
Probable	0	0	0
Confirmed	0	0	0
Conf & Prob	0.00%	0.00%	0.00%

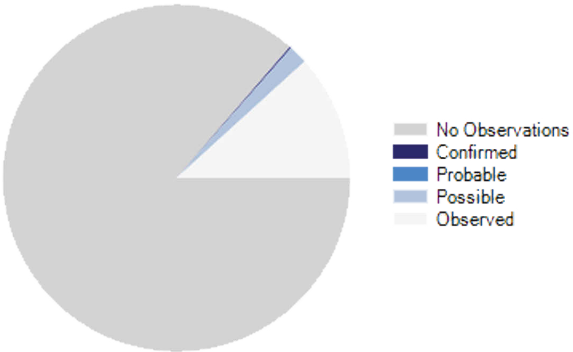
BBA I Results



BBA I



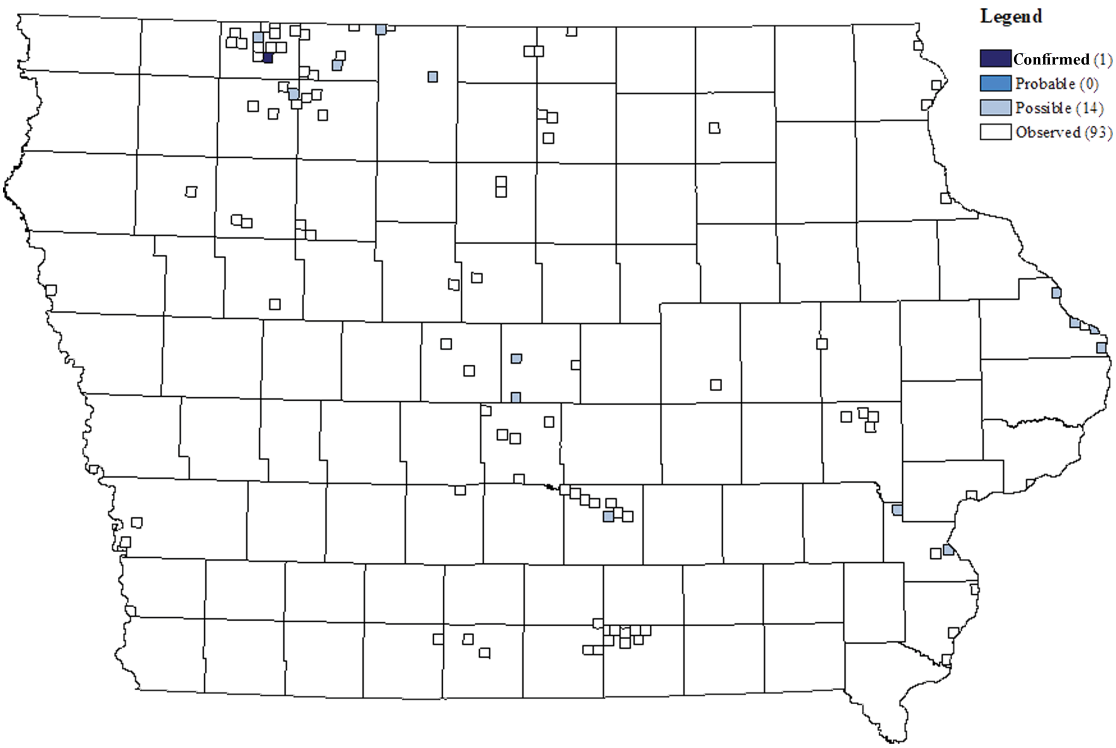
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	13	81	94
Possible	3	11	14
Probable	0	0	0
Confirmed	0	1	1
Conf & Prob	0.00%	0.30%	0.10%

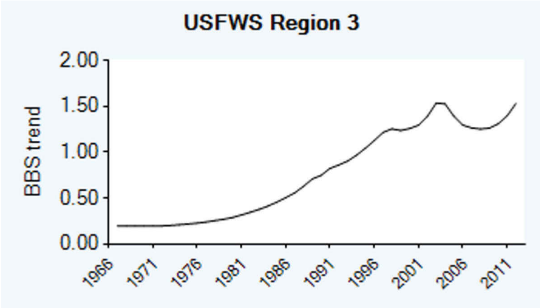
BBA II



© Stephen J. Dinsmore

Habitat	Sandy beaches and islands along major river corridors, especially Missouri River
Breeding Dates	26 May (PR)–26 May (PR)
Nest Type	Shallow depression on ground, sometimes lined with pebbles
Clutch Size	2–3 eggs
Incubation	19–22 days
Fledging	19–21 days
Status	Very rare migrant and breeder
BBS Trend	Stable (trend = 0.5, 95% CI is −5.0, 6.6) [Central US]

Patterns since BBA I



The Least Tern is a rare migrant and breeding bird in western Iowa. There is little evidence of its historical distribution, although it was probably a regular breeding bird along the Missouri River (Kent and Dinsmore 1996). The first nesting record was from Sioux City in 1930 (Youngworth 1930) and a small colony persisted at DeSoto National Wildlife Refuge in Harrison County through the early 1970s (Kent and Dinsmore 1996). More recently, nesting has occurred on fly-ash deposits at power plants at Council Bluffs in Pottawattamie County, and at Sioux City in Woodbury County (S. J. Dinsmore et al. 1993; J. J. Dinsmore et al. 1999; J. J Dinsmore et al. 2004). At Council Bluffs they first nested in 1984 (Kent and Dinsmore 1996) and nested most years through 2018; the most was 14 nests in 1987 (J. J. Dinsmore et al. 1999, 2004). They nested less often and in smaller numbers at Sioux City in 1986, 1992, and 1995–1998 (J. J. Dinsmore et al. 2004). Since 2018 the fly-ash deposits have been covered and this nesting habitat is no longer found in Iowa (S. J. Dinsmore pers. obs.). The only other modern nesting records are a pair with failed nest at Saylorville Reservoir in Polk County in 2006 (S. J. Dinsmore 2006), up to eight adults and three nests at Nottleman Island in Mills County in 2014 (Ubias et al. 2014), and up to 11 adults and five nests at M.U. Payne Wildlife Area in Fremont County in 2014 (Ubias et al. 2014). The BBS data are inadequate for estimating population trends of this species. This species often co-occurs with the Piping Plover.

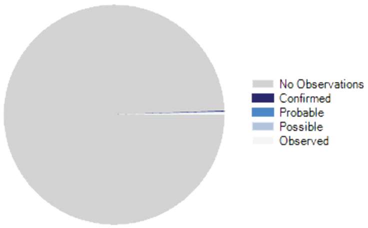
There were few reports of Least Terns during either atlas effort. During BBA II they were reported from five (0.6%) blocks, which was identical to BBA I when they were also found in five (0.6%) blocks. There were no confirmed records in BBA II, and the only probable nesting was in Woodbury County near the known Sioux City nesting site. The Sioux City site was a priority block in BBA I, and terns were documented nesting at least once (Jackson et al. 1996).

The Least Tern is federally listed as Endangered under the U.S. Endangered Species Act (Mueller 2020). It is also Endangered in Iowa and a Species of Greatest Conservation Need (Iowa DNR 2015). The future of this species in Iowa depends on flood events on the Missouri River that scour channels and create sandbars with suitable nesting habitat. Unlike the Piping Plover, this species may be more flexible in its use of nesting sites and will nest in smaller areas with less cobble and even dried mudflats (Thompson et al. 2020). Brush was cleared from a formerly occupied site at DeSoto National Wildlife Refuge, but terns did not recolonize the area (J. J. Dinsmore et al. 1984). Periodic flood events along the Missouri and possibly the Des Moines rivers could produce nesting habitat for this species in the future and offer the best chance for its persistence in Iowa.

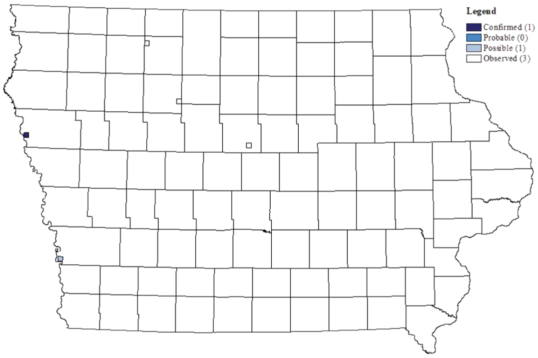
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	1	2	3
Possible	0	1	1
Probable	0	0	0
Confirmed	0	1	1
Conf & Prob	0.00%	0.30%	0.10%

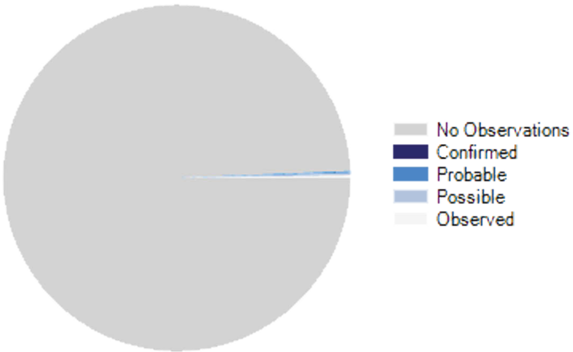
BBA I Results



BBA I



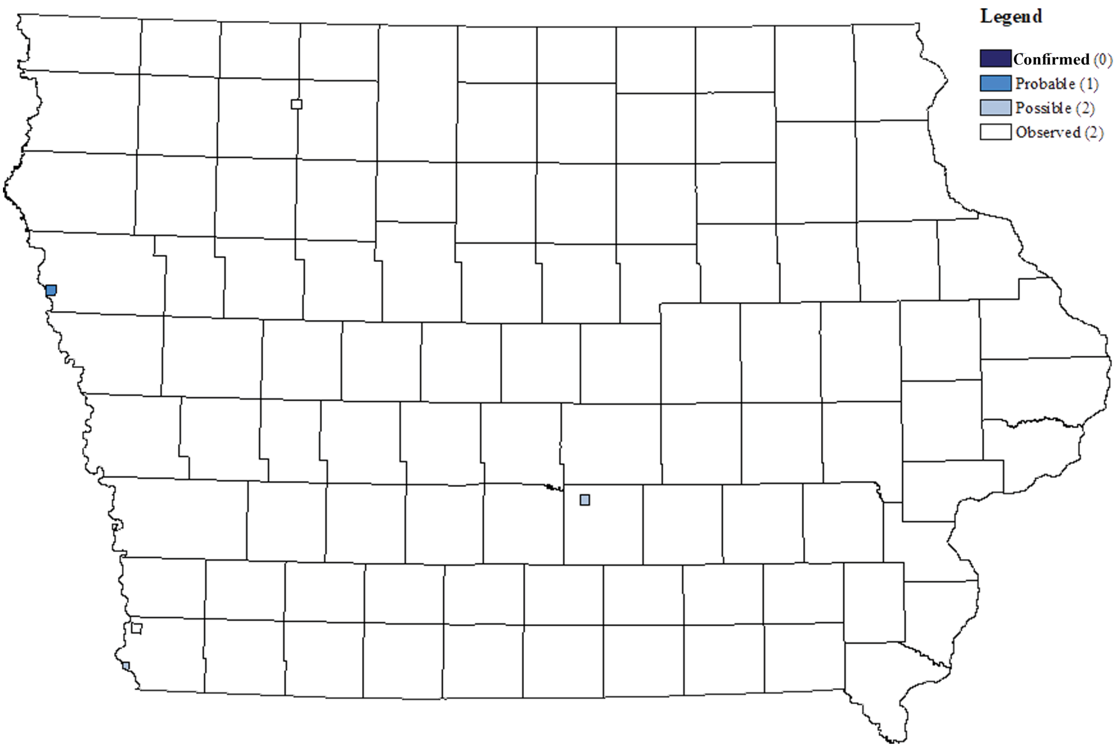
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	2	2
Possible	0	2	2
Probable	0	1	1
Confirmed	0	0	0
Conf & Prob	0.00%	0.30%	0.10%

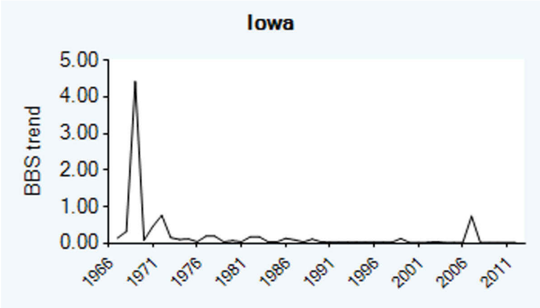
BBA II



© Mark Brown

Habitat	Shallow wetlands with stands of emergent vegetation, especially bulrush
Breeding Dates	18 May (PR)–5 Aug (CO)
Nest Type	Floating mound of vegetation, lined with finer plant material
Clutch Size	3 (rarely 2–4)
Incubation	20–22 days
Fledging	~4 weeks
Status	Fairly common migrant, rare to uncommon summer visitor, rare breeder
BBS Trend	Stable (trend = −3.5, 95% CI is −18.4, 2.8) [Iowa]

Patterns since BBA I



The Black Tern is a local and declining breeding bird of Iowa's prairie potholes. This species prefers semipermanent wetlands with sparse emergent vegetation (Heath et al. 2020), and in Iowa selected wetlands and wetland complexes >20 ha (Brown and J. J. Dinsmore 1986). They were common and easily found as far south as central Iowa through the 1960s (Anderson 1907, Bergman et al. 1970, Kent and Dinsmore 1996), but by the 1990s they were much less common (Jackson et al. 1996). The BBS data suggest a strong decrease in Iowa (Sauer et al. 2012) and nationally (Sauer et al. 2017). This species has sharply declined in much of its southern and eastern breeding areas (Heath et al. 2020).

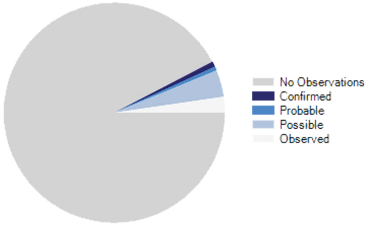
The Black Tern was reported from 60 (7.6%) blocks during BBA II, compared to 66 (7.7%) blocks during BBA I. There were 11 confirmed records in BBA II clustered tightly in north-central Iowa (three records) and the Iowa Great Lakes region (eight records). Conformations consisted of some active nests, but also included several reports of adults attending young. There were four probable reports in BBA II including two reports east and south of their expected breeding areas. Many of the possible and observed reports probably involved nonbreeding birds or errant migrants. This pattern was very similar to what was found during BBA I with all confirmed and probable reports within the Prairie Pothole Region. The only difference was that the center of breeding appeared to be in north-central Iowa during BBA I but had shifted to the Iowa Great Lakes region in BBA II. In both atlas efforts, most reports came from priority and habitat blocks that include the natural wetlands favored by this species.

The Black Tern is a Species of Special Concern and a Species of Greatest Conservation Need in Iowa (Iowa DNR 2015) but has no special designation nationally. It is unknown why this species declined as a breeding bird on Iowa's wetlands, and it is troubling that numbers have not increased with modern wetland restoration efforts. The area of wetlands in the Prairie Pothole Region of Iowa has increased sharply from 30,000 acres in the 1970s to 119,000 acres by 2016 (Staudt 2016), concurrent with efforts to restore many of the larger natural wetlands (Geisthardt et al. 2013) that were favored by this species. Indeed, future conservation of this species may largely depend on mitigating the loss and degradation of remaining wetlands (Audubon Minnesota 2014a, Heath et al. 2020). Creating artificial wetlands (Heath et al. 2020), using herbicides to remove cattail from a occupied wetlands (Linz and Blixt 1997), and focusing restoration efforts on larger, more permanent wetlands (Van Rees-Siewert and J. J. Dinsmore 1996) may be effective management strategies.

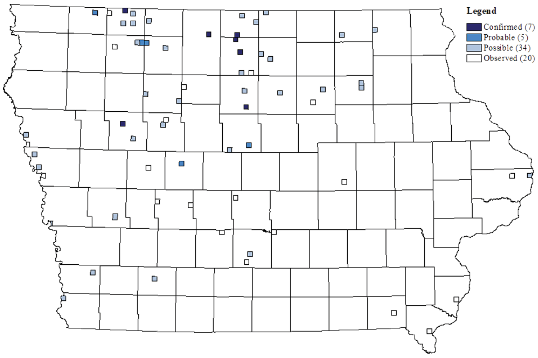
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	2	18	20
Possible	5	29	34
Probable	2	3	5
Confirmed	1	6	7
Conf & Prob	0.60%	2.30%	1.40%

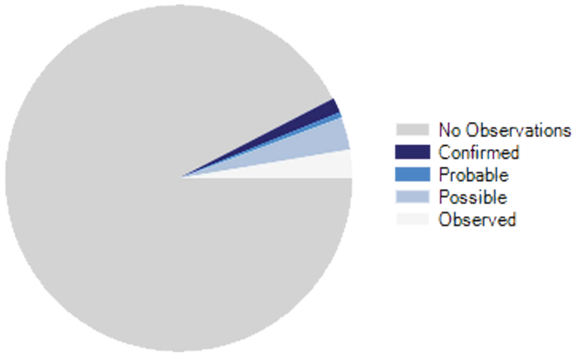
BBA I Results



BBA I



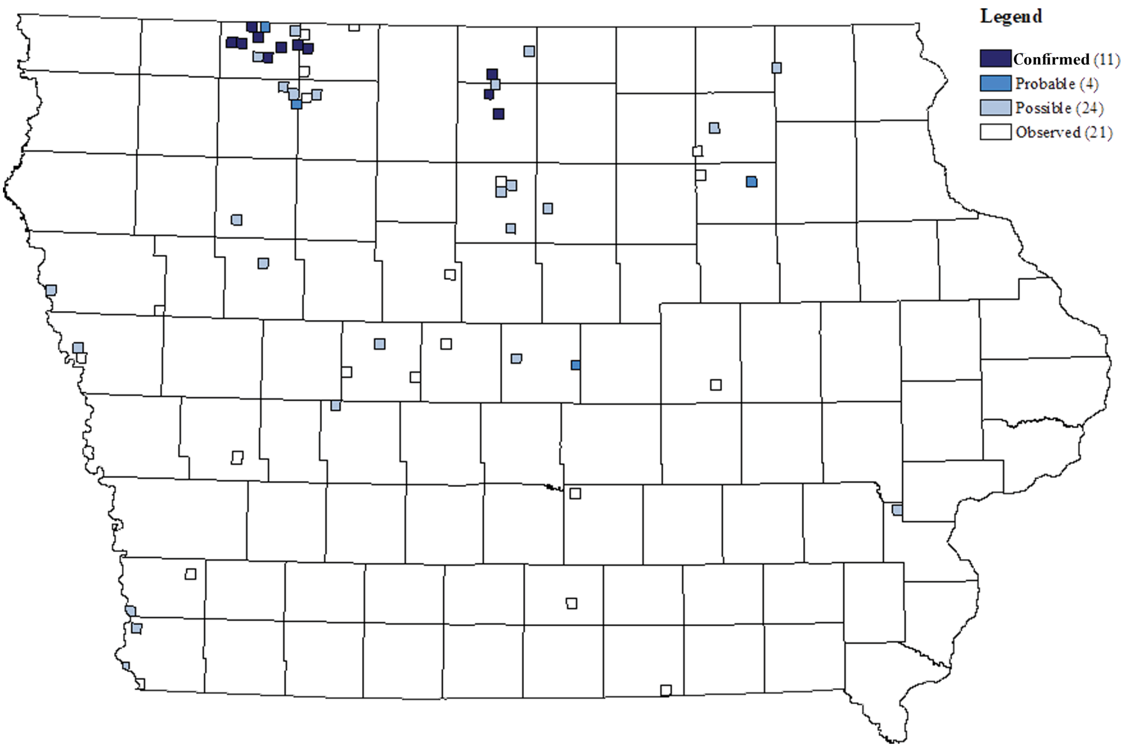
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	1	20	21
Possible	2	22	24
Probable	0	4	4
Confirmed	0	11	11
Conf & Prob	0.00%	3.80%	1.70%

BBA II



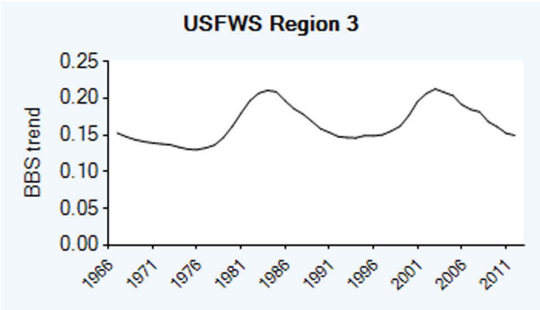
Forster's Tern *Sterna forsteri*

© Reid Allen

Habitat	Wetlands
Breeding Dates	12 May (PR)–19 Jul (PR)
Nest Type	Floating platform of vegetation or placed on muskrat lodge
Clutch Size	2–3 eggs
Incubation	23–25 days
Fledging	Remain in nest for <1 week, mobile, tended until capable of flight
Status	Fairly common migrant and uncommon summer visitor
BBS Trend	Stable (trend = 0.6, 95% CI is –2.9, 3.6) [Central US]

Patterns since BBA I

The Forster's Tern is a scarce and possibly extirpated breeding bird of larger wetlands throughout the Prairie Pothole Region of Iowa. The species is almost entirely restricted to North America year-round where it breeds in a variety of fresh, saltwater, and brackish wetlands (McNicholl et al. 2020). The BBSs are too sparse to estimate an Iowa trend but regionally and nationally there is evidence for a weak decline (Sauer et al. 2017). This species has a patchy breeding distribution in North America with strongholds in Manitoba, California-Oregon, and along the Gulf Coast (McNicholl et al. 2020).



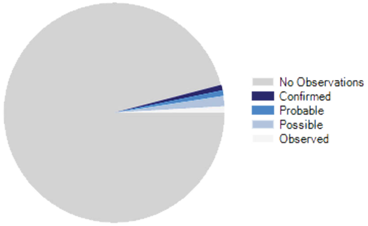
The Forster's Tern exhibits one of the most inexplicable patterns of atlas change of any Iowa breeding species. The species occurred in 50 (6.3%) blocks during BBA II, which was up from 35 (4.1%) blocks during BBA I. There were no confirmed records of Forster's Tern during BBA II, however, in contrast to seven confirmed during BBA I. There were five probable reports during BBA II compared to seven probable during BBA I. Most reports during both atlas efforts were in the possible and observed categories and were clustered in the Prairie Pothole Region with scattered reports elsewhere. The Prairie Pothole Region is the stronghold of this species as an Iowa nesting bird (Bergman et al. 1970, J. J. Dinsmore et al. 1984, Kent and Dinsmore 1996). Unlike the Black Tern, this species seems more restricted to large shallow-water wetlands, a habitat that is limited in Iowa. Despite many large-scale wetland restoration efforts this species has almost disappeared as a summer resident. Indeed, all seven wetlands where breeding was confirmed during BBA I are still functioning and appear unchanged today, adding to the mystery of why this species no longer breeds in Iowa. Forster's Terns often nest colonially and are not secretive when nesting, so it is unlikely this species was overlooked. The last nesting report was at Diamond Lake in Dickinson County, where two pairs nested in 2007 (J. J. Dinsmore 2007), just before the start of BBA II. This was certainly one of the most disappointing findings from BBA II. In both atlas efforts, most reports came from priority and habitat blocks that include the natural wetlands favored by this species.

The Forster's Tern is a Species of Special Concern and a Species of Greatest Conservation Need in Iowa (Iowa DNR 2015) but has no special designation nationally. It is unknown why this species declined so dramatically as a breeding bird on Iowa's wetlands, or why it hasn't recovered despite wetland restoration efforts. The area of wetlands in the Prairie Pothole Region of Iowa has increased sharply from 30,000 acres in the 1970s to 119,000 acres by 2016 (Staudt 2016), concurrent with efforts to restore many of the larger natural wetlands (Geisthardt et al. 2013) that were favored by this species. One explanation may be that this species is slow to discover and occupy new breeding sites. Audubon Minnesota (2014b) and McNicholl et al. (2020) suggest that the management and restoration of large wetland complexes may be the best strategy to conserve this species.

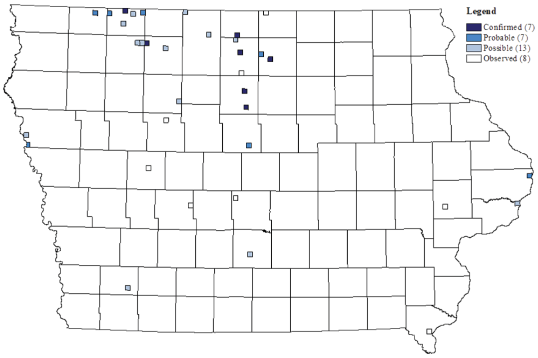
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	8	8
Possible	6	7	13
Probable	1	6	7
Confirmed	0	7	7
Conf & Prob	0.20%	3.30%	1.60%

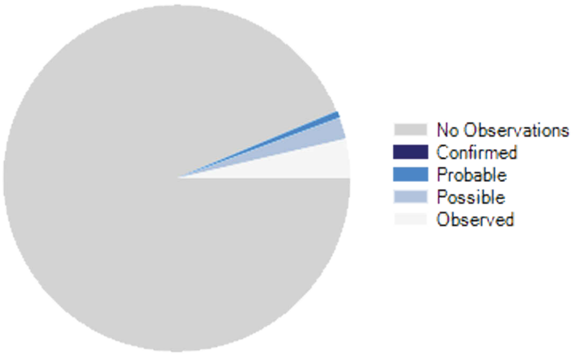
BBA I Results



BBA I



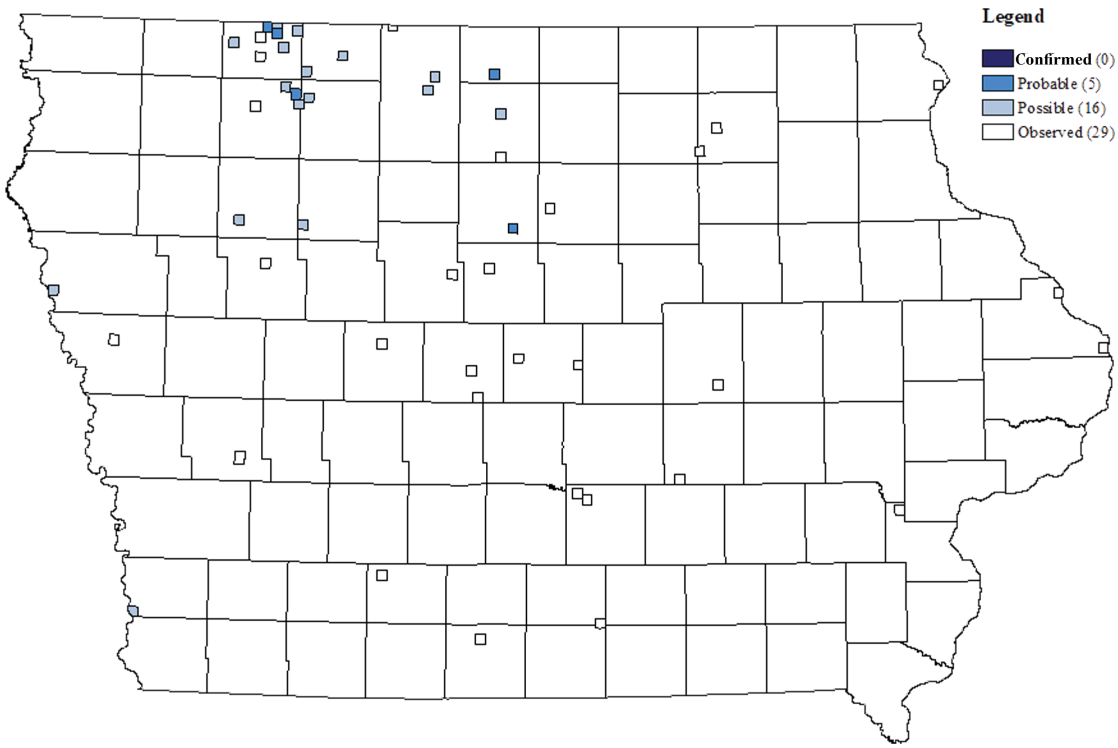
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	4	25	29
Possible	1	15	16
Probable	1	4	5
Confirmed	0	0	0
Conf & Prob	0.20%	1.00%	0.60%

BBA II

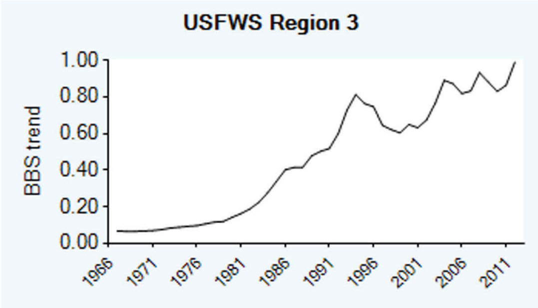


© Kip Ladage

Habitat	Larger wetlands, lakes, and reservoirs
Breeding Dates	NA
Nest Type	Stick platform lined with finer material
Clutch Size	3–4 (rarely 2–9)
Incubation	25–29 days
Fledging	10 weeks
Status	Common migrant, uncommon summer visitor, rare breeder
BBS Trend	Increasing (trend = 4.4, 95% CI is 1.7, 7.5) [Central US]

Patterns since BBA I

The Double-crested Cormorant is a common and widespread piscivorous bird throughout North America. Cormorants feed primarily on fish, which they capture underwater (Dorr et al. 2020). They characteristically perch in trees and on other structures with their wings outspread, which is thought to aid in drying their wet feathers (Dorr et al. 2020). This species is a fairly common migrant throughout Iowa and nests at colonies along the Mississippi River and occasionally at other sites (J. J. Dinsmore et al. 1984, Jackson et al. 1996). J. J. Dinsmore et al. (1984) summarized the five known nesting records prior to 1970. A small colony was established around 1980 at Pool 13 in Clinton County (Kent and Dinsmore 1996) and has grown steadily to >1,000 pairs by the 2010s (S. J. Dinsmore pers. obs.). There are other recent nesting records from Allamakee, Appanoose, Emmet, Fremont, Jackson, Johnson, Kossuth, and Polk counties, most at small colonies that persisted for 1–3 years. The BBS data suggest significant cormorant increases in Iowa (Sauer et al. 2012) and nationally (Sauer et al. 2017). This species often co-occurs with the American White Pelican, Great Blue Heron, and Great Egret in nesting colonies.



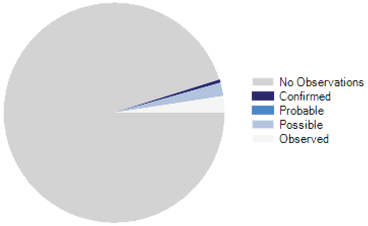
Double-crested Cormorants were widely reported in both atlas efforts. This species was found in 198 (25%) blocks during BBA II, a large increase from 42 (4.9%) blocks during BBA I. The apparent increase needs clarification, however. During BBA II, there were just 11 (5.6%) confirmed and no probable reports, which was up only slightly from four (9.5%) confirmed and no probable reports during BBA I. Most reports of this species during atlas efforts were in the possible (38%) and observed (57%) categories during BBA II and this species is hard to miss as a breeding bird because it often nests in large colonies. The confirmed records from BBA II were much more widely scattered than records from BBA I. Four were associated with Coralville and Rathbun reservoirs where dead trees are abundant. Five of the reports were from large natural lakes in north-central Iowa where this species has occasionally nested previously. The last two reports were in opposite corners of the state in Allamakee and Fremont counties. Oddly, there were no other reports of nesting from anywhere along the Mississippi River.

The Double-crested Cormorant has no special conservation designation in Iowa. Indeed, nationally there is considerable debate about conflicts with humans that can include negative impacts to sport fisheries, depredation of fish at commercial aquaculture facilities, and the loss of vegetation associated with nesting colonies (Dorr et al. 2020). These conflicts have been managed primarily using lethal control of adults at nesting colonies (Dorr et al. 2012, 2020) and spraying eggs with corn oil to addle them (Duerr et al. 2007), although such management activities have not occurred in Iowa. The future of this species in Iowa will depend on the availability of suitable nesting sites, preferably islands with trees and little disturbance (Dorr et al. 2020). The only persistent colony in Iowa at present is at Pool 13 of the Mississippi River in Clinton County.

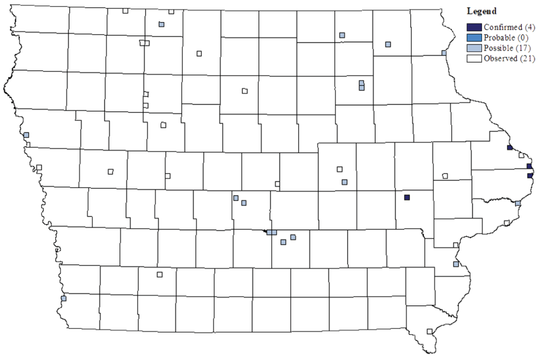
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	1	20	21
Possible	2	15	17
Probable	0	0	0
Confirmed	0	4	4
Conf & Prob	0.00%	1.00%	0.50%

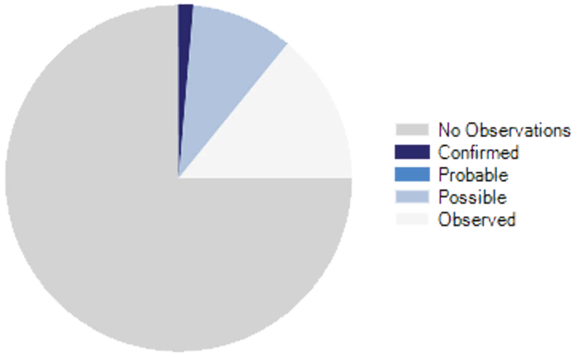
BBA I Results



BBA I



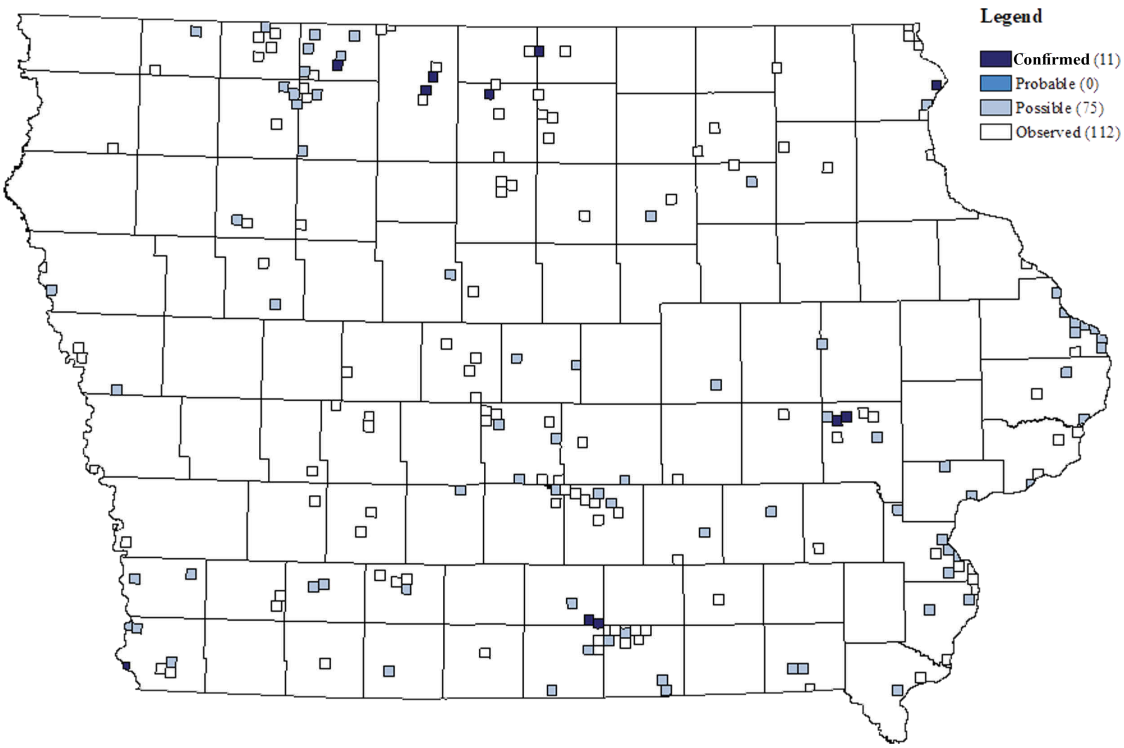
BBA II Results



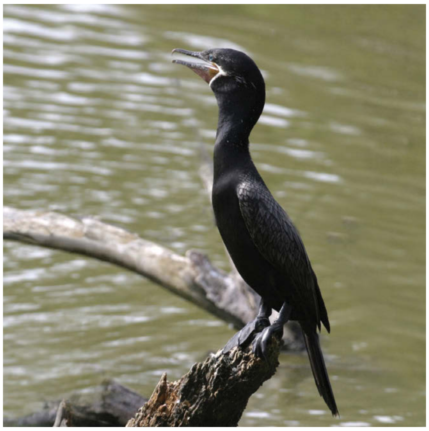
BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	26	86	112
Possible	9	66	75
Probable	0	0	0
Confirmed	1	10	11
Conf & Prob	0.20%	2.50%	1.30%

BBA II



Sponsored by Stan Buman

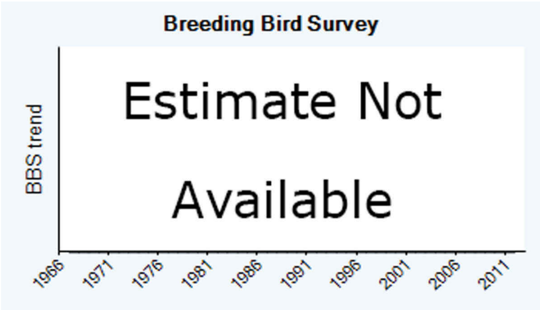


© Reid Allen

Habitat	Larger wetlands, lakes, and reservoirs
Breeding Dates	NA
Nest Type	Stick platform lined with finer material
Clutch Size	4 (rarely 3–6)
Incubation	~25 days
Fledging	~84 days
Status	Casual migrant and summer visitor, increasing
BBS Trend	No Trend Available

Patterns since BBA I

The Neotropic Cormorant is a relatively recent addition to Iowa's avifauna since the first report in 1996 (S. J. Dinsmore 1997). This small, tropical cormorant is widespread in Central and South America, is expanding northward, and is thought to be more adaptable and occurs in more diverse habitats than other cormorant species (Telfair and Morrison 2020). Since 1996, there have been >40 reports in Iowa, a pattern of increase that is mirrored elsewhere in the Midwest and Great Plains (Hanson et al. 2010, Telfair and Morrison 2020). Most such reports are of presumed spring overshoots and postbreeding wanderers. The increased sightings in Iowa were followed by the first nesting record at Pool 13 in Clinton County in 2012 (S. J. Dinsmore et al. 2012), unfortunately outside an atlas block. The BBS data are inadequate for estimating population trends of this species, although it is clear from sight records and its steady range expansion that this species is increasing in North America (Telfair and Morrison 2020).



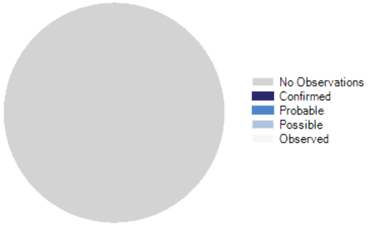
Single adult Neotropic Cormorants were detected in blocks in Lucas, Woodbury, and Wright counties during BBA II, all associating with Double-crested Cormorants. None were detected during BBA I, which occurred before this species was first reported in Iowa. Future nesting records would not be surprising and are most likely in Double-crested Cormorant colonies, especially those in the southern and western portions of the state.

The Neotropic Cormorant has no special conservation status in Iowa or nationally. This species has shown a widespread pattern of increase in the Great Plains and Midwest in the last decade (Hanson et al. 2010, Telfair and Morrison 2020). It is now an established local breeder in Kansas (Grzybowski and Silcock 2008) and Oklahoma (Reinking 2004) with extra-limital breeding records north to eastern South Dakota (Drilling 2012) and Iowa. Vagrants occur widely throughout the United States and continued range expansion seems likely. It is possible this species will become a regular breeding bird in Iowa, especially if Double-crested Cormorant nesting colonies persist.

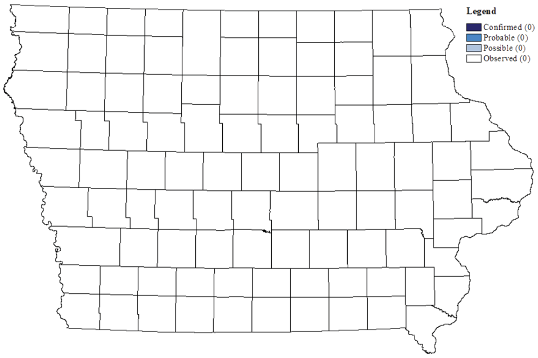
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	0	0	0
Probable	0	0	0
Confirmed	0	0	0
Conf & Prob	0.00%	0.00%	0.00%

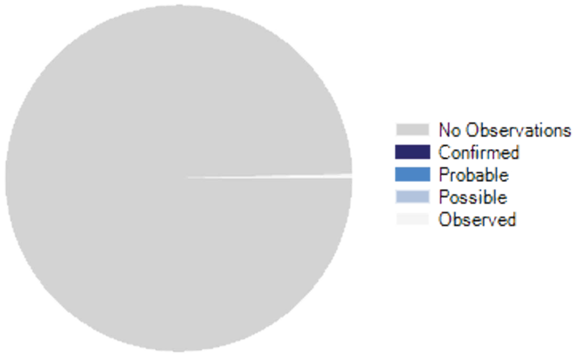
BBA I Results



BBA I



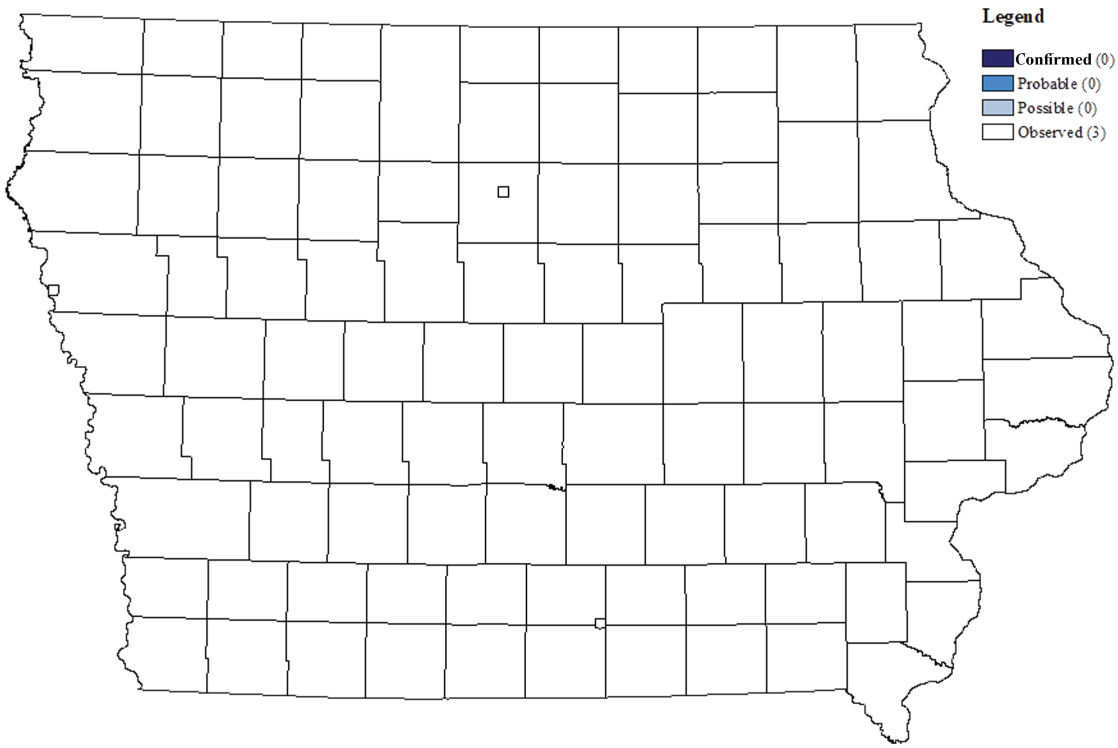
BBA II Results



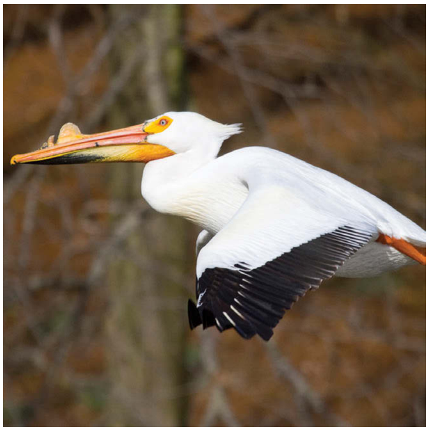
BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	3	3
Possible	0	0	0
Probable	0	0	0
Confirmed	0	0	0
Conf & Prob	0.00%	0.00%	0.00%

BBA II



In Honor of April Poulsen (Paul Roisen)

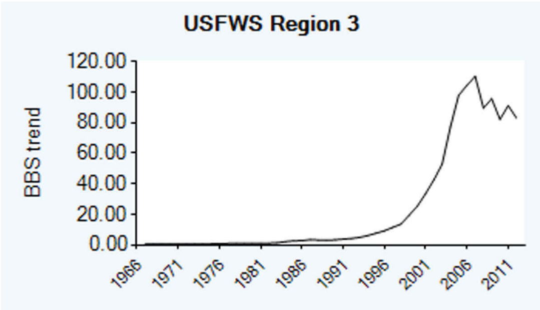


© Linda Rudolph

Habitat	Larger wetlands, lakes, and reservoirs
Breeding Dates	NA
Nest Type	Shallow ground depression, sometimes lined with vegetation
Clutch Size	1–2 eggs
Incubation	30 days
Fledging	~10–11 weeks
Status	Fairly common migrant, uncommon summer visitor, rare breeder (one colony)
BBS Trend	Increasing (trend = 7.2, 95% CI is 5.2, 12.2) [Central US]

Patterns since BBA I

The American White Pelican is a ubiquitous visitor to larger water bodies throughout Iowa and is slightly more common in the western half of the state (J. J. Dinsmore et al. 1984, Kent and Dinsmore 1996). Numbers have increased dramatically in Iowa since the 1980s and resulted in the establishment of a breeding colony on Pool 13 in Clinton County in 2007 (J. J. Dinsmore 2007). In addition to the Pool 13 colony, which has held >1,000 nesting pairs since 2010 (S. J. Dinsmore and Griffin 2010 pers. obs.), there is a single report of failed nesting at West Swan Lake, Emmet County in 2008 (J. J. Dinsmore 2008). The BBS data are insufficient to estimate a trend for Iowa, but this species is increasing regionally and nationally (Sauer et al. 2017). Pelicans often co-occur with the Double-crested Cormorant, Great Blue Heron, and Great Egret in nesting colonies.



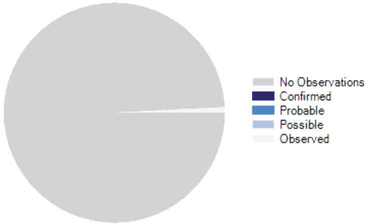
Pelicans were widely encountered during BBA II statewide although many records were concentrated at larger wetlands within the Des Moines Lobe landform, along the Mississippi and Missouri rivers, and at the large human-made reservoirs. This species was found in 135 (17.1%) blocks during BBA II, a huge increase from just seven blocks (0.8%) during BBA I. Most if not all reports, however, probably pertained to nonbreeding birds that spent the summer south of the normal breeding range (Knopf and Evans 2020). During BBA II there were three possible reports, all from the Iowa Great Lakes Region in Clay (1) and Emmet (2) counties. Nesting colonies of this species are unlikely to be overlooked because of their specialized habitat requirements and large size. Most reports in both atlas projects were in the observed category, probably all nonbreeders. It is also worth noting that the species may have been under-reported in BBA I because it was not listed on the atlas report form (Jackson et al. 1996). Nonetheless, the dramatic increase in overall reports between BBA I and BBA II is indicative of this species' increase in Iowa, and perhaps additional nesting colonies will eventually be established in other parts of Iowa.

The American White Pelican is a Species of Greatest Conservation Need in Iowa (Iowa DNR 2015). This species requires protected islands for nesting (Knopf and Evans 2020), a habitat that is scarce in Iowa and may prevent the species from ever becoming established a more than a handful of breeding sites. Minimizing human disturbance is thus a key management concern, along with pesticide contamination and shooting losses due to perceived fish depredation in the aquaculture industry (Knopf and Evans 2020). Knopf and Evans (2020) reported that the single greatest source of mortality in banded birds was shooting, which is surprising given that this species is not hunted or palatable. The Pool 13 colony is protected during the nesting season by signage and this appears successful given the rapid growth of this colony and expansion to nearby islands in Illinois (S. J. Dinsmore pers. obs.).

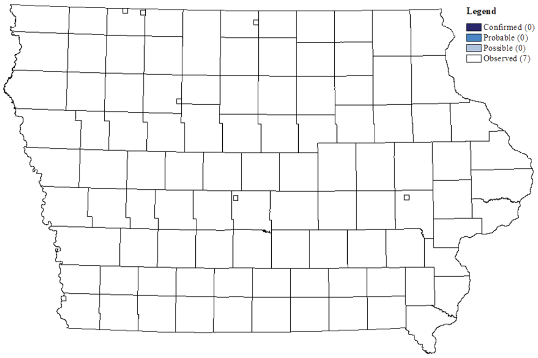
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	1	6	7
Possible	0	0	0
Probable	0	0	0
Confirmed	0	0	0
Conf & Prob	0.00%	0.00%	0.00%

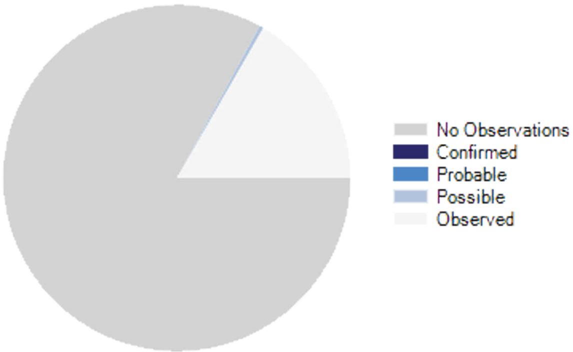
BBA I Results



BBA I



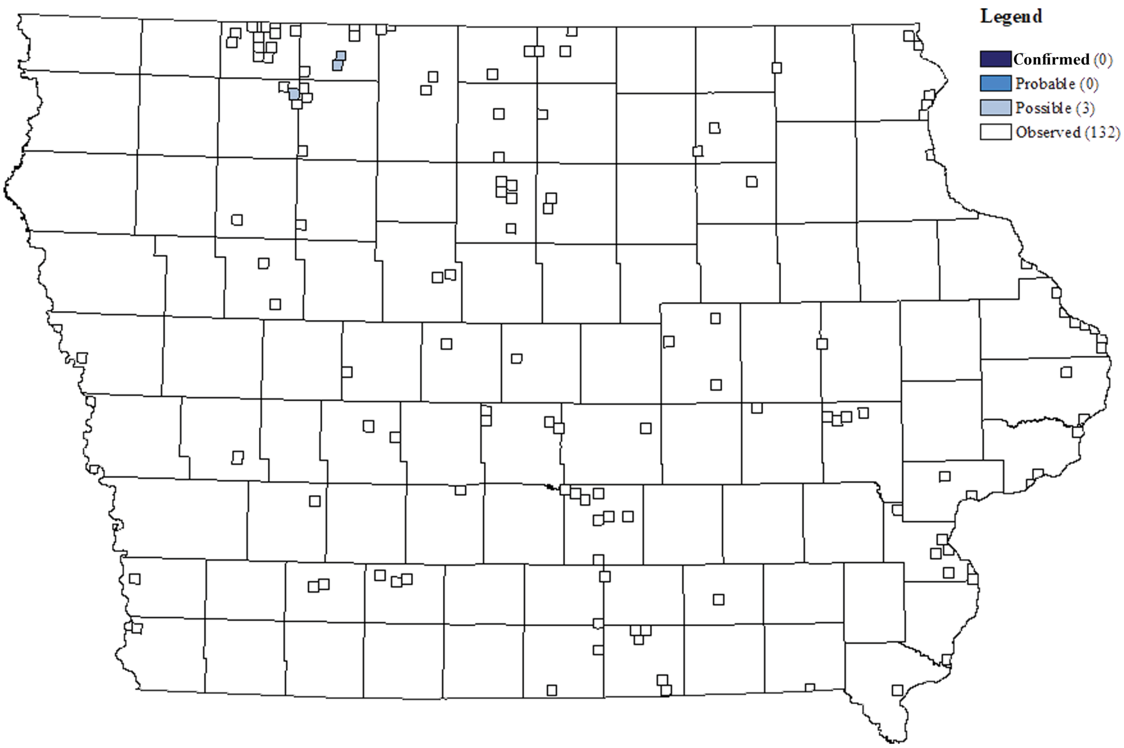
BBA II Results

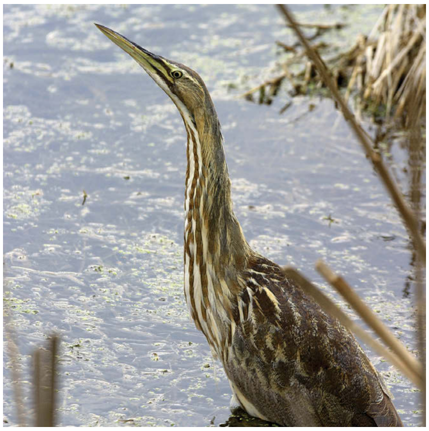


BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	17	117	134
Possible	0	3	3
Probable	0	0	0
Confirmed	0	0	0
Conf & Prob	0.00%	0.00%	0.00%

BBA II

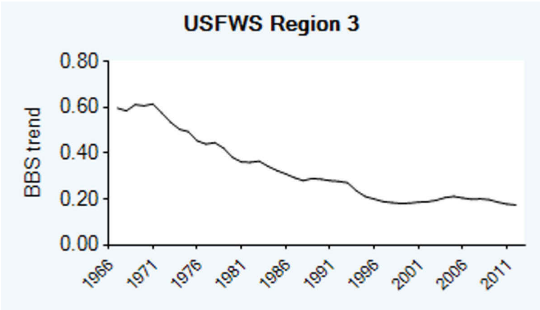




Habitat	Wetlands with dense emergent vegetation
Breeding Dates	7 May (PR)–10 Jul (PR)
Nest Type	Platform of reeds, sedges, cattail, or other available emergent vegetation
Clutch Size	2–7 eggs
Incubation	24–28 days
Fledging	1–2 weeks
Status	Rare and secretive nesting species
BBS Trend	Stable (trend = 0.0, 95% CI is −1.5, 1.5) [Central US]

Patterns since BBA I

A considerable nationwide decline in American Bittern numbers has been documented by the North American BBS and other studies from the 1940s through the early 1990s. Since then, the BBS data have shown a leveling out followed by a slight increase in numbers through 2015. While those federal surveys could not gather enough information for numbers specifically in Iowa, BBA II located 2.3 times more American Bitterns than BBA I. BBA I reported only 27 sightings in 861 survey blocks with two (7.4% of all sightings) confirmed as successful breeders and four were probable (14.8%). BBA II found the species in 63 of 791 blocks, with three (4.8% of all sightings) confirmed as successful breeders, while 14 (22.2%) were probable.



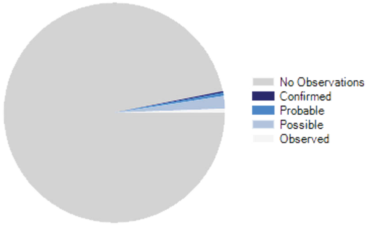
American Bitterns nest in emergent marsh vegetation or sometimes in surrounding tall grassland meadows. Nests are on mounds of thick, dying vegetation, typically in shallow water. When breeding and nesting, this bittern species can be especially difficult to find, due to well-camouflaged plumage. By characteristically raising head and neck straight upwards, vertical throat stripes blend into surrounding vegetation, making the bird seem to disappear. Because of such camouflage and secretive behavior of American Bitterns, it is possible there may be larger numbers in Iowa than accounted for in BBA I, BBA II, as well as by the federal BBS and other avian surveys.

Until more specific research might be accomplished, apparently low numbers of the American Bittern have resulted in its listing as a Species of Greatest Conservation Need by Iowa DNR. Massive conversion of Iowa's landscape from grasslands and wetlands to monotypic agriculture, especially since the 1940s, has been a primary cause of rapid and concerning bittern population loss. Consequently, wetland protection and restoration became a major goal of multiple conservation agencies and nongovernmental conservation organizations in the early 1990s. This has since resulted in restoring thousands of acres of suitable habitat over the past three decades, likely causing American Bittern populations to stabilize and even increase to a significant extent.

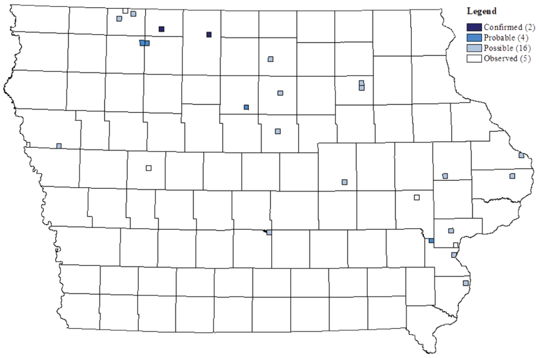
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	5	5
Possible	2	14	16
Probable	1	3	4
Confirmed	1	1	2
Conf & Prob	0.40%	1.00%	0.70%

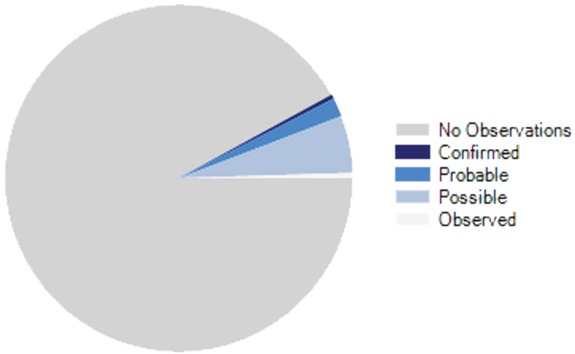
BBA I Results



BBA I



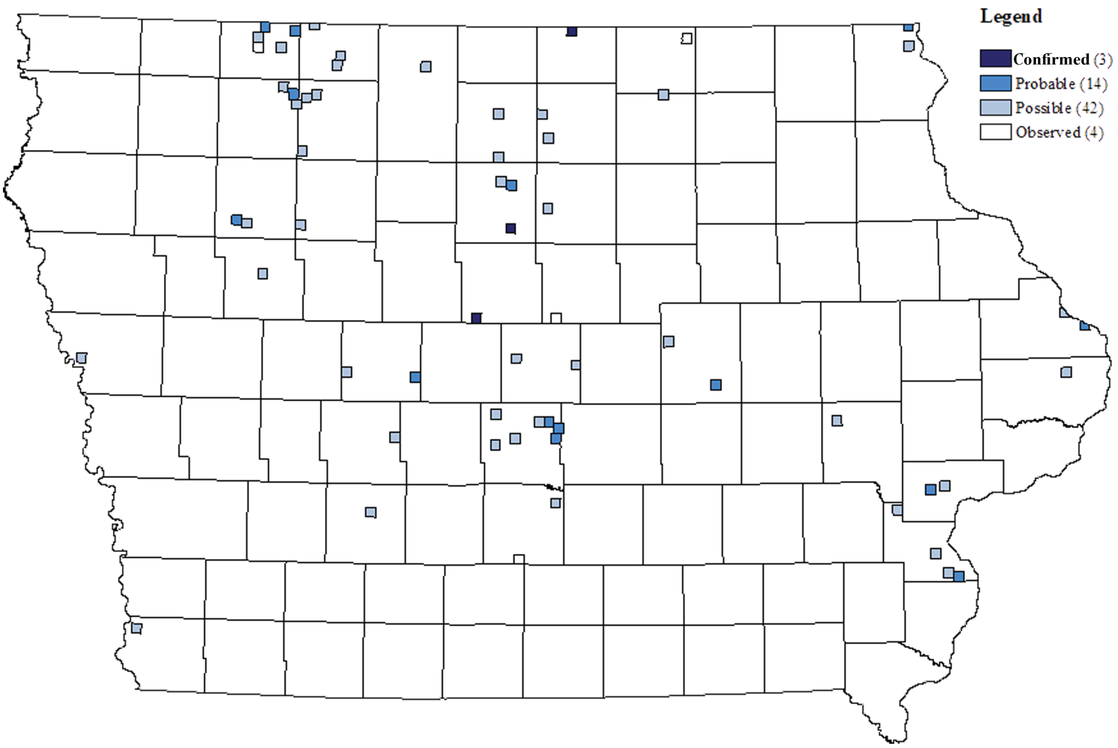
BBA II Results



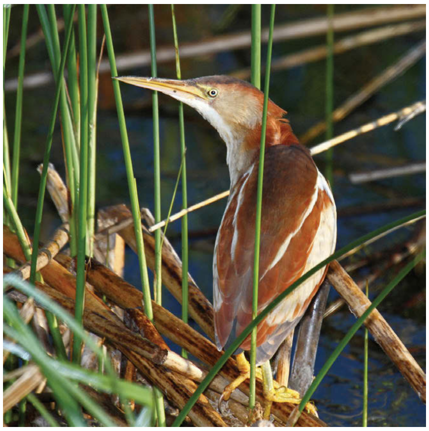
BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	2	2	4
Possible	3	39	42
Probable	1	13	14
Confirmed	1	2	3
Conf & Prob	0.40%	3.80%	2.00%

BBA II



Sponsored by Pamela Wingert

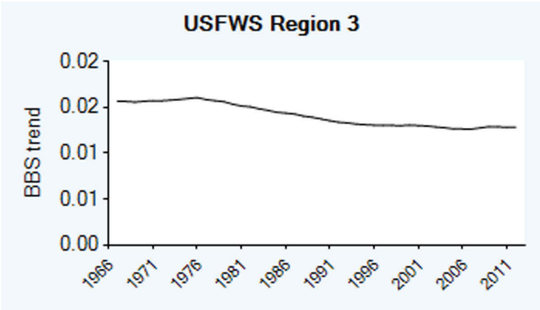


© Larry Dau

Habitat	Marshes and lake edges with thick emergent vegetation
Breeding Dates	27 May (PR)–5 Aug (CO)
Nest Type	Nesting platform, with canopy, made by pulling down and crimping surrounding vegetation
Clutch Size	2–6 eggs
Incubation	17–20 days
Fledging	13–15 days
Status	Uncommon and secretive nesting species
BBS Trend	Stable (trend = 0.2, 95% CI is–2.6, 3.2) [Central US]

Patterns since BBA I

Least Bitterns were recorded in a total of 45 survey blocks during BBA II, an increase of 50% more than the 30 recorded in BBA I. Six were confirmed as breeding in both BBA I and BBA II, but ten were probable breeders in BBA II, while only 2 were counted as probable in BBA I. Combining confirmed and probable detections for each of the Iowa BBAs, the total of most likely successful nests doubled in Iowa BBA II surveys. North American BBSs have not detected enough numbers in Iowa to estimate population changes.



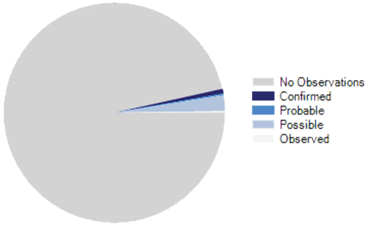
Least Bitterns are somewhat common in marsh habitat, but due to secretiveness like that of American Bitterns and considerably smaller size, this solitary species can often be very difficult to locate. To remain hidden in dense, emergent, aquatic vegetation, a Least Bittern will extend its head and neck skyward to a total body length of about 13 inches, less than half the extended height of an American Bittern. When head and neck are drawn in tightly, the bird's length is only about nine inches. Both these extended and withdrawn poses result in excellent ability to hide from view, often making it one of the more difficult-to-find and overlooked wetland birds. Certain research suggests it would be best to utilize call-response surveys for more accurate population data of this species (Bogner and Baldassarre 2002).

Iowa lies at the heart of North America's summer breeding range for Least Bitterns; hence, the species can be found in wetlands statewide. The most common local abundance, however, is concentrated in remaining and restored glacial wetlands of the Des Moines glacial lobe, extending from northwestern Iowa's Spirit Lake region, down to Des Moines, and back north to the Mason City-Clear Lake region. Scattered numbers found in the rest of Iowa occur primarily in riverine backwater and oxbow wetlands or shallow, marshy upper portions of reservoirs. While difficult to survey, some bird studies appear to show relatively stable populations from the 1960s to 1990s. The BBA II indicates Least Bitterns in Iowa may now be increasing to some degree. This is likely related to increasing preservation of existing wetlands and restoration of some once-drained marshes on formerly private farmlands. Many of those wetlands are now in public ownership for wildlife and habitat conservation.

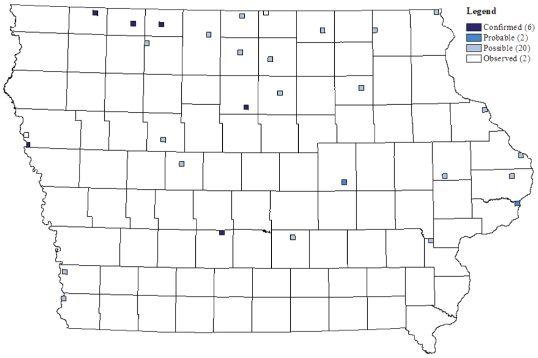
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	2	2
Possible	2	18	20
Probable	0	2	2
Confirmed	2	4	6
Conf & Prob	0.40%	1.50%	0.90%

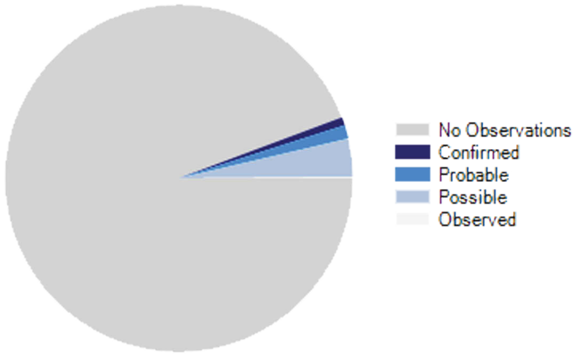
BBA I Results



BBA I



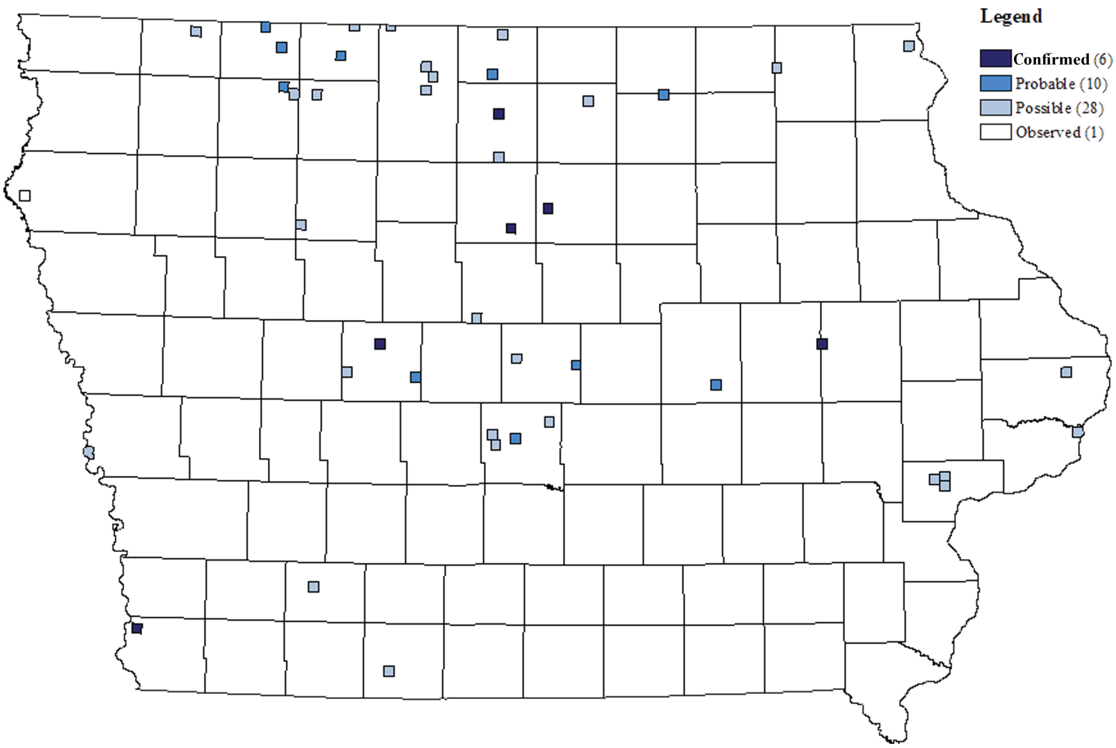
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	1	1
Possible	5	23	28
Probable	1	9	10
Confirmed	0	6	6
Conf & Prob	0.20%	3.80%	1.90%

BBA II



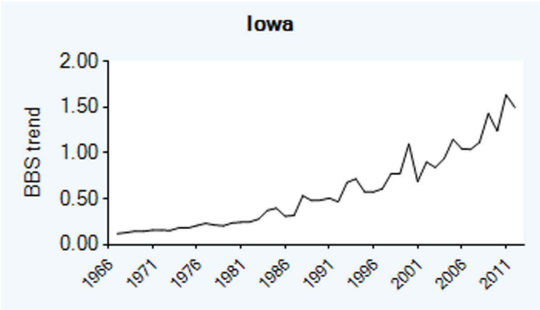
Sponsored by Stephen J. Dinsmore

© Kip Ladage

Habitat	Wetlands and water bodies of all sizes
Breeding Dates	17 Mar (CO)–31 Aug (PR)
Nest Type	Platform of twigs with a saucer-shaped interior lined with smaller and softer material
Clutch Size	2–6 eggs
Incubation	~27 days
Fledging	51–54 days
Status	Fairly common nesting bird
BBS Trend	Increasing (trend = 7.5, 95% CI is 5.8, 10.0) [Iowa]

Patterns since BBA I

Great Blue Herons were present in 666 blocks in BBA II, an increase of 57% over the 424 found in BBA I. During BBA II, confirmed nesting was found in 72 blocks (10.8 %), compared to only 14 blocks (3.3%) in BBA I. Probable nesting was detected in 56 blocks during BBA II but only in one block of BBA I. Although reportedly decreasing in the early twentieth century, this species was described in BBA I as increasing from 1966 to 1991, based on data from the North American BBS. More recently, Great Blue Herons have been reported as a Species of Least Concern by the International Union for the Conservation of Nature and Natural Resources (BirdLife International 2016). Personal communications by Iowa conservationists with many people engaged in outdoor recreation also indicate it is one of the most well-known and easily observed local wading birds, due to quite common occurrence.

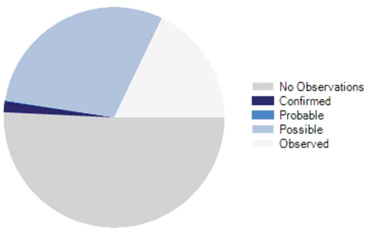


Great Blue Heron is the largest and mostly widely distributed wading bird in North America, nesting in all the United States except Hawaii. Primarily recognized as colonial nesters, they also may be found nesting as single pairs. Colonies are being reported in more new places by Iowa citizens, and even when a colony is disturbed and abandoned, the nesters will shift to a new colony location near another portion of a large wetland, or further upstream or downstream on a riverine system. Expansion of publicly owned wetlands and restoration of private wetlands since the early 1990s obviously has provided more habitat for the species. Even relatively small marshes can sometimes host a single breeding pair, provided there is a suitable tall tree for constructing a nest in upper branches, but Great Blue Herons might, on rare occasion, utilize a shrub or even nest on a cliff near water (Baicich and Harrison 2005).

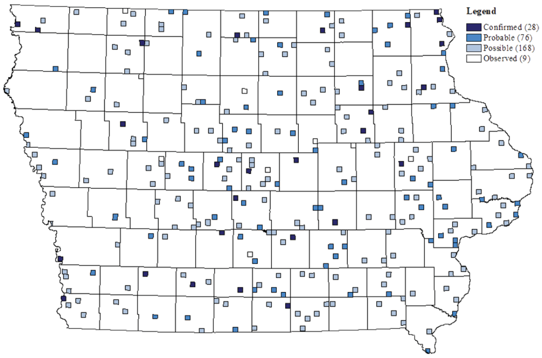
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	67	87	154
Possible	83	172	255
Probable	0	1	1
Confirmed	5	9	14
Conf & Prob	1.00%	2.50%	1.70%

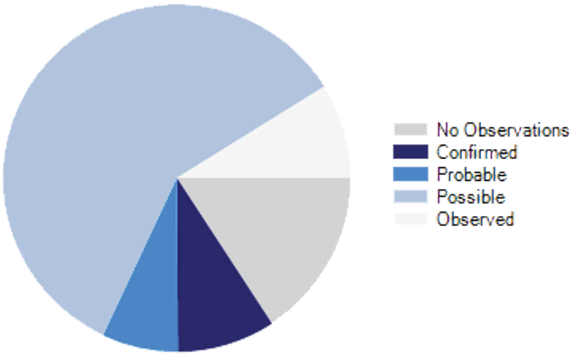
BBA I Results



BBA I



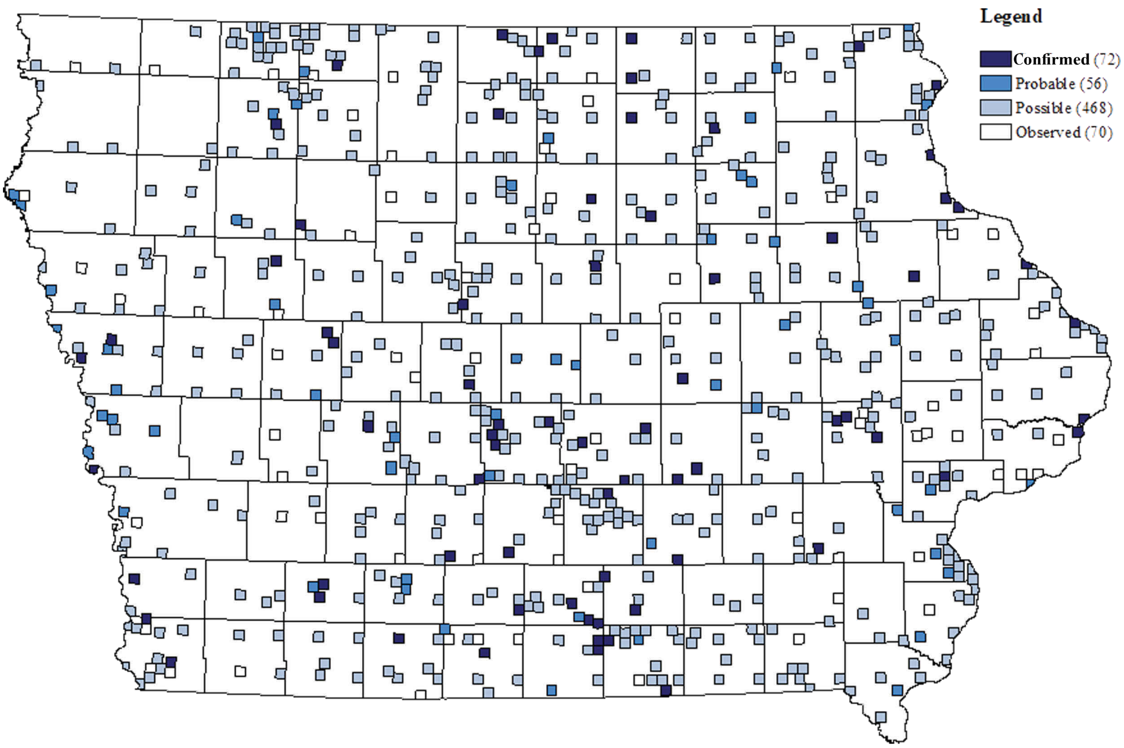
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	47	23	70
Possible	208	261	469
Probable	12	44	56
Confirmed	16	56	72
Conf & Prob	5.40%	25.10%	14.90%

BBA II



Sponsored by Iowa DNR Wildlife Diversity Program

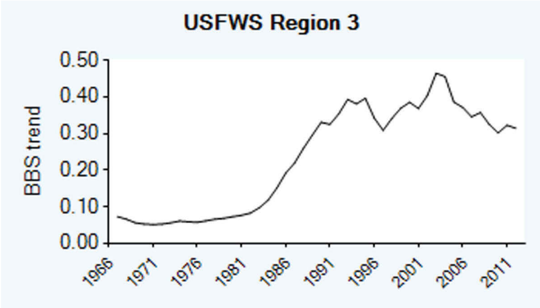
Great Egret *Ardea alba*

© Stanley Buman

Habitat	Lakes, rivers, and ponds
Breeding Dates	NA
Nest Type	Colonial nester; large platform nest comprised of various sized sticks
Clutch Size	1–6 (avg. 3)
Incubation	23–27 days
Fledging	49–56 days to flight
Status	Common migrant and rare summer resident
BBS Trend	Increasing (trend = 3.3, 95% CI is 1.5, 4.7) [Central US]

Patterns since BBA I

Great Egrets have expanded their detected numbers and verified nesting season sites across Iowa since BBA I. Total findings for BBA II were reported in 151 survey blocks, compared to 106 in BBA I, a 42.5% increase in locations. While there were no confirmed nesting locations in BBA I, seven nesting locations were confirmed in BBA II, 4.6% of all survey blocks. Because of its colonial nesting habits, typically in the tops of large trees near water, Great Egrets can be readily confirmed as easily as Great Blue Herons, with which they sometimes share a nesting colony. No possible Great Egret nesting was reported in either BBA I or BBA II, however, because all others detected were simply seen in wetlands or in flight.

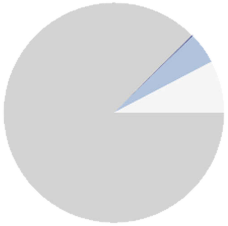


The BBA II data should well verify that Great Egret numbers are continuing to increase in Iowa. This species was already reported as increasing in BBA I, when comparing that survey's numbers with low population reports from the late 19th through mid-twentieth century. Those early and rapid Great Egret declines resulted primarily from unregulated nineteenth century plume hunting; twentieth century increases in dangerous pesticide use for agriculture; plus rapidly expanding, human-caused, landscape development. With increased protection and restoration of wetlands on both public and private lands over the past three decades, Great Egrets are continuing to increase as nesters and now are frequently noted in large migrating flocks. Large size and snow-white plumage make Great Egrets particularly easy to observe and identify. Because of current populations, it is not listed as an Iowa threatened or endangered species, nor is it even considered a Species of Greatest Conservation Need.

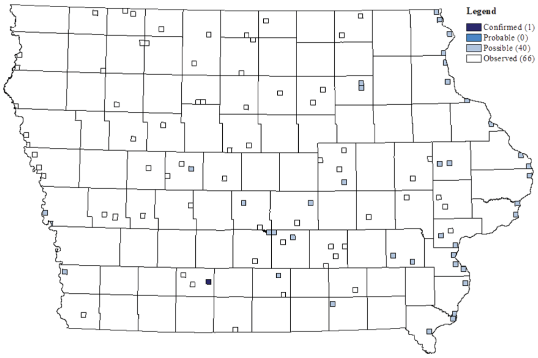
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	21	45	66
Possible	5	35	40
Probable	0	0	0
Confirmed	0	1	1
Conf & Prob	0.00%	0.30%	0.10%

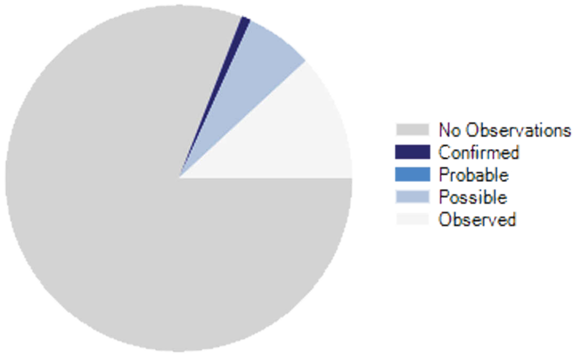
BBA I Results



BBA I



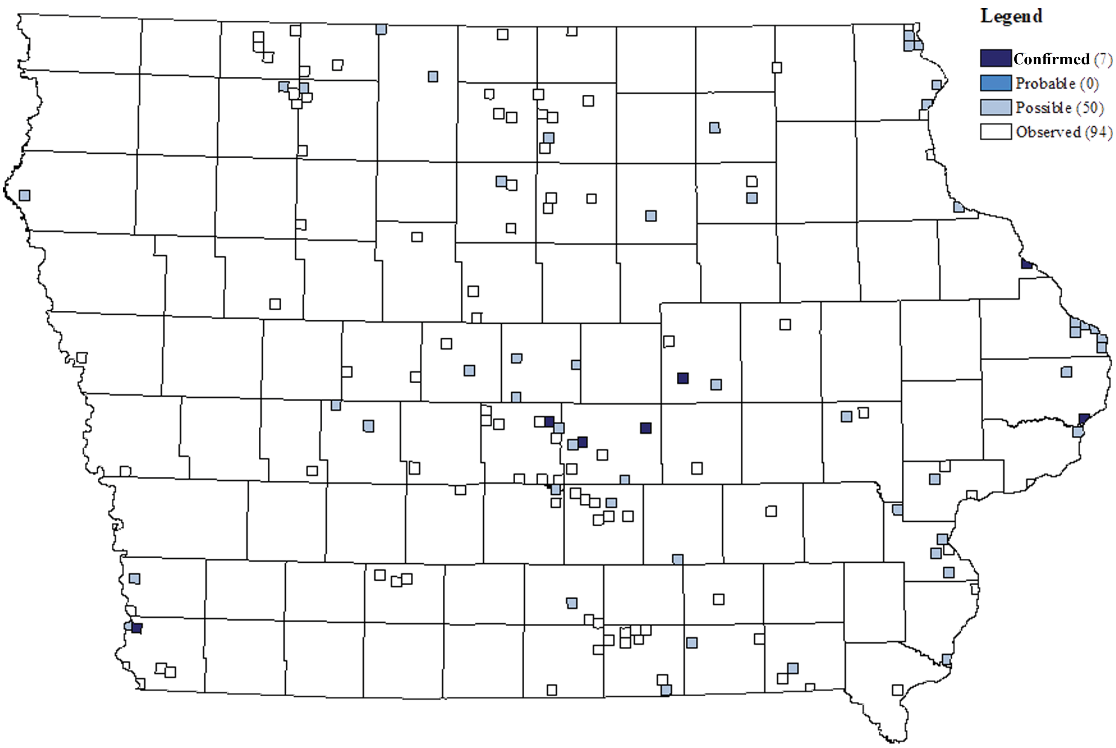
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	14	81	95
Possible	7	43	50
Probable	0	0	0
Confirmed	0	7	7
Conf & Prob	0.00%	1.80%	0.80%

BBA II



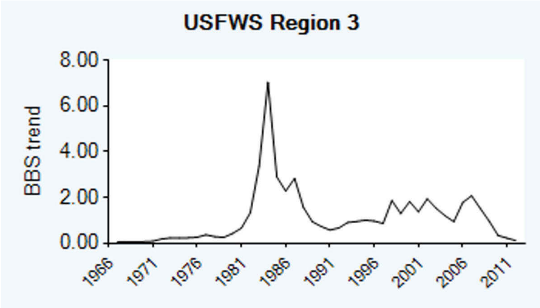
In Honor of Kirsten Winter (Carol Winter)

© Kip Ladage

Habitat	Undisturbed woody vegetation near pastures, fields or wetlands
Breeding Dates	10 Jul (PR)–13 Jul (PR)
Nest Type	Platform nest comprised of interwoven sticks for base, then twigs and sometimes reeds or vines and lined with finer herbaceous material; typically placed in low tree or shrubby vegetation
Clutch Size	1–9 eggs (3–4 eggs typical)
Incubation	22–26 days
Fledging	~30 days
Status	Regular and rare nesting species
BBS Trend	Stable (trend = 1.7, 95% CI is –0.4, 3.3) [Central US]

Patterns since BBA I

The Cattle Egret originated in the African tropics and expanded its range to the North American continent in the early 1950s. It was first documented to nest in Iowa (colony of at least 135 nests at Folsom Lake in Mills County) in 1984 (Silcock 1984). While this species is too rare to show any significant trend on Iowa's BBS, throughout its U.S. breeding range the populations have declined at an average annual rate of 1.38% from 1966–2015 (Sauer et al. 2017). Telfair (2019) reports that after an initial significant 14-year increase in the U.S. population (from 1966–1979), there followed a 38-year decline in population. Cattle Egret was reported in 12 (1.4%) blocks in BBA I and in 17 (2.1%) blocks in BBA II. Similar to results found on Iowa atlases, this egret was found in only six (<1%) blocks in Missouri's Breeding Bird Atlas (Jacobs and Wilson 1997), and it was found in 16 (1.2%) of sampled BBA blocks in Illinois (Kleen et al. 2004).



During the first Iowa BBA, Cattle Egret records were found in 11 counties (Jackson et al. 1996), and records were found in 11 counties during BBA II. Like what was found for other egret and heron species, 75% of BBA I records and 88% of BBA II records came from public land blocks. There was no confirmed nesting documented during either Iowa atlas and the only probable record came from BBA II where a pair of Cattle Egrets was reported at Forney Lake WMA in Fremont County. Even in Illinois, where several multi-species colonies have been reported to include hundreds to more than 1,000 nesting pairs of Cattle Egrets, confirmed nesting occurred in just 3 atlas blocks (Kleen et al. 2004). In Iowa, only three (25%) records were reported as possible during BBA I, with eight (47%) records reported as possible during BBA II.

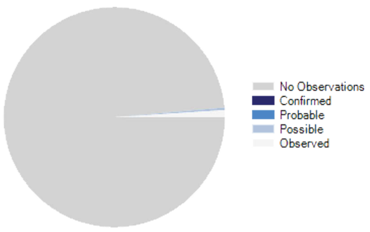
Distribution of Cattle Egret changed only slightly between Iowa atlases. While records came from 11 counties for each atlas, the only counties with records in each atlas were Fremont, Mills, and Clay. Most records came from the western half of the state for both atlases. There was an increase in records in the central part of the state during BBA II, however, particularly associated with larger public wetlands. From 2008 – 2012, the largest number of Cattle Egrets reported in Iowa was at Forney Lake WMA, where 1,190 egrets were reported on 8 July 2008. Other high counts include 438 on 31 July 2010 in Mills County, and 300 reported on 11 June 2011 at Waubonsie Access WMA in Fremont County (Iowa Ornithologists' Union 2019).

According to Telfair (2019), the main keys to the continued spread and success of the Cattle Egret are its dispersal tendencies, gregariousness, varied diet, and its foraging adaptability. Since Cattle Egrets tend to nest in heronries already established by earlier-arriving heron species, a major factor that will help determine the future of this small hump-backed egret is the availability of existing heronries (Telfair 2019).

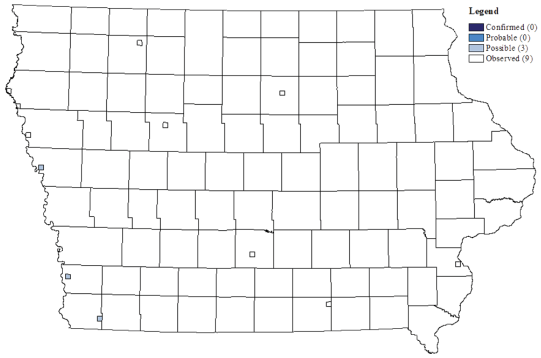
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	2	7	9
Possible	1	2	3
Probable	0	0	0
Confirmed	0	0	0
Conf & Prob	0.00%	0.00%	0.00%

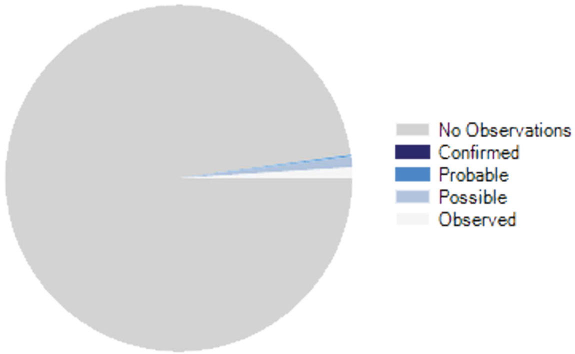
BBA I Results



BBA I



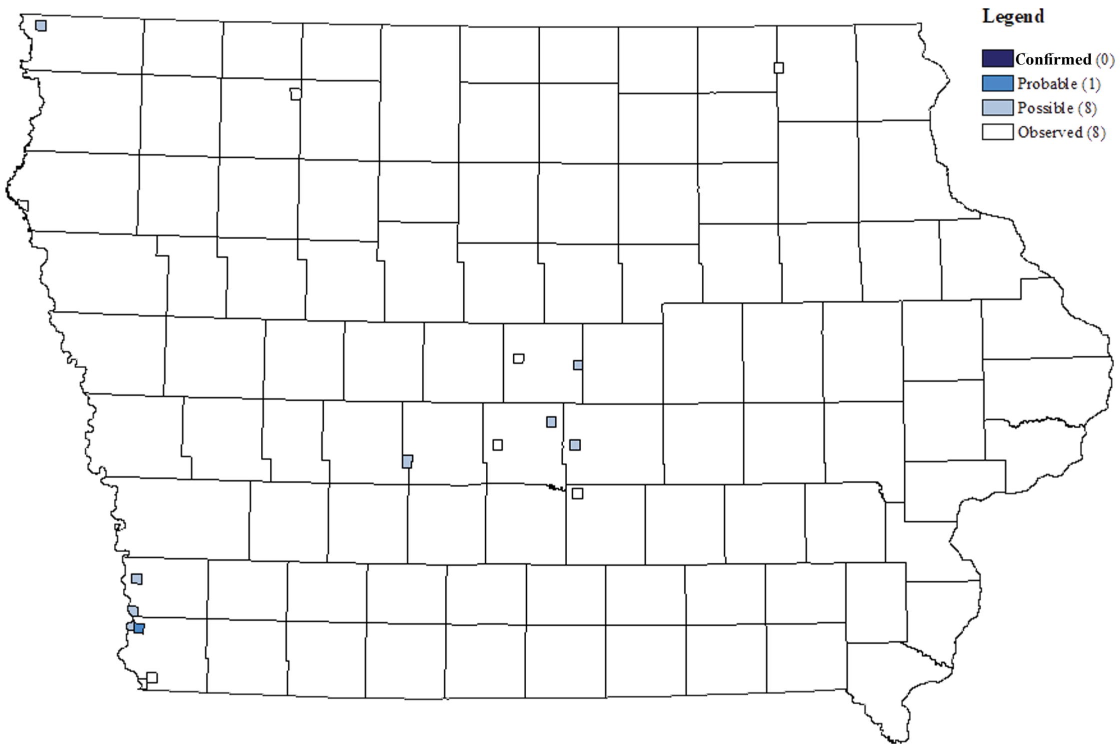
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	1	7	8
Possible	1	7	8
Probable	0	1	1
Confirmed	0	0	0
Conf & Prob	0.00%	0.30%	0.10%

BBA II

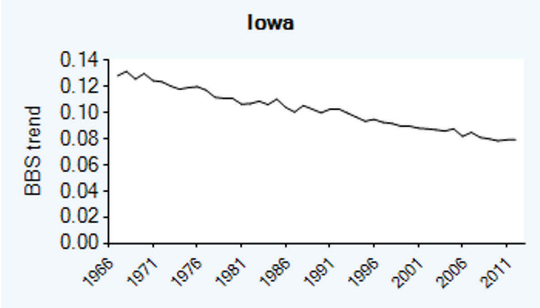


Sponsored by James J. Dinsmore

© James Scheib

Habitat	Typically nest in shrubby, wooded areas associated with wetlands
Breeding Dates	2 May (PR)–17 Aug (CO)
Nest Type	Nest a platform of interwoven sticks and twigs, occasionally lined with finer vegetative material placed low in a shrub or tree, over or close to water
Clutch Size	2–6 eggs (4–5 eggs typical)
Incubation	19–21 days
Fledging	21–25 days
Status	Regular statewide common nesting species
BBS Trend	Stable (trend = −0.1, 95% CI is −2.1, 2.0) [Iowa]

Patterns since BBA I



Green Heron can be found inhabiting any type of wetland habitat, although shrubby wooded areas along rivers, streams, lakes, ponds, marshes, and sloughs are its favored nesting locations. While fish is the primary food, it eats a diversity of invertebrates, along with frogs, salamanders, tadpoles, snakes, lizards, and small mammals (Davis and Kushlan 1994). This heron is known as a solitary nester, with a small nesting colony occasionally confirmed. Green Heron was reported in 281 (32.6%) blocks in BBA I and in 289 (36.5%) blocks in BBA II, essentially with little change in numbers of records between the atlases. In agreement with these data, Iowa's BBS finds the population of this species to be stable. Throughout its U.S. breeding range, however, populations have undergone an average annual decrease from 2005–2015 of 1.22% (Sauer et al. 2017). In the neighboring state of Illinois, Graber et al. (1978) estimated an 80% population decline within the 49-year span between surveys conducted during 1907–1909 and 1956–1958. The main population decline causes were the destruction and pollution of this heron's many habitats and increased human disturbance within these habitats. Because humans continue to degrade preferred Green Heron habitats, it is no surprise that 86% of BBA II records were documented in public land blocks, where a higher percentage of preferred riparian woody habitats exist. Similarly, 72% of nest records came from public land blocks during BBA I (Jackson et al. 1996).

During the first atlas, Green Heron records were found in 94 counties (Jackson et al. 1996), with records found in 90 counties during BBA II. Because this species tends to place its nest in dense, shrubby thickets, over or close to the water, nests can be difficult to detect. In addition, adults tend to be quite secretive at or near their nests. Not surprisingly, the nesting confirmation rate for this species is low. During BBA I, just 10% of observations confirmed nesting. During BBA II, 14.5% of observations were confirmations of nesting. Iowa's Green Heron results are very similar to the confirmation rates that were documented during atlases in Missouri with 9% confirmed records (Jacobs and Wilson 1997) and Illinois with 15% confirmed nesting records (Kleen et al. 2004). In Iowa, this heron was confirmed nesting in 24 counties during BBA I and 30 counties during BBA II. Most confirmed records were observations of recently fledged young. Most records for this species were in the possible category, making up 60% of BBA I records and 56% of BBA II records.

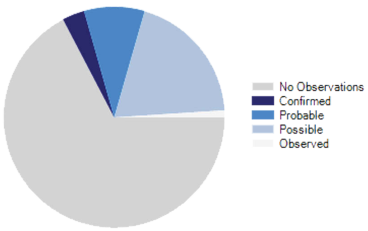
The distribution of this species did not greatly change between atlases. While there were four fewer counties with records in the second atlas than the first, the only county that lacked records for both atlases is Ida. Just as was observed during BBA I, BBA II records for this species were distributed along rivers and streams and around reservoirs, lakes, marshes, and woodland ponds.

The biggest threat to the existence of this heron is drainage of wetlands and habitat alteration and destruction in general (Davis and Kushlan 1994). Increased recreational use of river channels leads to decreased use by Green Herons, so it is important to maintain backwater habitat such as oxbow ponds, side channels, and ephemeral pools, where herons are unaffected (Kaiser and Fritzell 1984). To continue to provide Green Herons access to high quality breeding and foraging habitats, a primary priority must be the conservation and management of all sizes and varieties of wetlands.

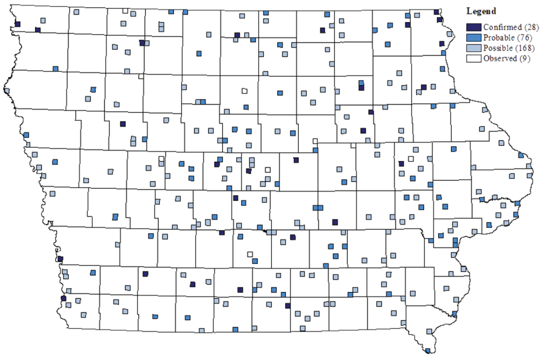
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	3	6	9
Possible	55	113	168
Probable	14	62	76
Confirmed	7	21	28
Conf & Prob	4.00%	20.80%	12.10%

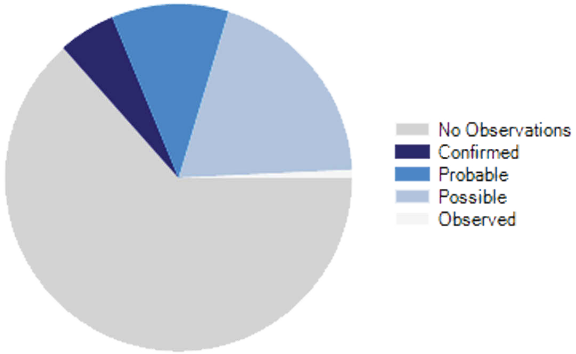
BBA I Results



BBA I



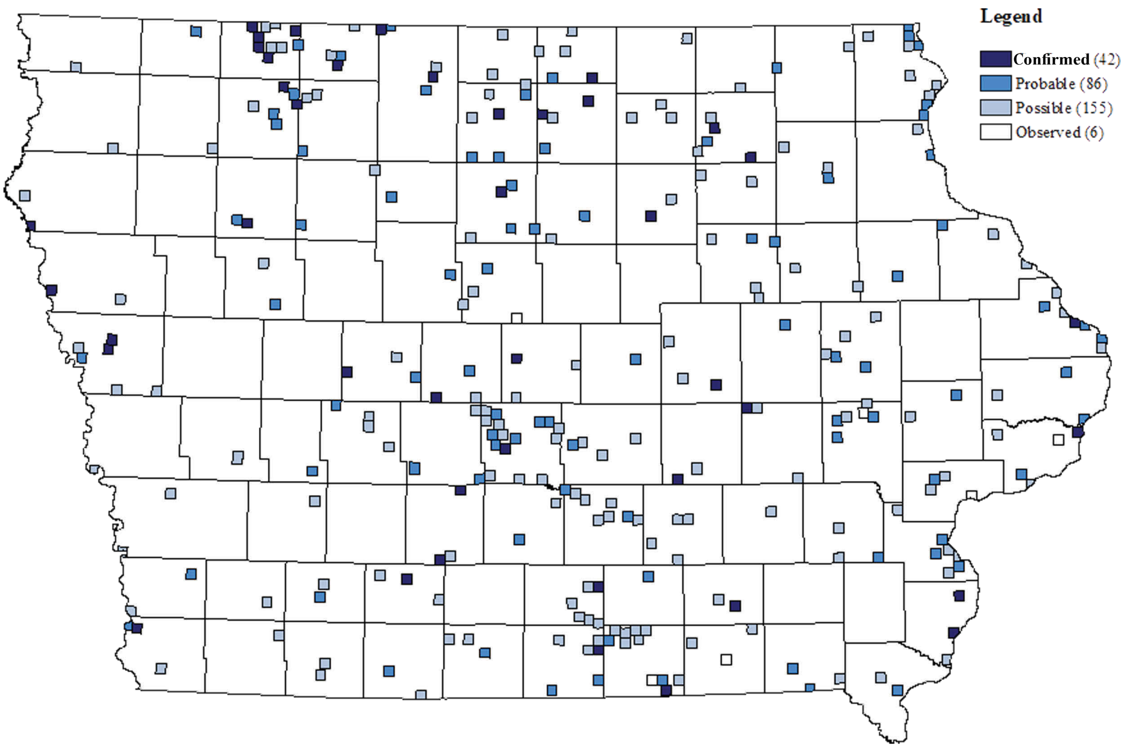
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	1	5	6
Possible	45	111	156
Probable	16	70	86
Confirmed	10	32	42
Conf & Prob	5.00%	25.60%	14.90%

BBA II



Sponsored by Natalie Patterson

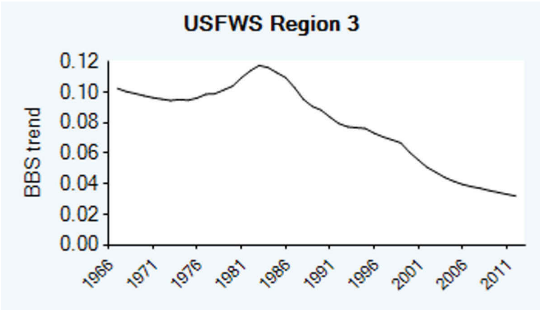
Black-crowned Night-Heron *Nycticorax nycticorax*

© James Durbin

Habitat	Woody borders of freshwater marshes, ponds, lakes or streams
Breeding Dates	26 Jun (PR)–1 Aug (PR)
Nest Type	Old nests frequently reused with each nest comprised of a loosely constructed platform of interwoven sticks, twigs, and reeds; typically placed 15 to 30 feet high on a sturdy branch of a tree
Clutch Size	3–5 eggs
Incubation	24–26 days
Fledging	~42 days
Status	Regular and rare nesting species
BBS Trend	Stable (trend = 1.1, 95% CI is –0.9, 2.8) [Central US]

Patterns since BBA I

While the Black-crowned Night-Heron is the most widespread heron in the world (Hothem et al. 2010), its sedentary daytime behavior and crepuscular and nocturnal feeding habits contribute to it being much less noticed than most other herons. This heron nests colonially, often in association with other heron species. Like Yellow-crowned Night-Heron, its fidelity to a breeding site is high, and when these sites have no predators and minimal disturbance, breeding colonies can continue for decades (Bailey 1915, Nickell 1966, Hothem et al. 2010). While this species is found too rarely to show any significant trend in Iowa's BBS, throughout its U.S. breeding range, populations have remained relatively stable from 1966–2015 (Sauer et al. 2017). Black-crowned Night-Heron was reported in 33 (3.8%) blocks in BBA I and in 26 (3.3%) blocks in BBA II, showing a slight decrease in the number of records between the atlases. This heron was found in only 14 (1.2%) blocks in Missouri's BBA (Jacobs and Wilson 1997), while it was found in 71 (5.5%) of sampled blocks in Illinois (Kleen et al. 2004).



During the first atlas, Black-crowned Night-Heron records were found in 27 counties (Jackson et al. 1996), and records were found in 21 counties during BBA II. Since this heron tends to place its nest in dense vegetation near or over water, nests can be difficult to detect. Because this bird is dependent on isolated and protected habitats, it is not surprising that 70% of BBA I records and 77% of BBA II records were documented in public land blocks. For reasons just mentioned, it also is no surprise that the nesting confirmation rate for this species is low. During BBA I, only four (12%) observations confirmed nesting, decreasing to one (3.8%) confirmed nesting during BBA II. Iowa's BBA I results are similar to the confirmation rates that were documented during atlases in Missouri, with 7% confirmed records (Jacobs and Wilson 1997) and Illinois, with 15.5% confirmed nesting records (Kleen et al. 2004). In Iowa, this heron was confirmed nesting in four counties (Osceola, Cerro Gordo, Wright, and Tama) during BBA I and only one county (Fremont) during BBA II, a nest found with young. Confirmed and probable records combined totaled 21% of BBA I records and 15.4% of BBA II records. Most records for this species were in the possible category, making up 46% of BBA I records and 62% of BBA II records.

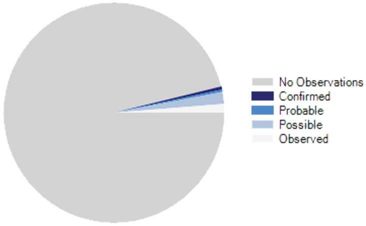
Distribution of Black-crowned Night-Heron changed slightly between atlases, with an increase in records in the southern third of the state and fewer records in the Prairie-Pothole Region during BBA II. In the past, most Iowa nesting colonies have been found in thickly vegetated marshes (Kent and Dinsmore 1996), especially in dense stands of cattail or bulrush, over water (Nigus 1977). Just as was observed in BBA I, BBA II records for this species were largely distributed around lakes, marshes, and reservoirs. More recently, a small nesting colony (four nests) of Black-crowned Night-Herons was observed on 4 July 2017 in an eight-acre woodlot in Franklin County, where nesting Barn Owls also were documented (Ehresman pers. obs.).

The largest threats to the existence of Black-crowned Night-Heron include drainage of wetlands, destruction of foraging and nesting areas, and increasing encroachment and harassment by humans (Nyboer et al. 2006, Hothem et al. 2010). Increased efforts to restore wetlands in this heron's traditional nesting areas should provide this opportunistic forager its best hope for a continued existence in this state.

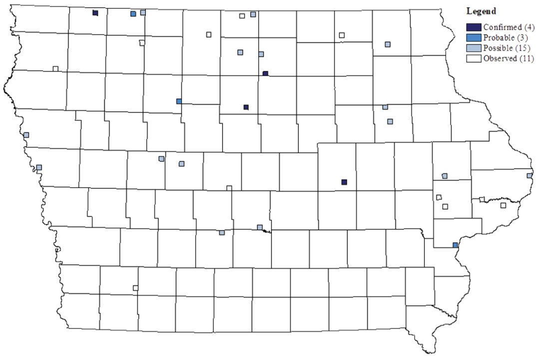
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	5	6	11
Possible	1	14	15
Probable	2	1	3
Confirmed	2	2	4
Conf & Prob	0.80%	0.80%	0.80%

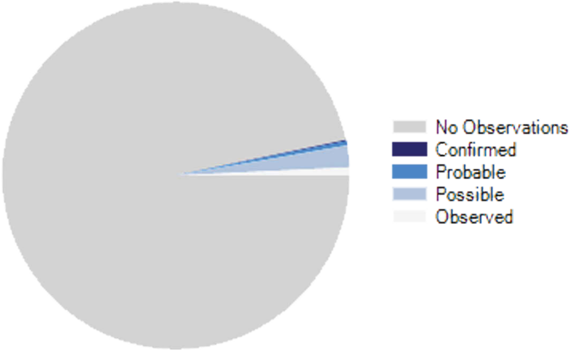
BBA I Results



BBA I



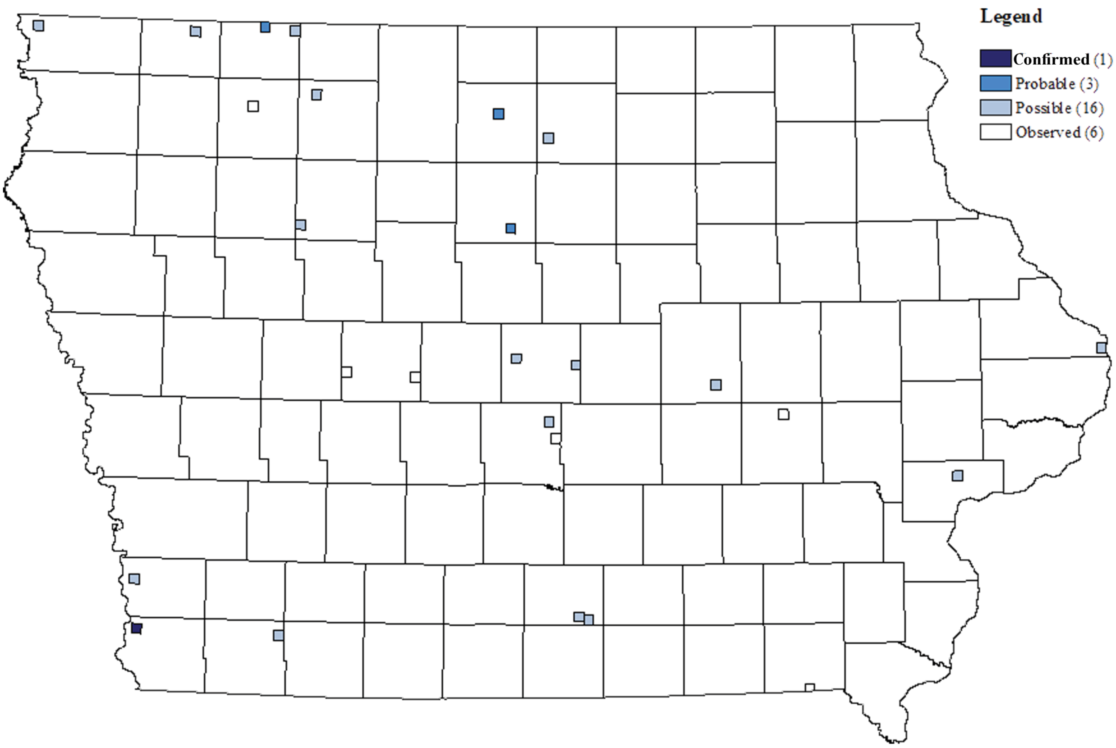
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	1	5	6
Possible	5	11	16
Probable	0	3	3
Confirmed	0	1	1
Conf & Prob	0.00%	1.00%	0.50%

BBA II

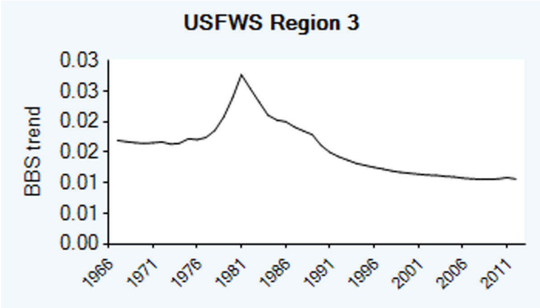


Sponsored by The Harms Family

© Billy Reiter-Marolf

Habitat	Mature wooded wetlands with moderate to sparse understory, especially associated with floodplain forests, sloughs, and marshes
Breeding Dates	1 Jun (PR)–5 Jul (CO)
Nest Type	Nest a platform of sticks and twigs, usually with a depression in the center and lined with grasses, leaves, and rootlets; placed high (~60 ft.) in the canopy, usually close to water
Clutch Size	2–6 eggs (4–5 eggs typical)
Incubation	~28 days
Fledging	~37 days
Status	Regular rare nesting species
BBS Trend	Stable (trend = 0.0, 95% CI is –2.0, 1.6) [Central US]

Patterns since BBA I



The Yellow-crowned Night-Heron is more solitary, secretive, and nocturnal than the Black-crowned Night-Heron. It is a crayfish specialist in its diet and is more likely to nest in wooded areas in close association with houses than its black-crowned relative (Watts 2011). Its fidelity to a breeding site is high, and a preferred nest site may be used for 10–15 years in-a-row (Darden 1962 in Watts 2011). In Iowa, Yellow-crowned Night-Herons were first found nesting in Polk County in the Des Moines River floodplain in 1956 (Brown 1956), and nesting was documented at that same location in 1957, 1959, 1960, and 1961 (Brown 1961). The location of nesting areas is strongly influenced by the availability of foraging habitat (Watts 2011), which in Iowa typically is in wooded wetlands along major rivers and in large cattail marshes (Kent and Dinsmore 1996). There is no Iowa BBS trend, and there is no definitive information on its U.S. population status (Watts 2011). During BBA I, Yellow-crowned Night-Heron was found in just eight (1%) blocks, and in BBA II it was found in 17 (2.1%) blocks. Similarly, this heron was found in just 14 blocks in Indiana's BBA (Castrale et al. 1998), 19 (1.6%) blocks in Missouri's BBA (Jacobs and Wilson 1997), and in 28 (2.2%) of sampled blocks in Illinois (Kleen et al. 2004).

Yellow-crowned Night-Heron records were found in seven counties during BBA I, and records were found in 11 counties during BBA II. This heron was undoubtedly overlooked because of its secretive nature. Roosting in trees during day and foraging at evening and night, as well as nesting high in mature woodlands are reasons why this species is not more often located. Public land blocks provided 100% of BBA I records and 88% of BBA II records.

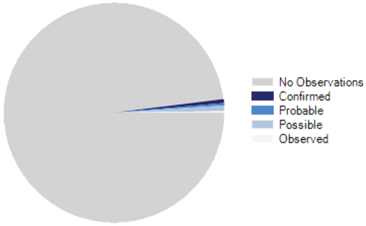
No confirmed nesting occurred during BBA I, with only one (5.9%) confirmed nesting during BBA II. Iowa's BBA results are similar to the confirmation rate that was documented during Missouri's atlas, with one (5.3%) confirmed record (Jacobs and Wilson 1997). Illinois confirmed nesting in seven (25%) blocks with records (Kleen et al. 2004). Iowa's one confirmation was a recent fledgling seen with adults along the Chariton River in Lucas County. Most records for this species were in the possible category, making up 50% of BBA I records and 70.6% of BBA II records. Because it is difficult to locate this secretive heron, it is probable that it nested in more blocks than recorded.

Historical Yellow-crowned Night-Heron records were from throughout the state, with most records from southeastern and southwestern Iowa and from Polk County (Kent and Dinsmore 1996). Records from BBA I were distributed in the eastern half of the state. During BBA II, most records came from eastern Iowa, with one record from southwestern Iowa (Forney Lake WMA in Fremont County). Three records were associated with the Des Moines River, two records came from the Skunk River watershed, and a probable nest record from the Wapsipinicon River in Chickasaw County was the same location where Yellow-crowned Night-Herons raised three young in 2005 and fledged four young in June 2006 (Rachel Hau Anderson pers. comm.). Seven records came from the Chariton River watershed, five from Lucas County. Continued loss and fragmentation of bottomland hardwood forests are serious threats to Yellow-crowned Night-Heron (Watts 2011), and management efforts for this heron should focus on reducing forest fragmentation along major river systems, especially in eastern Iowa.

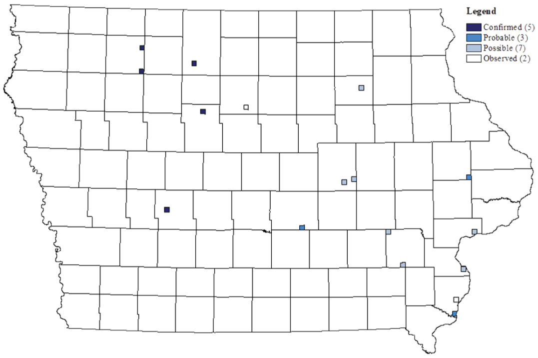
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	2	2
Possible	2	5	7
Probable	1	2	3
Confirmed	0	5	5
Conf & Prob	0.20%	1.80%	0.90%

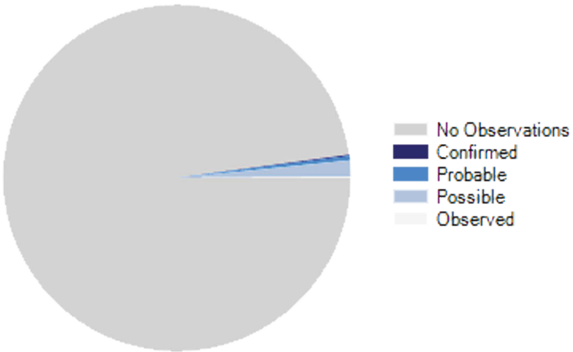
BBA I Results



BBA I



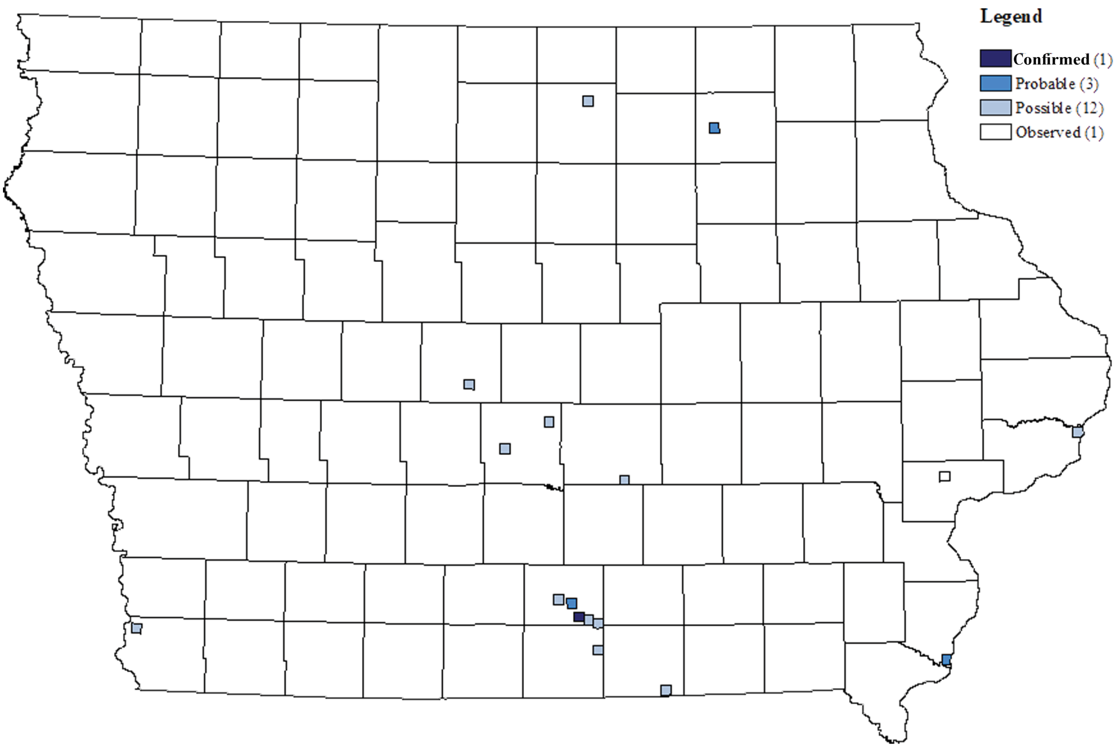
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	1	1
Possible	2	10	12
Probable	0	3	3
Confirmed	0	1	1
Conf & Prob	0.00%	1.00%	0.50%

BBA II



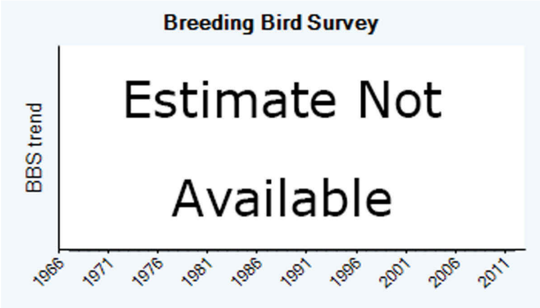
Sponsored by Scott & Rachel Hau Anderson

© Stephen J. Dinsmore

Habitat	Large wetlands with emergent vegetation
Breeding Dates	NA
Nest Type	Shallow platform in emergent vegetation or bushes over water
Clutch Size	3–4 eggs
Incubation	20–23 days
Fledging	25–28 days
Status	Very rare migrant
BBS Trend	No Trend Available

Patterns since BBA I

The Glossy Ibis is a very rare and increasing spring migrant in Iowa, where it occurs in a wide range of aquatic habitats. This medium-sized wading bird has a patchy global distribution and its dark coloration and bill structure have led to the nickname "black curlew" (Davis and Kricher 2020). This species is a relatively recent arrival in Iowa with the first record from Kossuth County in 1992 (Kenne 1994). In the ensuing years the Glossy Ibis has increased and is now an annual spring migrant with 1–5 reports each year. There have been no suggestions of nesting aside from the single report during BBA II. This species has greatly expanded north into the Midwest and Great Plains since the 1990s (Patten and Lasley 2000) with nesting documented in Nebraska in 2015 (Jorgensen and Silcock 2015). Hybridization with White-faced Ibis has become more common in the Great Plains, complicating identification of both species of Plegadis (Arterburn and Grzybowski 2003). The BBS data cannot estimate a trend for Iowa; the species has increased nationally (Sauer et al. 2017). The White-faced Ibis is sometimes considered sympatric with the Glossy Ibis; their ranges overlap along the Gulf Coast and they occasionally hybridize with some hybrids noted in Iowa (Ryder and Manry 2020).



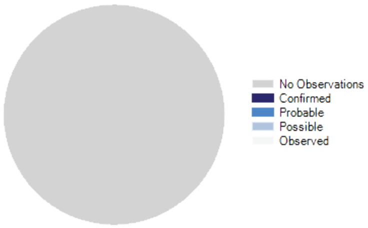
Glossy Ibis was unreported during BBA I (Jackson et al. 1996). During BBA II it was reported from just one (0.1%) habitat block. This was a possible report from a small White-faced Ibis colony at Forney Lake in Fremont County, where at least one bird was present during the nesting period (J. J. Dinsmore 2008). This species has nested with White-faced Ibis in Nebraska and might be expected to do so in Iowa in the future.

The Glossy Ibis has no special conservation designation in Iowa or nationally. It was hunted extensively in Florida into the early 1900s (Baynard 1913), but not elsewhere. Ibis populations are threatened by oil spills (Parsons 1994), exposure to pesticides and other contaminants (Davis and Kricher 2020), and destruction of breeding habitat and disturbance of breeding colonies (Davis and Kricher 2020). Conversely, this species is highly adaptable and is capable of dramatic changes in both its numbers and distribution (Davis and Kricher 2020). Regional patterns suggest that the Glossy Ibis will continue to expand into Iowa and may eventually nest with White-faced Ibis and other waders.

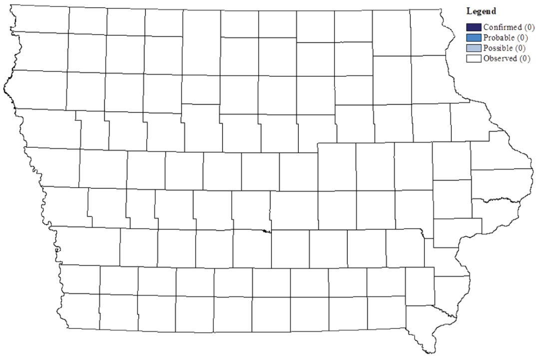
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	0	0	0
Probable	0	0	0
Confirmed	0	0	0
Conf & Prob	0.00%	0.00%	0.00%

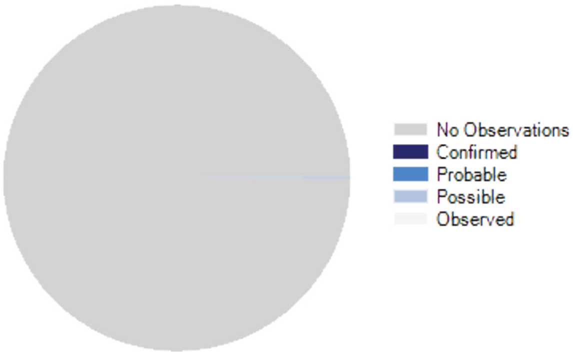
BBA I Results



BBA I



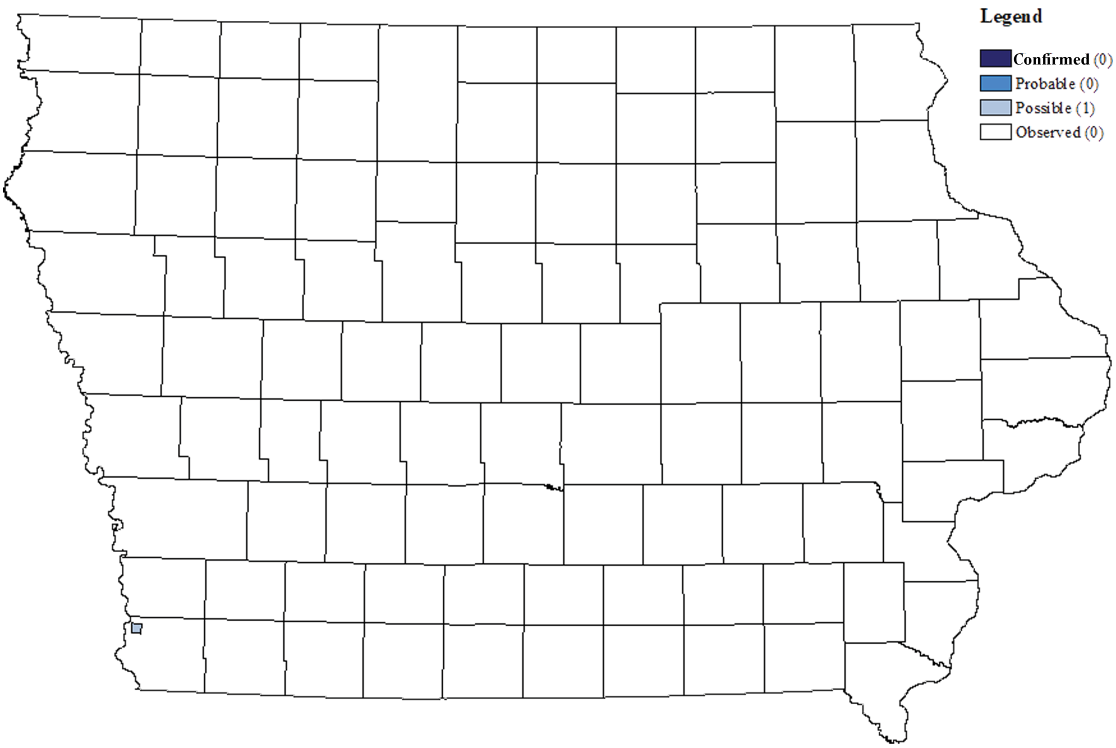
BBA II Results

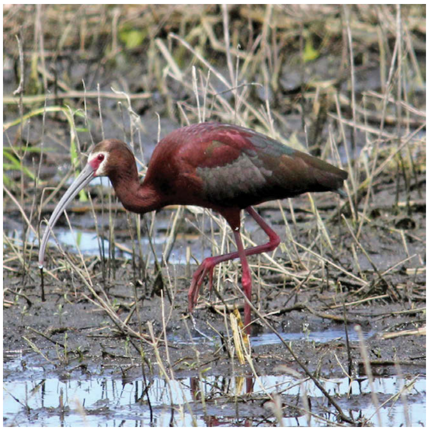


BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	0	1	1
Probable	0	0	0
Confirmed	0	0	0
Conf & Prob	0.00%	0.00%	0.00%

BBA II

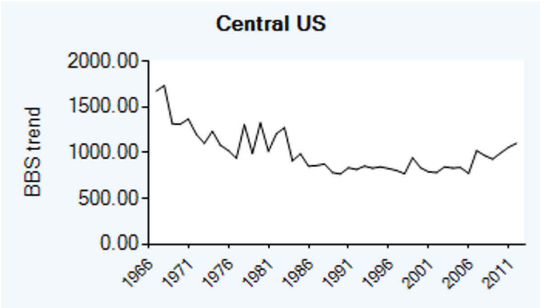




© Doug Harr

Habitat	Large wetlands with emergent vegetation
Breeding Dates	NA
Nest Type	Shallow platform in emergent vegetation over water
Clutch Size	2–5 eggs
Incubation	17–21 days
Fledging	ca. 35 days
Status	Uncommon migrant and very rare breeder
BBS Trend	Stable (trend = 0.0, 95% CI is –3.0, 3.1) [Central US]

Patterns since BBA I



The White-faced Ibis is a very rare breeding bird on Iowa's large wetlands with extensive beds of emergent cattails and other vegetation. This colorful, medium-sized wading bird is more common to the west of Iowa, although it has expanded its range in the last few decades, especially into the northern Great Plains (Ryder and Manry 2020). There are few historical records of ibis in Iowa, most not identified to species. The first documented Iowa occurrence was in 1891, and there were very few acceptable records through 1984 (J. J. Dinsmore et al. 1984, Kent and Dinsmore 1996). The first nesting report was a small colony at Jemmerson Slough, Dickinson County in 1986 (S. J. Dinsmore and J. J. Dinsmore 1986). Reports of this species have increased greatly since the 1980s and it is now a regular spring migrant statewide. The BBS data cannot estimate a trend for Iowa; the species has declined regionally (Sauer et al. 2017). This species is sometimes considered sympatric with the Glossy Ibis; their ranges overlap along the Gulf Coast and they occasionally hybridize. Some hybrids are noted in Iowa (Ryder and Manry 2020).

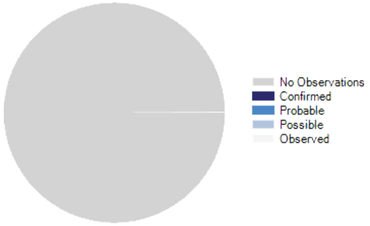
White-faced Ibis showed an increase in reports during the time spanned by both atlas projects. During BBA II it was reported from ten (1.3%) blocks, up from one (0.1%) block during BBA I. During BBA II there was a single confirmed report from Fremont County, where the lone possible report also occurred. The confirmed report consisted of a colony of 20+ pairs of ibis nesting with Black-crowned Night-Herons at Forney Lake (J. J. Dinsmore 2008). The eight observed reports were from central and north-central Iowa except for a lone report from Mills County. This contrasts with BBA I, which had a single observed report from Clay County (Jackson et al. 1996). It is perhaps surprising there were not more reports, especially during BBA II, from north-central and northwestern Iowa where most of the larger wetlands remain.

The White-faced Ibis is a Species of Greatest Conservation Need in Iowa (Iowa DNR 2015) but has no special national conservation designation. This species was hunted in the United States through the early 1900s (Bent 1926) but is no longer a hunted species. Ibis populations are threatened by exposure to pesticides and other contaminants (Henny and Bennett 1990, Ryder and Manry 2020), alterations to water level and emergent vegetation management at breeding sites, and disturbance of breeding colonies (Ryder and Manry 2020). Despite these challenges, this species has become established as regular part of Iowa's avifauna and will probably continue to breed sporadically when wetland conditions permit.

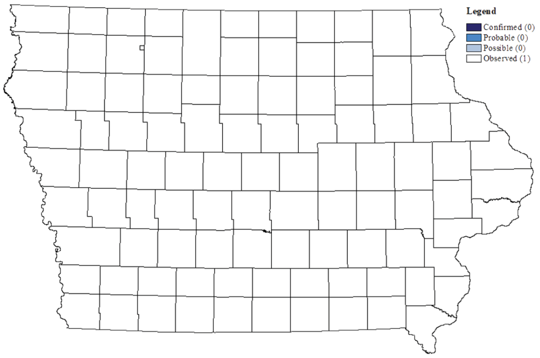
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	1	1
Possible	0	0	0
Probable	0	0	0
Confirmed	0	0	0
Conf & Prob	0.00%	0.00%	0.00%

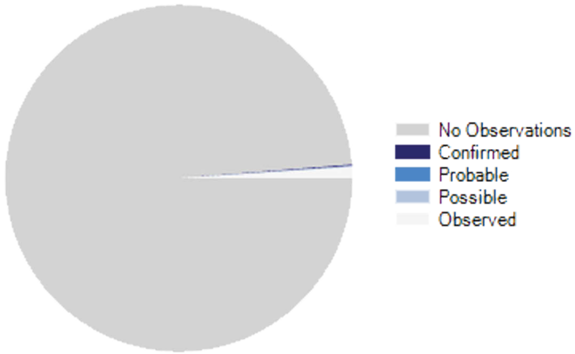
BBA I Results



BBA I



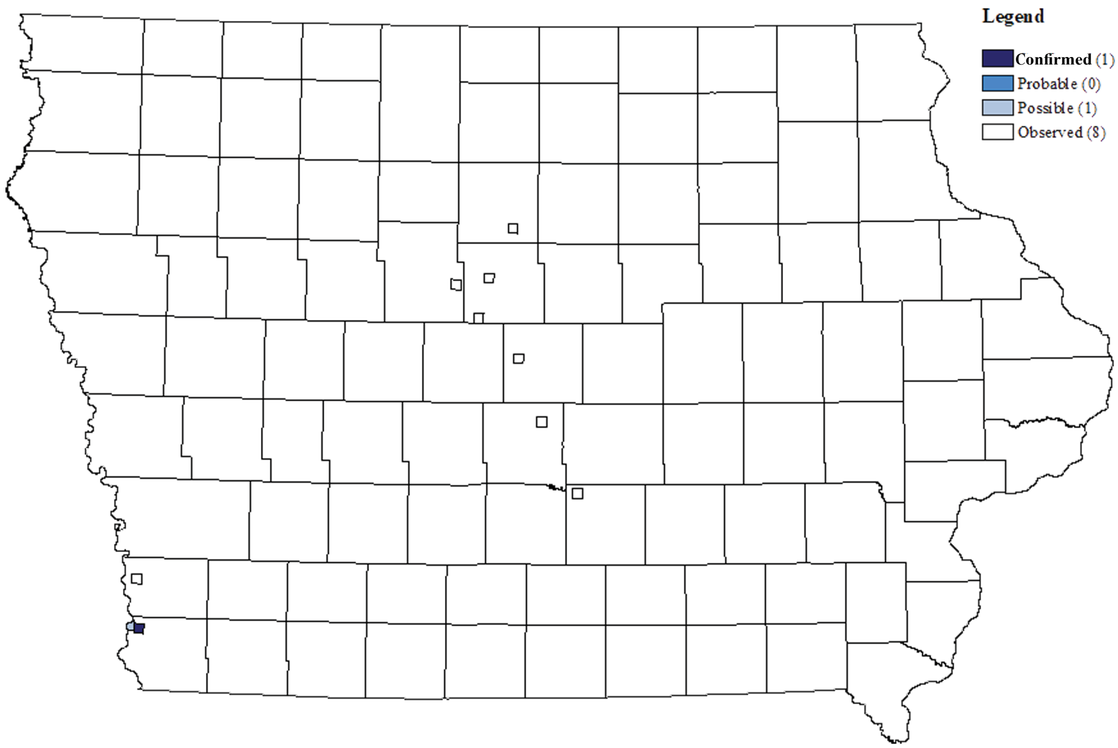
BBA II Results



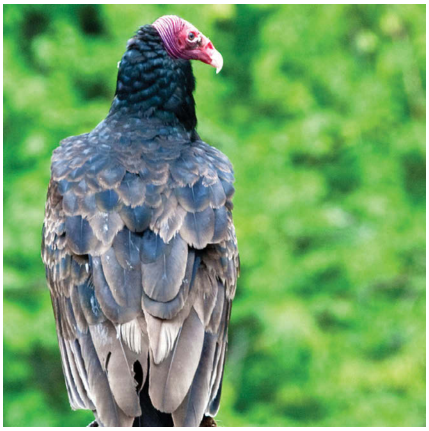
BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	2	6	8
Possible	0	1	1
Probable	0	0	0
Confirmed	0	1	1
Conf & Prob	0.00%	0.30%	0.10%

BBA II



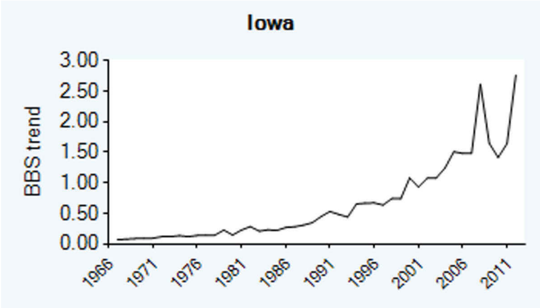
Sponsored by Stan Buman



© Reid Allen

Habitat	Farmland close to undisturbed forest; nests in abandoned buildings, hollow trees, and rock outcrops isolated from human disturbance
Breeding Dates	2 Apr (PR)–26 Aug (CO)
Nest Type	Eggs laid directly on bare soil, woody debris, leaf litter, straw, etc.; depression may form in substrate from weight of incubating birds
Clutch Size	2 eggs, range 1–3
Incubation	38–41 days
Fledging	66–88 days
Status	Regular nesting species
BBS Trend	Increasing (trend = 7.2, 95% CI is 4.9, 10.0) [Iowa]

Patterns since BBA I



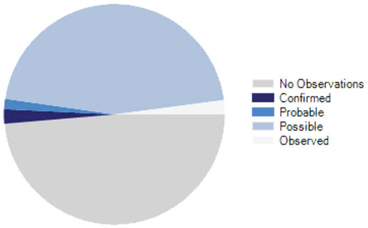
When I grew up in rural eastern Iowa (Jones County) in the 1960s, I was nearly 20 years old before I first witnessed a Turkey Vulture. Today, this master of soaring flight is quite common and can be seen virtually anywhere in the state. The number of Turkey Vulture records collected increased dramatically between atlas periods, with 442 (51.3%) records collected during BBA I increasing to 764 (96.6%) records in BBA II. As further support of this apparent increase, data collected from Iowa BBS routes show a significant population increase of 7.2% per year in recent years (Sauer et al. 2012). The overall percentage of nesting confirmations did not significantly change between atlas periods, with 4.1% (18) confirmed records in BBA I and 4.6% (36) confirmed in BBA II. This low confirmation rate appears related to the fact that this species typically nests in hollow trees and other out of sight places, and nests are difficult to find. Most of the confirmed records were recently fledged young. The high percentage (89%) of BBA I records documented at the possible level was similar to the high percentage (77%) of BBA II records recorded at the possible category. The number of probable nesting records substantially increased between atlases, going from 13 (2.9%) BBA I records to 136 (17.8%) BBA II records. A good reason for such a small percentage of probable records is that both sexes of vultures look alike, and it is difficult to distinguish a nesting pair. Typically seeing two vultures together was recorded as possible nesting, although repeated vulture presence at a potential nest site often was recorded as visiting or probable nest site. Perhaps especially because Turkey Vultures readily nest in old abandoned buildings (that are prevalent on privately owned farmsteads) and are not habitat specialists, they were found equally well (in all nesting categories) in grid blocks and habitat blocks. The BBA results for Turkey Vulture in Missouri was very similar to Iowa's, except for a significantly higher percentage (17% vs. Iowa's 4.7%) of confirmed nesting records in Missouri (Jacobs and Wilson 1997).

While Turkey Vulture was considered to have statewide distribution for both atlas periods, that distribution has changed somewhat between those two time periods. For instance, this species was found in almost every northern Iowa block during the second atlas, while it was missing in many blocks in extreme northern Iowa during the first atlas. In fact, there were no Turkey Vulture records for Osceola and Palo Alto counties during BBA I and very few records for most counties in northwestern Iowa. Certainly, there is an increased presence of this vulture in the Loess Hills and in the Prairie Lakes areas of the state, probably related to the fact that these areas hold a fair percentage of wooded land. Beginning ~1920–1940 and continuing through the 1990s in the Upper Midwest, this vulture's breeding range has expanded northward, and its population has significantly increased in northern parts of its range (Kirk and Mossman 1998). Jackson et al. (1996) predicted the Turkey Vulture was likely to continue to be an uncommon breeder in Iowa. Based on the current increasing population and increasing northward distribution of this species, I tend to agree with a statement from Jacobs and Wilson (1997) that, "although not confirmed, Turkey Vulture presumably bred in or near many blocks." If the increasing number of "nuisance animal" complaints that Iowa DNR receives annually (especially regarding roosting sites in towns and cities) is any indication, it appears that Turkey Vultures already are well-adapted to living close to humans.

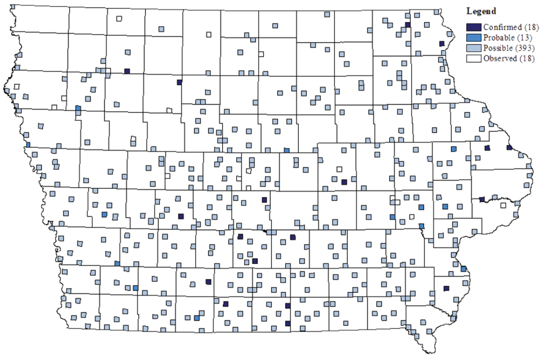
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	9	9	18
Possible	161	232	393
Probable	6	7	13
Confirmed	6	12	18
Conf & Prob	2.30%	4.80%	3.60%

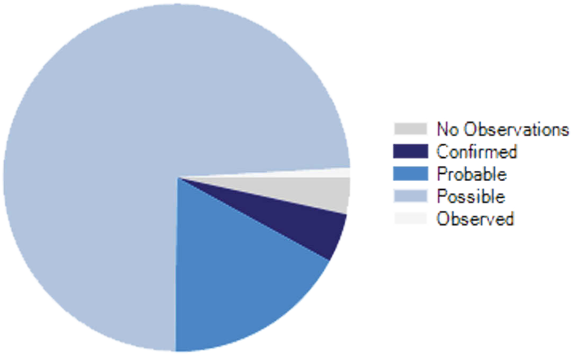
BBA I Results



BBA I



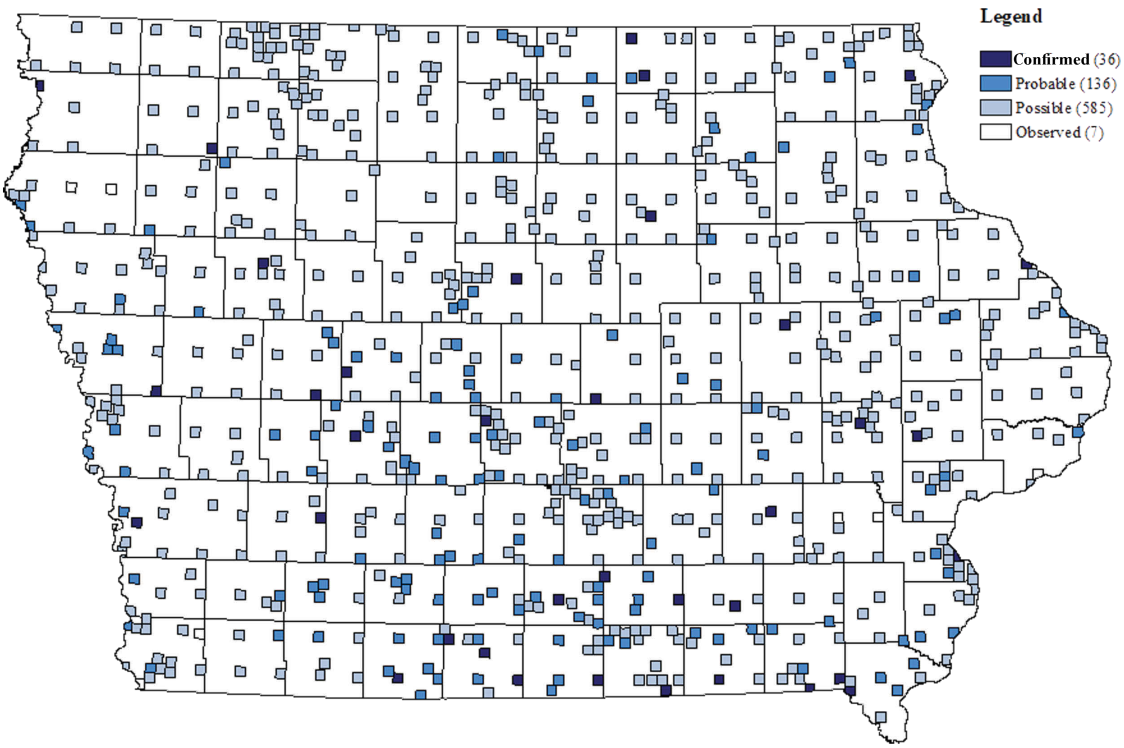
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	6	1	7
Possible	299	288	587
Probable	50	86	136
Confirmed	17	19	36
Conf & Prob	12.80%	26.30%	20.00%

BBA II

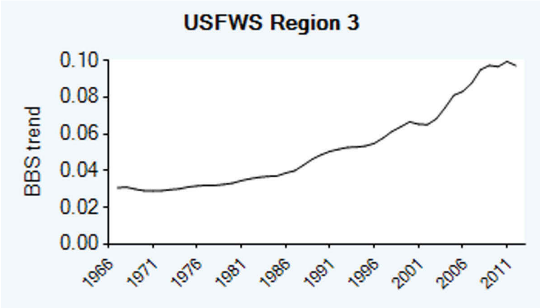


© Adam Ciha

Habitat	Wooded lakes, reservoirs, and rivers
Breeding Dates	1 Apr (CO)–10 Aug (CO)
Nest Type	Large stick nest in tree or on artificial nest platform
Clutch Size	3–4 eggs
Incubation	34–40 days
Fledging	49–56 days
Status	Introduced regular nester
BBS Trend	Stable (trend = 2.7, 95% CI is –2.0, 31.5) [Central US]

Patterns since BBA I

Osprey was not documented nesting in Iowa historically although the First Nation oral culture indicates this species did nest, particularly in wooded shorelines of large natural lakes in Dickinson County. According to Bailey (1918), "The Osprey is not often found nesting in Iowa," and the single nest record he describes for Linn County in 1892 along the Cedar River, from George H. Berry, is disputed. During Iowa's first BBA, the only records of Osprey were those of summering birds. The first recorded modern-day osprey nest attempts occurred in 2000 in Dickinson County. First successful nests occurred in both Dickinson and Johnson counties in 2003. These nests were the result of an Iowa Osprey release program (which Iowa DNR initiated in 1997) and a similar Osprey release program begun by Minnesota DNR in southwestern Minnesota. From 1997 through 2013, 291 Ospreys were released from 12 hack sites in Iowa, and 134 wild-produced Osprey young have fledged from 80 successful nests. During 2013 there were 18 active nesting territories, and 14 successful nests produced 28 young (Pat Schlarbaum pers. comm.).



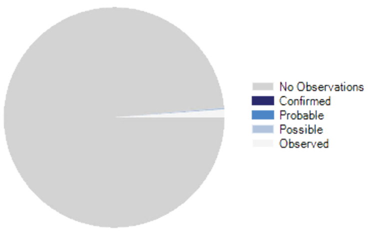
During BBA II, Ospreys were detected in 59 (7.5%) blocks and nesting evidence was found more frequently in habitat (83%) than grid (17%) blocks. This species is easily seen and nests mostly on human-made structures (Bierregaard et al. 2016), especially atop nest platforms and cell towers. Ospreys were confirmed breeding in 12 (33%) of the blocks where it was found. Nest confirmation occurred in seven counties, particularly in areas near release sites in Polk, Boone, Johnson, Linn, Cerro Gordo, and Dickinson counties. The two nest sites in Woodbury County blocks appeared to be related to an Osprey release program in South Dakota, which began in 2003 (Eileen Dowd Stukel pers. comm.). Ospreys (especially males) typically do not readily pioneer into new areas and are most likely to return to areas near where these birds originally fledge (Bierregaard et al. 2016). The high proportion (61%) of observed records may indicate an increasing number of birds not yet sexually mature. Counties where Ospreys have nested in recent years, in addition to the seven already listed, include Monona, Black Hawk, Marion (Red Rock Lake), Warren, and Appanoose (Rathbun Lake).

Wildlife Biologist Stephanie Shepherd, with Iowa DNR's Wildlife Diversity Program, oversees a Volunteer Wildlife Monitoring Program that continues to monitor Osprey nests and their outcomes. At the beginning of 2018, there were 40 Osprey nest sites that were designated as routinely active (i.e., active in recent years). Results of monitoring during 2018 indicated that there were 29 active Osprey nests in Iowa within 11 counties (Dickinson, Woodbury, Monona, Guthrie, Dallas, Polk, Jasper, Johnson, Linn, Buchanan, and Black Hawk), and 16 of these nests successfully produced at least 30 young (Iowa DNR 2019). Based on nesting evidence, especially from the last decade, it appears that Ospreys have become a regular nesting species in several particular areas of Iowa. With most nests now occurring on nesting platforms and cell towers, it appears that Ospreys will continue to flourish as long as humans provide them secure nesting sites.

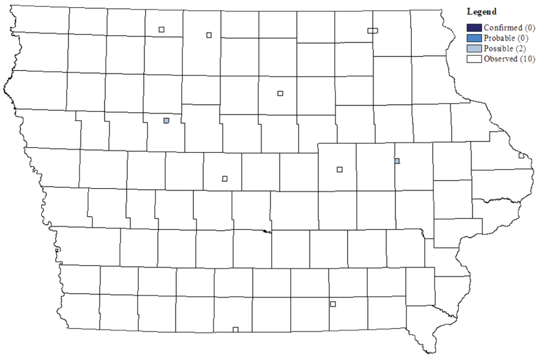
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	1	9	10
Possible	0	2	2
Probable	0	0	0
Confirmed	0	0	0
Conf & Prob	0.00%	0.00%	0.00%

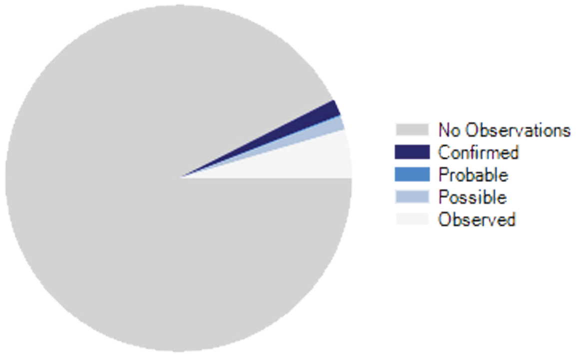
BBA I Results



BBA I



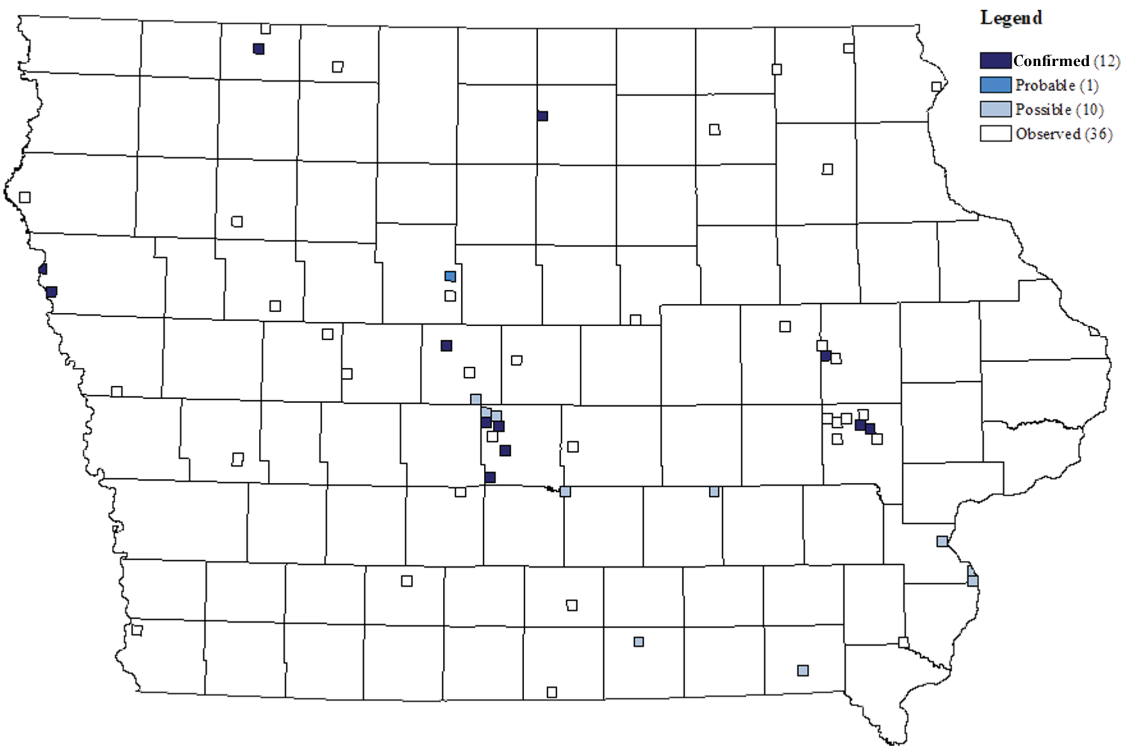
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	6	30	36
Possible	2	8	10
Probable	0	1	1
Confirmed	1	11	12
Conf & Prob	0.20%	3.00%	1.50%

BBA II



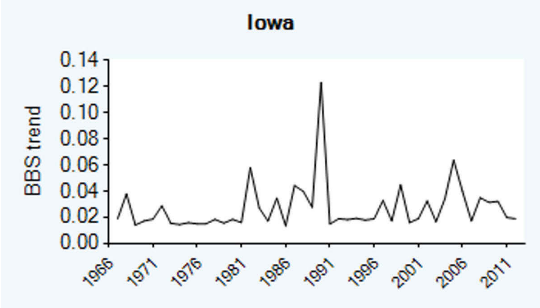
In Honor of Pat Schlarbaum (Stephanie Shepherd)

© Reid Allen

Habitat	Large open grasslands and marshy meadows; prairies
Breeding Dates	6 Apr (PR)–19 Aug (CO)
Nest Type	On ground; platform created with reeds, grasses, forbs, and weedy material; nest lined with finer grasses and sedges
Clutch Size	4–9 eggs (mean = 5 eggs)
Incubation	28–36 days (mean = 32 days)
Fledging	27–36 days
Status	Rare breeding bird
BBS Trend	Stable (trend = 3.0, 95% CI is −2.1, 9.0) [Iowa]

Patterns since BBA I

The Northern Harrier especially prefers nesting in large grassland tracts, and the densest populations are usually associated with large tracts of undisturbed habitats, especially those with thick vegetation growth (Apfelbaum and Seelbach 1983). Except for extreme western Iowa, nesting evidence was detected in most of the state where grassland habitat still exists. Overall, this species was found in 92 (11.6%) blocks. Probably because the type of habitat this raptor prefers is more likely to be found on larger tracts of public land, it was detected much more frequently in habitat (72%) than grid (28%) blocks.



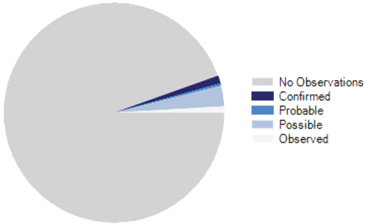
Northern Harrier distribution changed little since BBA I. The main change observed was confirmed nesting in an equal number of blocks in both northern and southern Iowa blocks during the first atlas, while all eight nesting confirmations occurred in blocks located in northern counties during BBA II. Because the main breeding range for the Northern Harrier is located north of Iowa (Smith et al. 2011), the lack of confirmed nesting in southern Iowa may not seem surprising. Perhaps this lack of nesting confirmation in southern Iowa is related to the decreasing number of acres of grassland habitat available. For instance, the amount of Iowa grassland habitat converted to row-crop agriculture from 2006 to 2011 was about 376,000 acres, and 1.3 million acres of grassland and wetland were converted to cropland in the Dakotas, Nebraska, and parts of Minnesota and Iowa between 2006 and 2011—a land conversion rate that has not been witnessed since before the Dust Bowl in the 1930s (Wright and Wimberly 2013).

Wet grasslands and marshes appear to support the highest breeding densities of Northern Harriers (Hamerstrom et al. 1985), and this type of habitat is especially found in Iowa's Prairie Pothole region. Recent BBS data show that Northern Harrier populations were stable for the time period (1999–2009) in the Prairie Pothole region (Smith et al. 2011), which is the area of the state where most nesting is documented. Iowa BBS data for 2001–2011 also indicate a stable population trend (Sauer et al. 2012). The conversion of native and nonnative grasslands for monotypic farming continues to contribute to local harrier population declines and remains a major threat to this species (Duebbert and Lokemoen 1977, Toland 1985, Smith et al. 2011). In addition, overgrazing of pastures, creation of larger crop fields with fewer grassy patches, and the widespread use of insecticides and rodenticides, continue to decrease the amount of habitat for this species, while also decreasing its prey availability (Duebbert and Lokemoen 1977, Hamerstrom 1986, Smith et al. 2011). Northern Harrier continues to be listed as an Endangered Species in states such as Iowa, Illinois, Missouri, and Indiana (Kleen et al. 2004, Jacobs and Wilson 1997, and Castrale et al. 1998), and its future in each of these states will be dependent on how much effort is invested in retaining, recreating, and maintaining the upland and wetland grassland habitats on which this species depends.

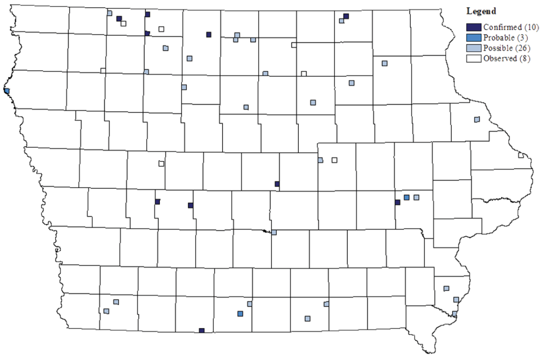
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	4	4	8
Possible	8	18	26
Probable	1	2	3
Confirmed	2	8	10
Conf & Prob	0.60%	2.50%	1.50%

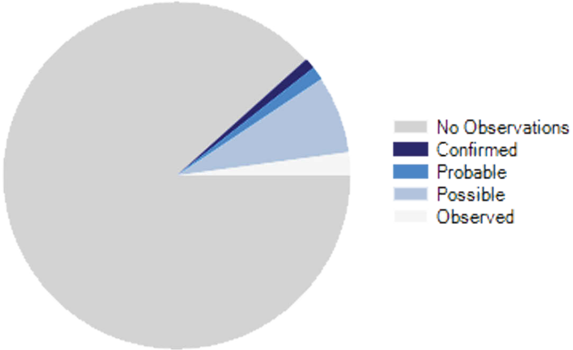
BBA I Results



BBA I



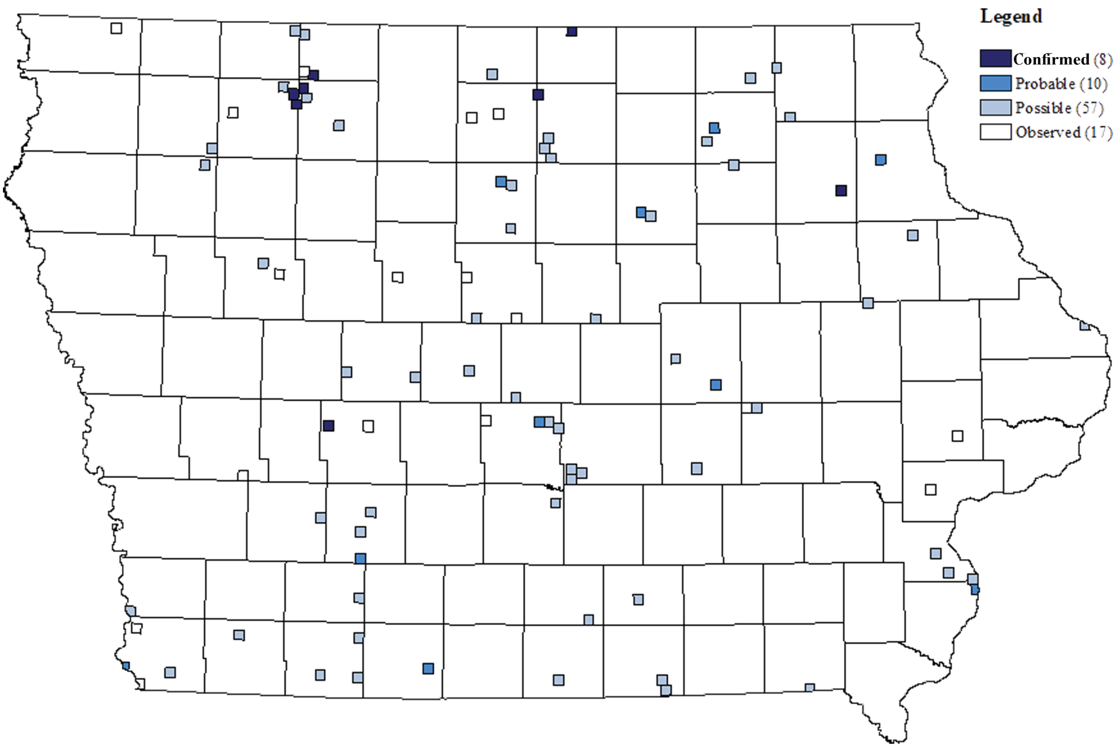
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	8	9	17
Possible	16	41	57
Probable	1	9	10
Confirmed	1	7	8
Conf & Prob	0.40%	4.00%	2.10%

BBA II

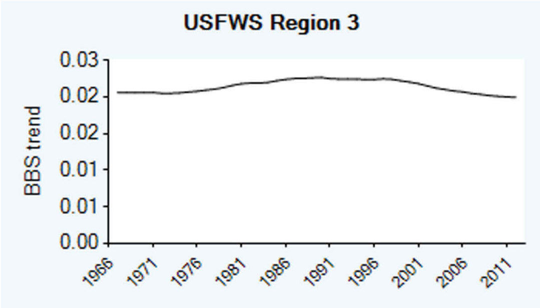


Sponsored by Ric Zarwell

© Jim Mason

Habitat	Nests mostly in large stands of deciduous, coniferous, and mixed pine-hardwood forests and pine plantations
Breeding Dates	4 May (PR)–4 May (PR)
Nest Type	~2 ft. diameter platform of sticks and twigs on horizontal limbs (avg. 30–35 ft. up) next to trunk, especially in pines
Clutch Size	4–5 eggs (mean = 4)
Incubation	30–32 days
Fledging	24–28 days
Status	Very rare nesting species
BBS Trend	Stable (trend = 0.2, 95% CI is −2.7, 2.2) [Central US]

Patterns since BBA I



The Sharp-shinned Hawk is a common migrant and less common winter resident, but it is rarely seen during Iowa's summer nesting season. This large forest species was recorded in just 18 (2.3%) blocks. An agitated adult, seen repeatedly in Ledges State Park in Boone County, was listed as the highest record of confirmation. While a recently fledged Sharp-shinned Hawk was documented at the edge of a stand of pines in the Whitebreast Unit of Stephens State Forest (Lucas County) on 19 July 2011, the BBA Steering Committee determined there was insufficient evidence to prove that bird fledged from that particular site. The weakly flying hawk was witnessed to be forced from the air to the ground by mobbing songbirds (mostly Red-winged Blackbirds), which seems to indicate this young bird fledged from a nest somewhat nearby. According to the Sharp-shinned Hawk distribution map produced by Bildstein and Meyer (2000), Stephens State Forest in Lucas County is in an area where this species is expected to breed.

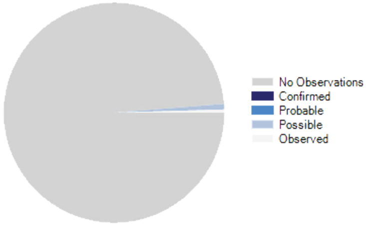
Comparing data collected during BBA I and BBA II, the distribution of this species did not change markedly between the two time periods. Most (56%) BBA II records were observed, and the seven (39%) records of possible nesting were all in habitat blocks. These records were chiefly associated with larger blocks of forest habitat with a conifer component, such as Loess Hills Forest (Harrison County), Indian Bluffs WMA (Jones County), and Stephens State Forest (Lucas County). Perhaps most surprisingly, the area of the state (northeastern) that is closest to prime nesting habitat of adjacent states lacked any nesting data during both atlases. For comparison, Sharp-shinned Hawk was confirmed nesting in extreme northeastern Illinois during that state's BBA (Kleen et al. 2004). As a testament to its secretive nature during nesting, nest records from Missouri's atlas indicated this species was much more widespread than previously thought in that adjacent state (Jacobs and Wilson 1997).

One reason for the lack of nesting data for the Sharp-shinned Hawk may be because it is known as the most secretive of North America's forest-breeding raptors (Bildstein and Meyer 2000). Unlike Cooper's Hawk, which actively defends its territory, the Sharp-shinned Hawk is more likely to quietly slip away as intruders approach its nest. Researchers still lack data about basic aspects of this raptor's breeding biology. While there is evidence of this raptor's preference to nest in conifers (Rosenfield et al. 1991), there is little known of the effects of forest use on breeding ecology and success, including the impacts of forest-patch size, age structure, and species composition (Bildstein and Meyer 2000).

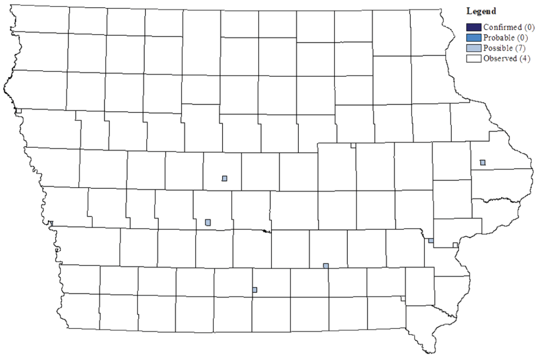
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	4	4
Possible	1	6	7
Probable	0	0	0
Confirmed	0	0	0
Conf & Prob	0.00%	0.00%	0.00%

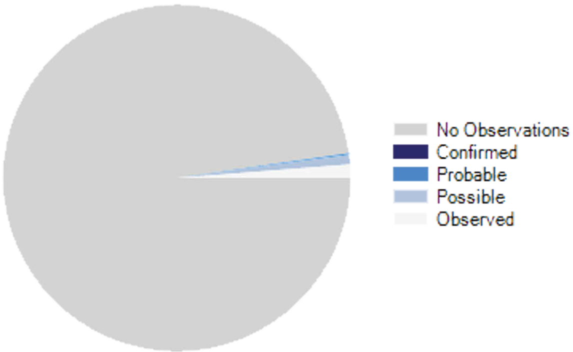
BBA I Results



BBA I



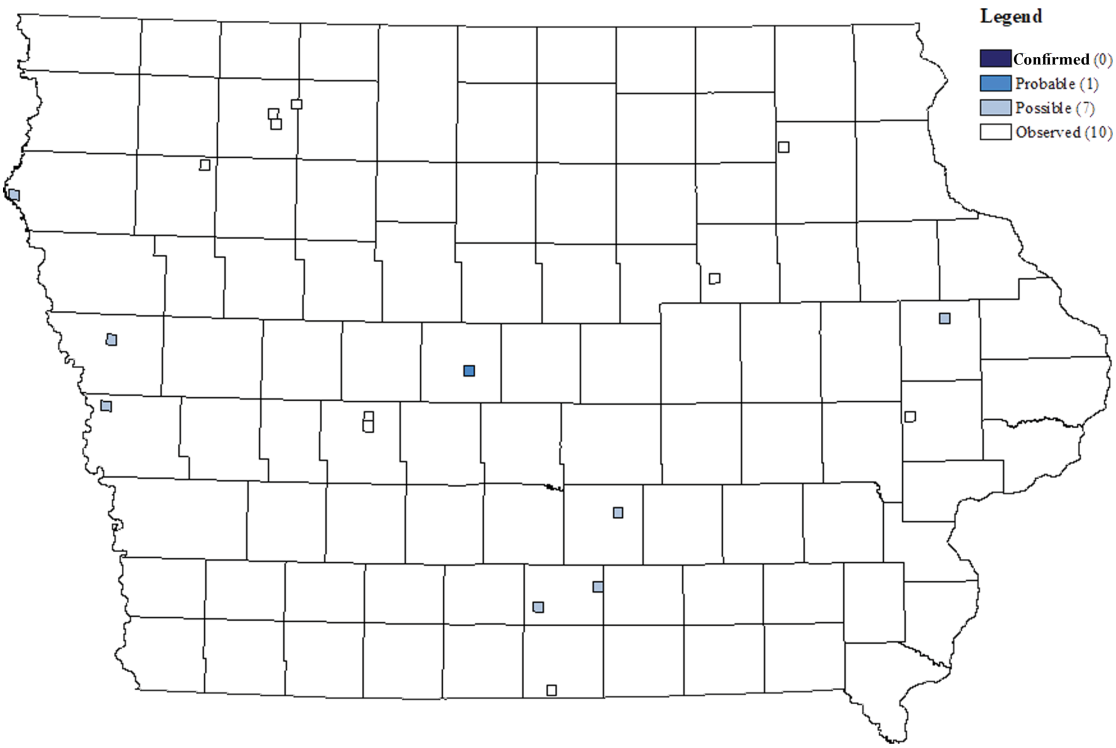
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	2	8	10
Possible	0	7	7
Probable	0	1	1
Confirmed	0	0	0
Conf & Prob	0.00%	0.30%	0.10%

BBA II



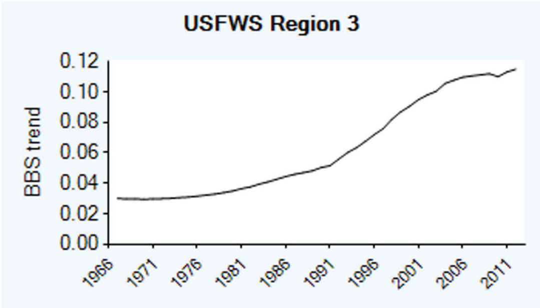
Cooper's Hawk *Accipiter cooperii*

© Adam Ciha

Habitat	Nests mostly in large stands of deciduous, coniferous, and mixed pine-hardwood forests and pine plantations
Breeding Dates	3 Apr (PR)–23 Aug (CO)
Nest Type	~61 cm diameter platform of sticks in upright crotch of deciduous tree or on horizontal limbs (avg. 8–15 m up) next to trunk of live tree
Clutch Size	3–5 eggs (typical)
Incubation	30–36 days
Fledging	25–34 days
Status	Increasingly common nesting species
BBS Trend	Increasing (trend = 3.7, 95% CI is 2.4, 4.9) [Central US]

Patterns since BBA I

Cooper's Hawk was listed as a rare summer resident less than two decades ago (Kent and Dinsmore 1996) and it was not removed from Iowa's Endangered Species List until 1994. Today this species is quickly becoming more common during Iowa's summer nesting season. This forest species was recorded in 287 (36.3%) blocks, with confirmed nesting recorded in 54 (19%) blocks and probable nesting in 61 (21%) of blocks in which it was found. The most frequently used evidence categories for confirmed breeding were attending young and recently fledged young.



Iowa's largest tracts of forest are publicly owned, so it is no surprise that 187 (65%) blocks with nesting data were habitat blocks. This compares well to the first atlas when 71% of records were associated with public land. During the first atlas, Cooper's Hawk was found in only 62 (7.2%) blocks and confirmed nesting in 15 (24.2%) of blocks in which it was found. Put more simply, during the second atlas this accipiter was documented in 4.6 times as many blocks and confirmed nesting in 3.6 times as many blocks. While not highly significant, BBS data for Central United States indicate that Cooper's Hawk increased at an average annual rate of 8% from 2001 to 2011 (Sauer et al. 2012).

The distribution of this species did change significantly since the first atlas. Overall, it appears that Cooper's Hawks were found wherever adequate woodland habitat exists. For example, many new records were documented in the western one-third of the state. Forested areas (northwest) along the Little Sioux River and around the Great Lakes area in Dickinson County especially produced a good number of confirmed and probable records. Since the first atlas, another aspect that changed significantly is the nesting of this species in urban habitats. Confirmed nesting occurred in multiple blocks in the Des Moines and Ankeny area, as well as in urban-suburban areas of Ames, Cedar Rapids, and Cedar Falls.

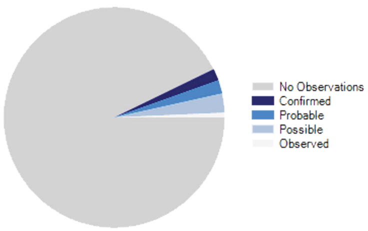
Because Cooper's Hawks are territorial and are quite vocal, they are more easily confirmed than some other raptor species (Curtis et al. 2006). Since this species seems to be adapting to live near humans, an increasing number of nesting reports are received by conservation agency staff. This is especially true during the time that young hawks are fledging in urban settings, like Ankeny and Des Moines, and concerned urban dwellers express concern about the welfare of their pets and children. Because Cooper's Hawk preys mostly on medium-sized birds like European Starling, Rock Pigeon, and Mourning Dove, it can be affected by the diseases these birds carry, like *Trichomoniasis gallinea* (also known as 'Frounce') (Rosenfield et al. 2002). This disease causes nearly 50% of the deaths in urban nestlings in southeastern Arizona (Boal and Mannan 1999).

The Cooper's Hawk has survived the era of direct persecution and then the era of destructive environmental toxins, especially DDT. It appears today's populations are thriving, undoubtedly in large part because of its ability to adapt to human-altered landscapes. For now, the future of the Cooper's Hawk in Iowa looks bright.

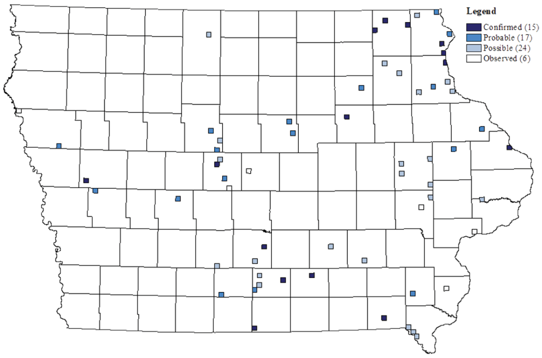
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	2	4	6
Possible	11	13	24
Probable	4	13	17
Confirmed	1	14	15
Conf & Prob	1.00%	6.80%	3.70%

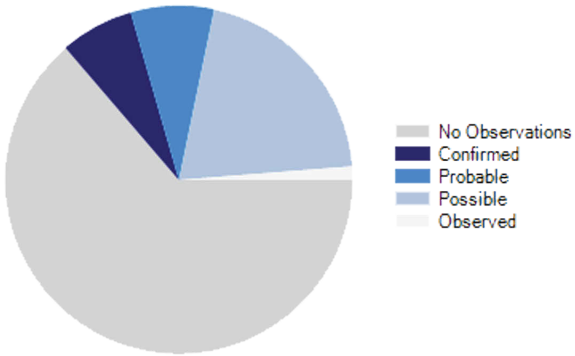
BBA I Results



BBA I



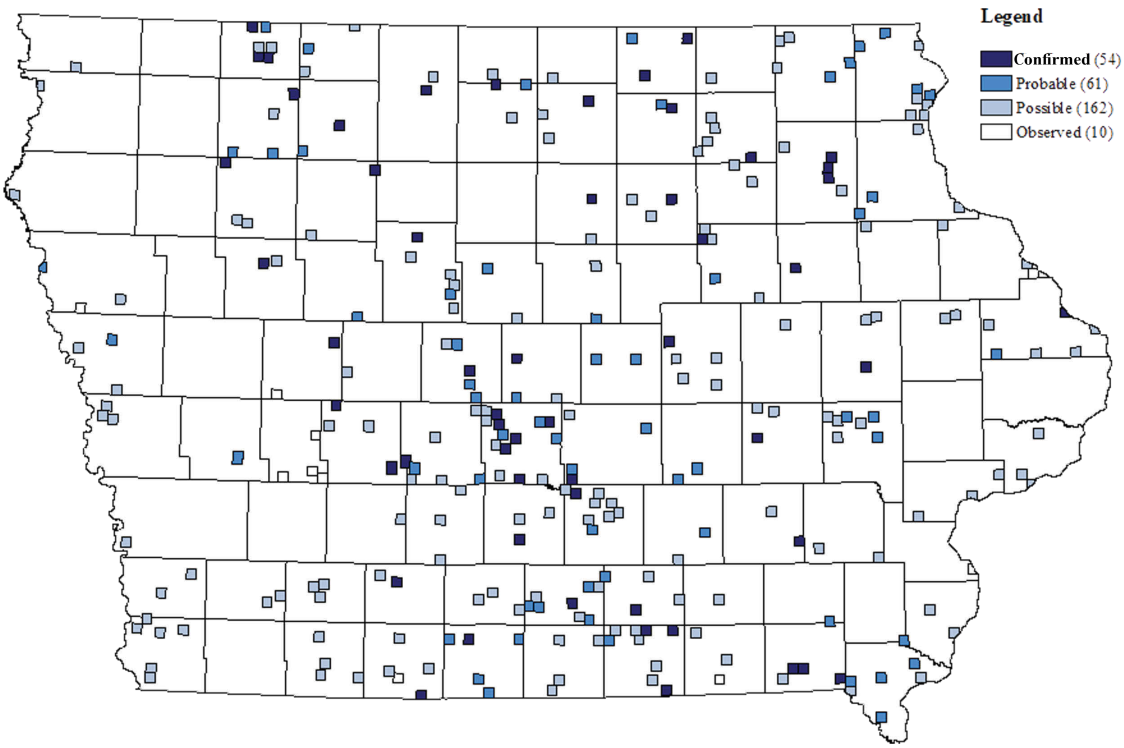
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	8	2	10
Possible	52	111	163
Probable	22	39	61
Confirmed	9	45	54
Conf & Prob	5.90%	21.10%	13.40%

BBA II

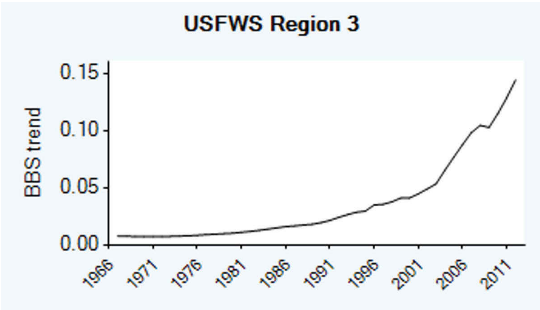


Sponsored by Pat Dinsmore

Habitat	Large trees along rivers, streams, and lakes
Breeding Dates	21 Jan (CO)–28 Dec (CO)
Nest Type	~6 ft. diameter stick nest placed ~2/3 up in large tree; especially cottonwood
Clutch Size	1–3 eggs (mean = 2 eggs)
Incubation	34–40 days (mean = 35 days)
Fledging	70–84 days
Status	Increasingly regular breeding bird
BBS Trend	Increasing (trend = 8.1, 95% CI is 7.0, 18.6) [Central US]

Patterns since BBA I

There has been a significant change in the status of the Bald Eagle since the first BBA, and this former Endangered Species has recovered well beyond all expectations. This species was found in 27 (4%) blocks during the first atlas, mostly in the eastern one-third of the state. It was confirmed nesting, at that time, in just three blocks, all in eastern Iowa. During the second atlas, this species was found statewide in 248 (31.4%) blocks. This large raptor was detected more frequently in habitat (73%) than grid (27%) blocks, which is probably related to the higher quality eagle habitat existing on public land.



Especially because the nesting of the Bald Eagle is well monitored by Iowa DNR, it was confirmed nesting in 123 (49.6%) of the blocks in which it was found. Bald Eagles appear to now nest along all of Iowa's major rivers, with about half of Iowa's approximately 300 active nests located along the Mississippi River. Including Iowa DNR data from the 2013 nesting season, Bald Eagles have now been documented to nest in all counties except Osceola, Union, and Monroe. While most confirmed nests (in BBA blocks) were documented in the eastern two-thirds of the state, a substantial number of records came from blocks located in the Missouri River floodplain and from the Great Lakes region in northwestern Iowa. Not surprisingly, many fewer eagle records were collected in western Iowa county blocks, which is a highly agricultural portion of the state that lacks quality eagle nesting habitat.

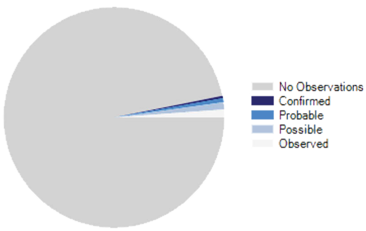
According to Buehler (2000), typical Bald Eagle nest sites occur in mature and old-growth forest with some habitat edge and located relatively close to water with suitable foraging opportunities. While Bald Eagles in Iowa most often choose these more typical sites to nest, several nest locations in western Iowa occur in 50-year-old cottonwood trees that line the banks of straightened rivers, now mostly large ditches in that part of the state. The Bald Eagle appears to be adapting to nest in areas that would not have been considered suitable habitat a couple decades ago. While breeding adults are considered highly territorial (Buehler 2000), Iowa nest records indicate that some eagle pairs are quite tolerant of each other, and active nesting territories have been documented as close as 100 meters on the Upper Mississippi River NWR (Stephanie Shepherd pers. comm.). Another good indicator of Bald Eagle recovery is the ability of this species to tolerate human activity, and Iowa has multiple records of eagles nesting successfully in close (100 meters) proximity to occupied homes and even at the edge of wooded parking lots at Mississippi River and Missouri River access boat ramps.

Environmental contaminants are a significant source of mortality for Bald Eagles (Buehler 2000). While the Midwest Bald Eagle population continues to grow, the relative frequency of admissions for lead poisoning remains unchanged after the 1991 Federal ruling requiring use of steel shot for waterfowl hunting. Admissions to the Raptor Center at University of Minnesota from 1980 to 1995 show that lead poisoning was the primary reason for admission of 138 (22%) Bald Eagles out of 634 total Bald Eagle admissions (Kramer and Redig 1997). These data suggest that Bald Eagles may be picking up lead from sources other than waterfowl.

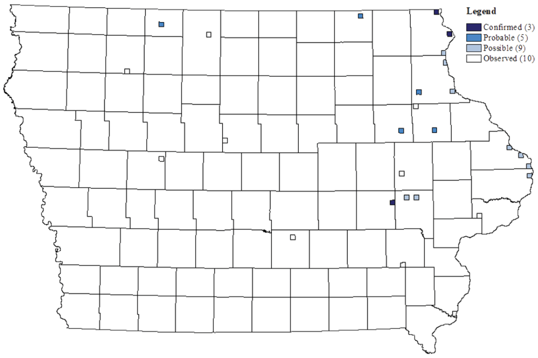
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	3	7	10
Possible	0	9	9
Probable	4	1	5
Confirmed	0	3	3
Conf & Prob	0.80%	1.00%	0.90%

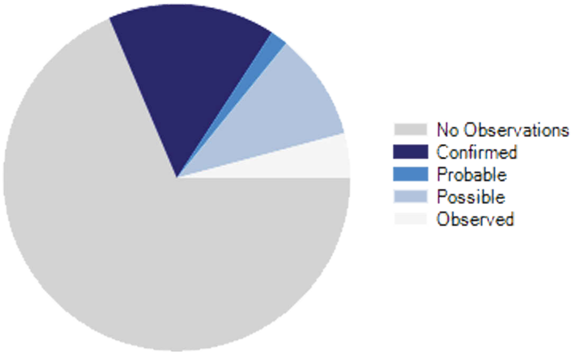
BBA I Results



BBA I



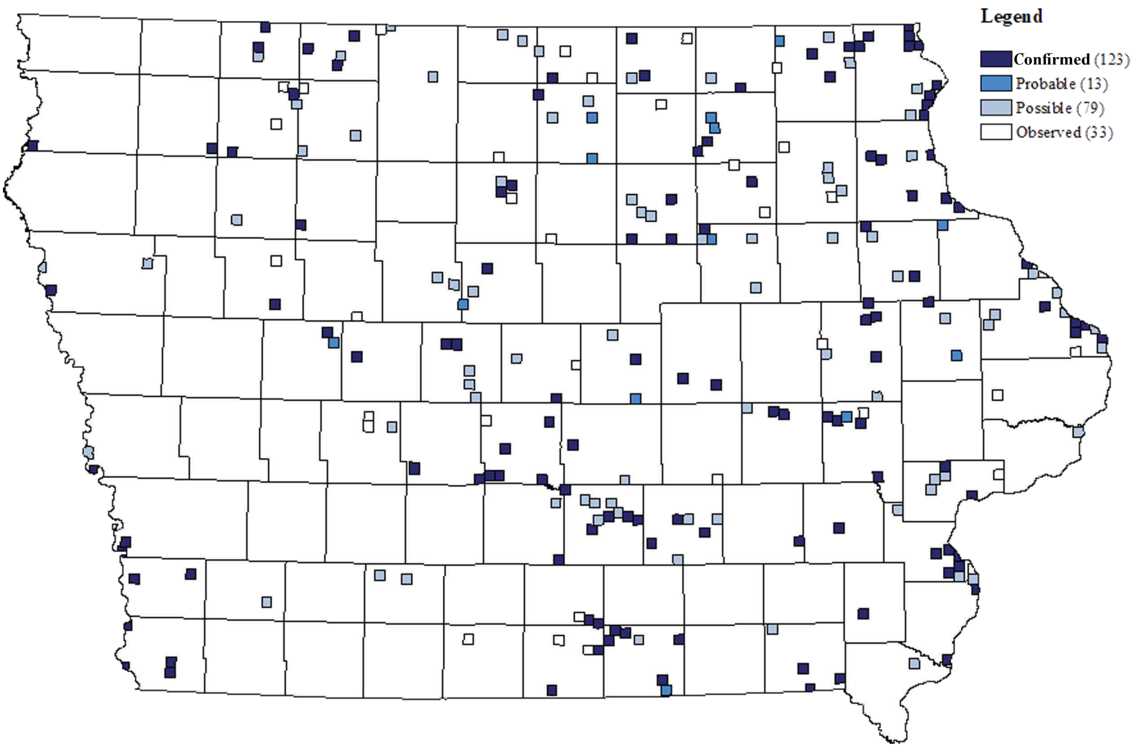
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	10	23	33
Possible	23	56	79
Probable	6	7	13
Confirmed	28	95	123
Conf & Prob	6.50%	25.60%	15.80%

BBA II



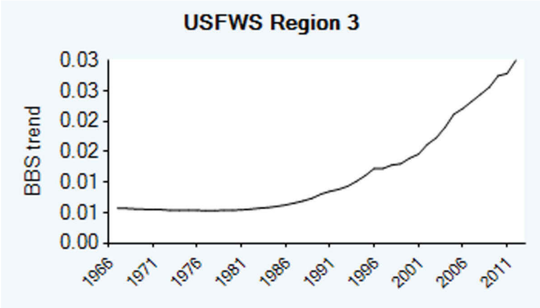
Sponsored by Ric Zarwell

© Doug Harr

Habitat	Large mature bottomland forest and riparian woodland with adjacent openings
Breeding Dates	10 Jul (PR)–10 Jul (PR)
Nest Type	Compact saucer of twigs and sticks, usually lined with green leaves and placed high in tree canopy
Clutch Size	1–3 eggs (mean = 2 eggs)
Incubation	29–32 days
Fledging	30–35 days
Status	Recent regular nester
BBS Trend	Stable (trend = 0.1, 95% CI is –1.0, 1.3) [Central US]

Patterns since BBA I

The Mississippi Kite was not documented nesting in Iowa historically, although there were two specimens collected (shot) in southeastern Iowa along the Mississippi River near Burlington in 1887, and an immature female was collected near Omaha for the Coe College Museum in Cedar Rapids (Bailey 1918). Parker and Ogden (1979) reported that the historical breeding range of the eastern population included areas with major stream corridors as far north as southeastern Iowa. The earliest evidence of potential nesting was summering adults in Clive in 1991, and in 1995 a nest was documented with one young fledged (Walsh 1996). During Iowa's first BBA, the only record of this species was a subadult seen at Dudgeon Lake in Benton County (Jackson et al. 1996).



During BBA II, Mississippi Kites were detected in three (0.4%) grid blocks and zero habitat blocks. The highest nesting evidence was a pair of kites observed in Ottumwa (Wapello County), and possible nesting was recorded when a single bird was seen in one block each in Story County (Ames) and Poweshiek County. During Missouri's BBA (1986–1992), nesting was documented along the Mississippi River from south of Cape Girardeau north to St. Louis, and there was evidence of nesting reported as far north as Pike County (Jacobs and Wilson 1997). Similarly, records from Illinois BBA (1986–1991) were mostly associated with the Mississippi River, and this kite was documented nesting as far north as Quincy (Kleen et al. 2004), about 30 miles south of Keokuk, Iowa.

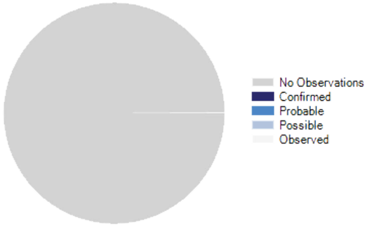
While no Mississippi Kites were documented in BBA blocks in Des Moines, a nest-fallen Mississippi Kite was found in Urbandale on 24 July 2012 and photographed by raptor rehabilitator, Kay Neumann. Mock combat of Mississippi Kites (three birds total) was noted to occur over Greenwood Park in Des Moines by Jim Sinclair on 9 June 2012 (J. J. Dinsmore 2012). Greenwood Park has been a popular site to view multiple flying Mississippi Kites during spring and summer since at least 2008. Interestingly, most individuals usually soar during midday in Illinois (Evans 1981), and this is prime time for viewing soaring kites in Des Moines as well. Multiple sightings of this species have occurred within the three nesting seasons (2010, 2011, and 2012) at another Des Moines site: near the intersection of Highway 6 and the Des Moines River. On 8 August 2013, two nest-fallen Mississippi Kite young, found about one-half mile south of Gray's Lake in Des Moines, were turned in to Kay Neumann for rehabilitation, and one died (Kay Neumann pers. comm.).

Because Mississippi Kite is known for its propensity to forage for insects on the wing (Parker 1999), often in groups, it can be conspicuous to bird observers. Therefore, it seems unlikely that this species was largely overlooked during the atlas. Mississippi Kite is known for colonizing urban riparian forest habitat (Parker 1999), and given the fact that many Iowa cities and towns include wooded riparian corridors, it seems likely that more nesting pairs of this species will be documented in Iowa in the future.

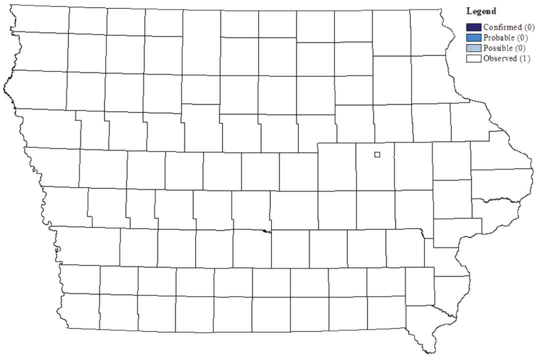
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	1	1
Possible	0	0	0
Probable	0	0	0
Confirmed	0	0	0
Conf & Prob	0.00%	0.00%	0.00%

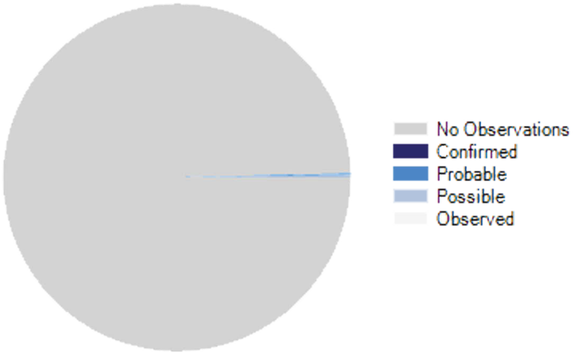
BBA I Results



BBA I



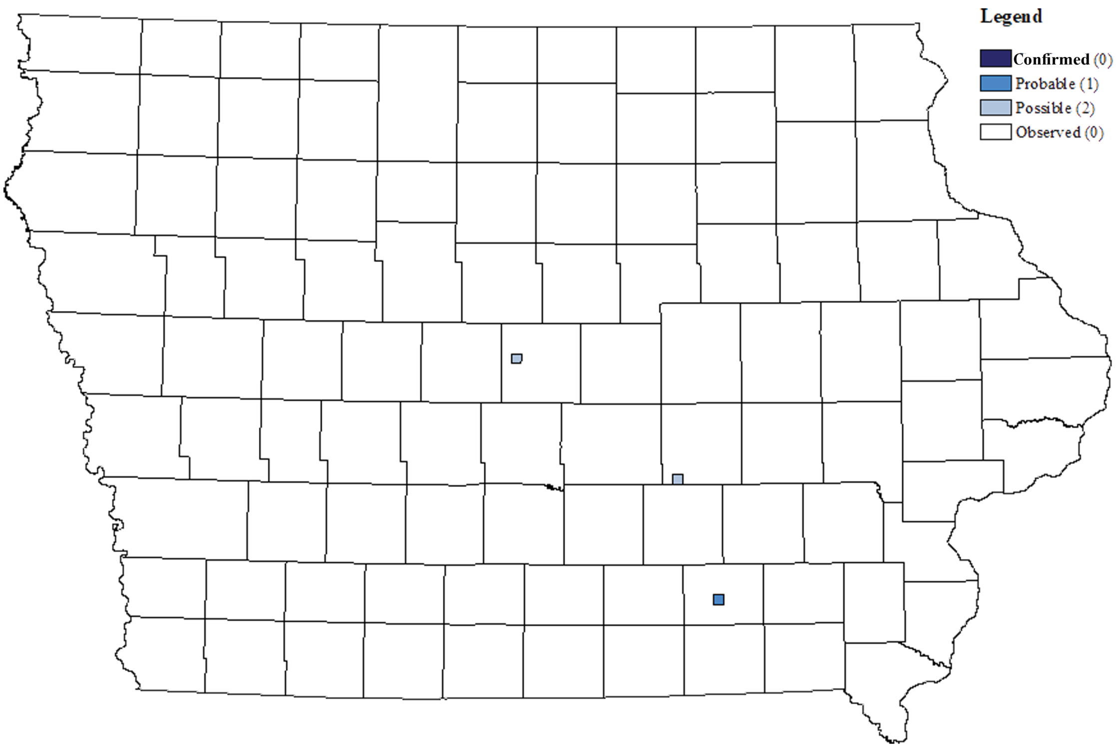
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	2	0	2
Probable	1	0	1
Confirmed	0	0	0
Conf & Prob	0.20%	0.00%	0.10%

BBA II

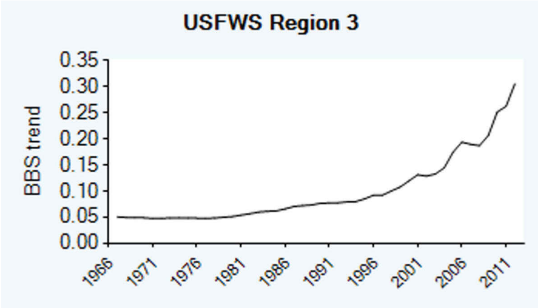


Red-shouldered Hawk *Buteo lineatus*

© Paul Roisen

Habitat	Nests mostly in large stands of bottomland hardwood forests and flooded riparian forests
Breeding Dates	26 Mar (PR)–19 Aug (PR)
Nest Type	18–24 in. diameter platform of sticks and twigs, 35–45 ft. up and often close to trunk in crotch of several branches
Clutch Size	2–5 eggs (mean = 3 eggs)
Incubation	28 days
Fledging	39–45 days
Status	Uncommon nesting species
BBS Trend	Increasing (trend = 2.8, 95% CI is 2.2, 3.5) [Central US]

Patterns since BBA I



Less than two decades ago, the Red-shouldered Hawk was listed as a rare permanent resident of heavily wooded riparian areas of eastern Iowa (Kent and Dinsmore 1996). In the late 1970s, Iowa's population was estimated to be down as much as 90% from presettlement historic numbers (Bednarz 1979, Dykstra et al. 2008). Both status and distribution for this species have substantially changed since then. One fact that has not changed is that this buteo continues to be found in its favored habitat of large floodplain forests interspersed with wetlands (Bednarz and J. J. Dinsmore 1982, Stravers 1989, 1992). The 20 block records of BBA I have increased to 85 (10.7%) blocks during BBA II. This bottomland forest species was confirmed nesting in 30 (35%) of BBA II blocks and was confirmed nesting in seven blocks during the first atlas. During the second atlas, it was documented with probable nesting evidence in 21 (25%) blocks and possible nesting evidence in 34 (40%) blocks. Probably because this species is area sensitive and because a high percentage of large bottomland forest tracts are publicly owned, 50 (82%) blocks with nesting data were habitat blocks. These data compare well to the first atlas, when 80% of records came from priority blocks.

The distribution of this species has significantly changed since the first atlas. During BBA I, all confirmed nesting occurred in northeastern Iowa along the Mississippi River, on the Wapsipinicon River (Sweet Marsh WMA), and on the Cedar River (Dudgeon Lake WMA). During BBA II, nesting distribution has especially expanded to southern Iowa and to more western counties. In south-central Iowa, Red-shouldered Hawks were confirmed nesting nine blocks, all associated with the Chariton River. This raptor also was confirmed nesting in two blocks in Decatur County, at Dekalb WMA, and at Sand Creek WMA (the most western record). In central and north-central Iowa, new watersheds with confirmed nesting included Des Moines, Raccoon, and Iowa rivers. A similar trend has been observed in Illinois, where Red-shouldered Hawk returned as a nesting species to parts of its former range during the 1980s and 1990s, and consequently was upgraded from state Endangered to Threatened status (Kleen et al. 2004). The BBS data for the central United States indicate that Red-shouldered Hawk increased at an average annual rate of 4.5% from 2001 to 2011 (Sauer et al. 2012).

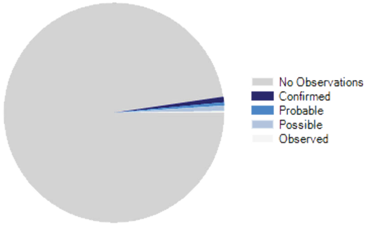
Because Red-shouldered Hawks are territorial and quite vocal, they are most easily detected early in the nesting season (March) and later (June-July), when young are fledging. While nests are not easily found, vocal fledglings are. Conversely, this species becomes quiet and secretive during incubation (especially from mid-April to mid-May); so it is likely this species was missed by atlassers in some blocks during this time frame.

One of the largest threats to this area-sensitive buteo is the breaking up of large contiguous forest into smaller blocks of forest (Dykstra et al. 2008). As forest blocks become more fragmented, they become more suitable habitat for the larger and more aggressive Great Horned Owl and Red-tailed Hawk, both competitors of the Red-shouldered Hawk (Bednarz and J. J. Dinsmore 1981, 1982). Even-aged forest management practices can render habitat unsuitable for nesting Red-shouldered Hawks, and selective cutting that decreases canopy closure below 70% may result in the replacement of Red-shouldered Hawks by Red-tailed Hawks (Bryant 1986). Selective thinning of forest appears to favor Great Horned Owls in Wisconsin, reducing numbers of Red-shouldered Hawks in that state (Jacobs and Jacobs 2002, Jacobs 2006).

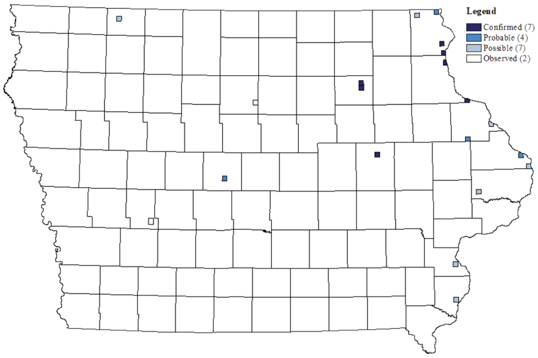
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	1	1	2
Possible	1	6	7
Probable	1	3	4
Confirmed	1	6	7
Conf & Prob	0.40%	2.30%	1.30%

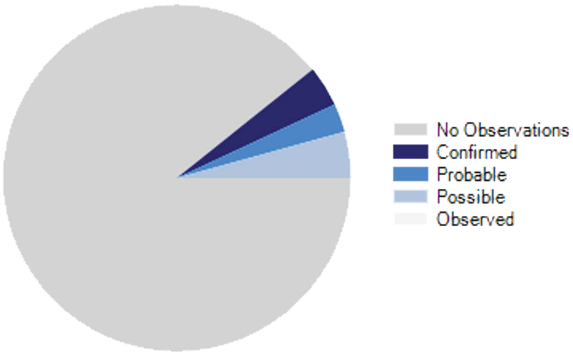
BBA I Results



BBA I



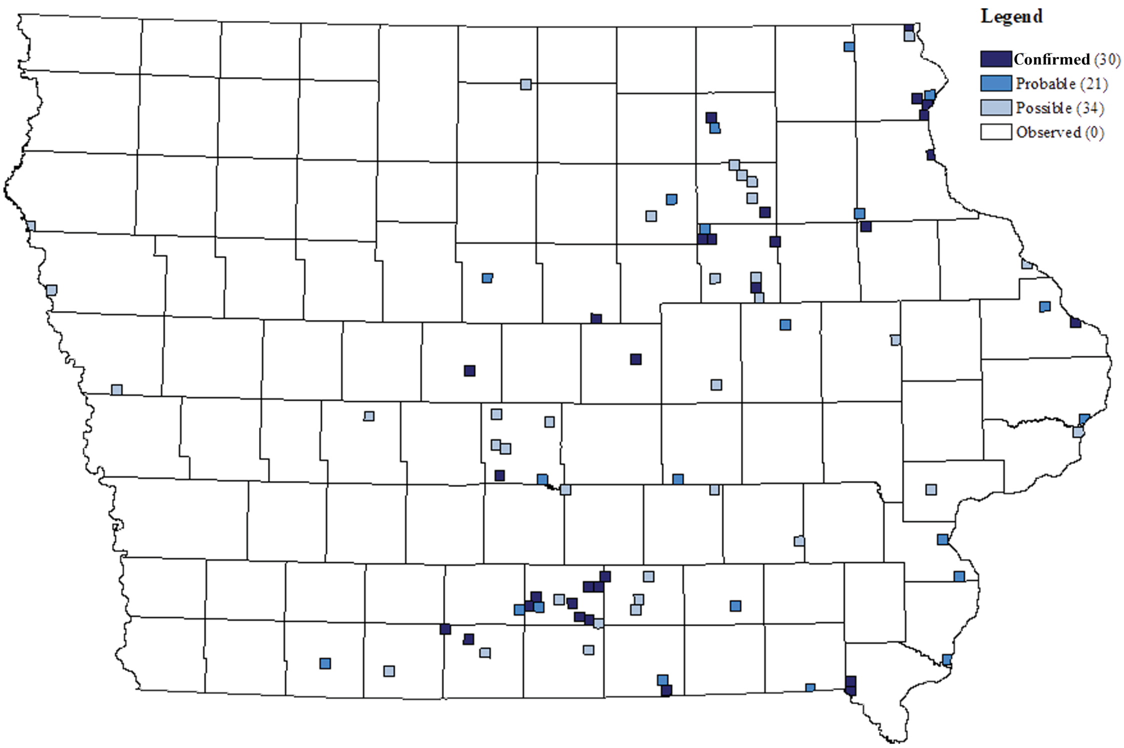
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	9	25	34
Probable	2	19	21
Confirmed	4	26	30
Conf & Prob	1.10%	11.30%	5.90%

BBA II



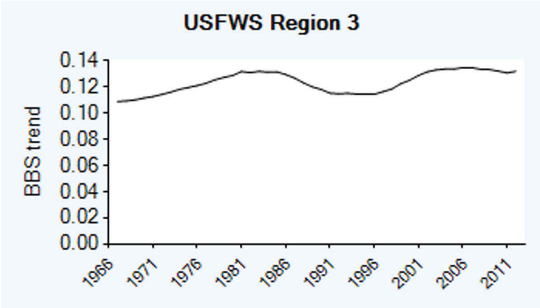
Sponsored by Gregory Stempien

© Jim Mason

Habitat	Nests especially in large upland deciduous forests; often near water
Breeding Dates	25 Apr (PR)–10 Aug (PR)
Nest Type	15–17 in. diameter platform of sticks and twigs, 24–40 ft. up; often close to trunk in crotch of several branches and sometimes atop old squirrel or crow nest
Clutch Size	1–4 eggs (usually 2–3 eggs)
Incubation	28–32 days
Fledging	35–42 days
Status	Regular but uncommon nesting species
BBS Trend	Stable (trend = 1.4, 95% CI is 0.0, 2.4) [Central US]

Patterns since BBA I

The Broad-winged Hawk has been known to nest in much of Iowa in the past, although it was most commonly found in the larger forests of eastern Iowa (Kent and Dinsmore 1996). This species was found in 30 (4%) of the blocks during BBA I, increasing to 79 (10%) of the blocks during BBA II. While this upland forest species was confirmed nesting in 15 (19%) blocks during the second atlas, it was confirmed nesting in just one block during BBA I. During BBA II, probable nesting evidence occurred in 35 (44%) blocks and possible nesting evidence in 27 (34%) blocks. Like the Red-shouldered Hawk, this species is area sensitive and seems to be found most often in the larger publicly owned forest tracts. Consequently, 82% of BBA II record blocks and 90% of BBA I record blocks were those holding public land.



The overall distribution of this species did not significantly change since the first atlas, although there were a higher proportion of records from southern Iowa during BBA II than BBA I. Similar for both atlases, most records for this species are associated with mature forests associated with riparian corridors. In particular, seven (47%) blocks with confirmed nesting were associated with the Des Moines River. On the other hand, there were no confirmed nests in blocks associated with the Mississippi River, where this species might be more expected. This result may be more related to effort than a difference in habitat. Fremont County was the only county with a confirmed Broad-winged Hawk nest in both atlases, and it is anticipated that this buteo will become more prevalent in forests of the Loess Hills in the future.

Illinois BBA data for Broad-winged Hawk were similar to Iowa's, with 84 total records and 19 confirmed breeding records (Kleen et al. 2004). The other trend seen in Illinois, similar to Iowa, is that breeding evidence for this buteo was found throughout the state wherever adequate habitat still exists. Regarding favored habitat for this species, Broad-winged Hawks typically use younger forests with more openings than do nesting Red-shouldered Hawks (Crocoll and Parker 1989). In Minnesota and Wisconsin, broad-wings use managed forests, especially oak (*Quercus*) and aspen (*Populus*) stands 35–50 years old that are dominated by northern red oak (Keran 1978). Rosenfield (1984) estimated that breeding density in Minnesota was one pair/2.4 km^2. While not highly significant, BBS data for the central United States indicate that Broad-winged Hawk increased at an annual rate of 2% from 2001 to 2011 (Sauer et al. 2012).

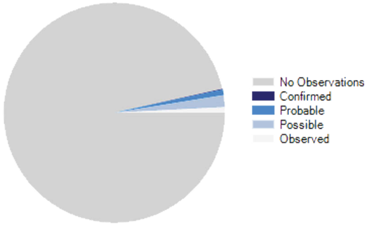
Because the Broad-winged Hawk often nests deep within the forest, its nests are difficult to find. For this reason, more than twice as many records were at the probable category than confirmed. Agitated or territorial adults were apparent but tracking an adult to its nest is not so easily done. This species often nests deep within the forest and can go undetected unless spotted soaring above the tree canopy or the atlasser can recognize its plaintive monotone whistle. Like other forest nesting species, Broad-winged Hawks become quiet and secretive during incubation, so it is possible this species was more prevalent than atlas records indicate. Since breeding Broad-winged Hawks appear to use mostly large, continuous forest (Goodrich et al. 2014), Iowa's best strategy for assuring presence of nesting habitat for this species in the future should be retain and enhance forested riparian corridors.

 By Bruce L. Ehresman

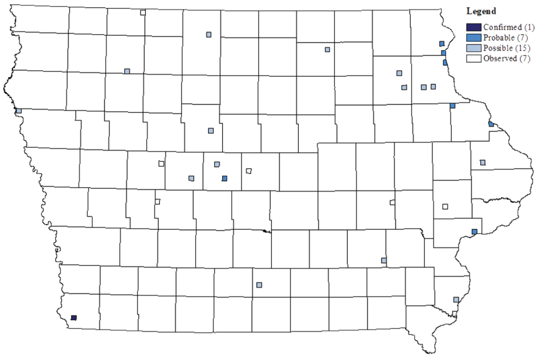
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	7	7
Possible	3	12	15
Probable	0	7	7
Confirmed	0	1	1
Conf & Prob	0.00%	2.00%	0.90%

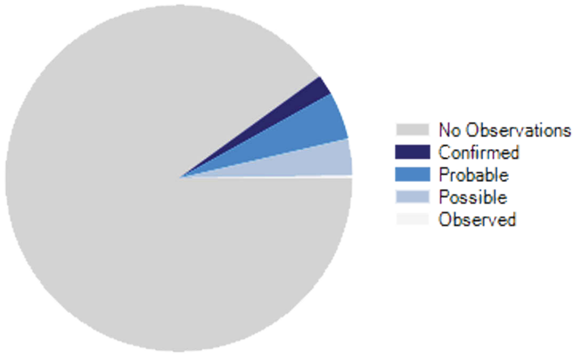
BBA I Results



BBA I



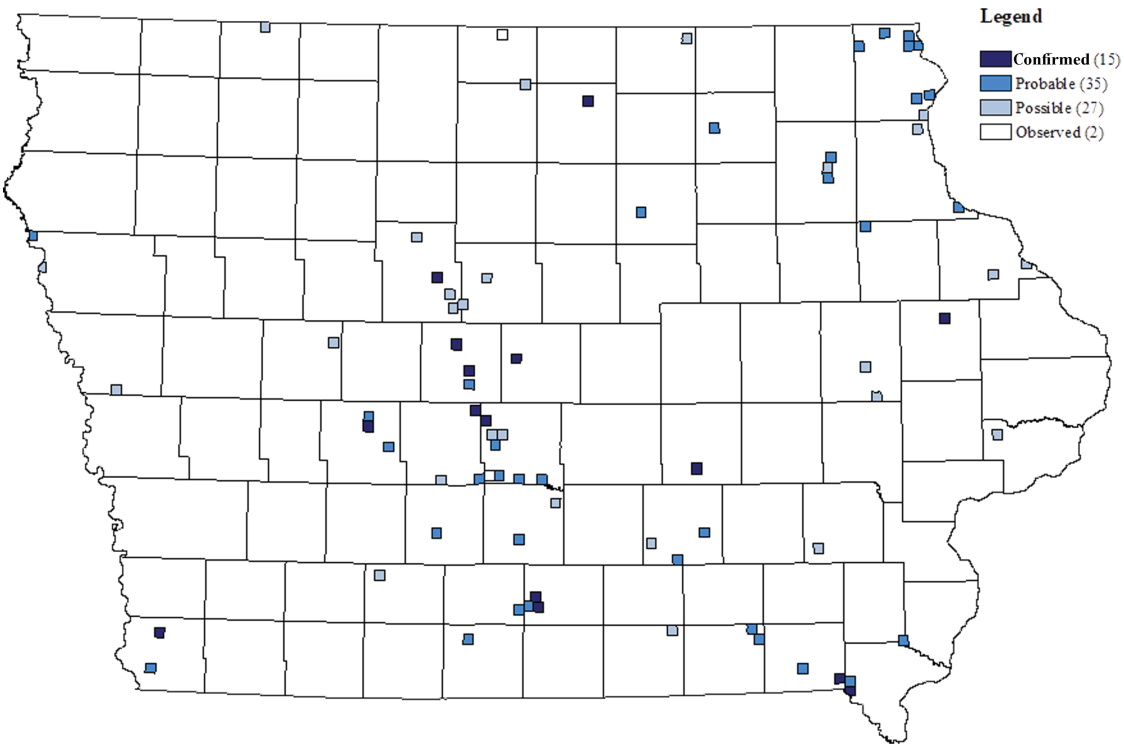
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	2	2
Possible	6	21	27
Probable	6	29	35
Confirmed	4	11	15
Conf & Prob	1.90%	10.00%	5.80%

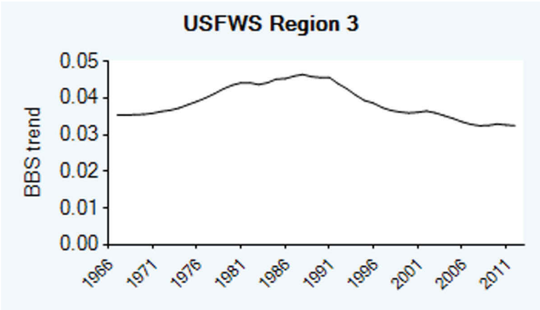
BBA II



Habitat	Nests in savannas; grassland with scattered groves of trees
Breeding Dates	22 Jun (PR)–22 Jun (PR)
Nest Type	Flimsy stick and twig nest ~3 ft. diameter, often near top of tree away from trunk; often in cottonwood
Clutch Size	2–3 eggs
Incubation	34–35 days
Fledging	38–46 days
Status	Rare nesting species
BBS Trend	Stable (trend = 0.4, 95% CI is −0.1, 0.8) [Central US]

Patterns since BBA I

The Swainson's Hawk is a raptor of the prairie and savanna in northern and western Iowa and was known to nest in 13 counties from 1960–1989 (Roosa and Stravers 1989). This species was found in 23 (3%) of the blocks during BBA I, while records were documented in only nine (1%) of the blocks during BBA II. While this hawk was confirmed nesting in two blocks during BBA I, no confirmed nests were documented during BBA II. The highest level of nesting was one probable nesting record in Hancock County, where an adult was observed defending its territory, which included a few acres of mixed woodland containing bur oaks (*Quercus macrocarpa*) and cottonwoods (*Populus deltoides*) within a rolling grassland landscape. Possible nesting records were documented in Lyon (two blocks) and one block record each in Greene, Wright, Chickasaw, and Fayette counties. This species does not appear to be area sensitive, and it was found nearly equally in grid blocks (five records) as it was in habitat blocks (four records).



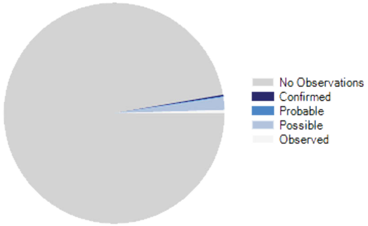
The distribution of this species did not significantly change since the first atlas, although there were few records from which to draw conclusions. When data are combined for both atlases, the blocks where nesting evidence was documented align quite well with the counties where Swainson's Hawk was documented nesting from 1960–1995, as shown in a diagram by Kent and Dinsmore (1996). Because Swainson's Hawk is easily identified and is a species of open country, its presence, during the atlas, was probably not often missed. The BBS data from eastern United States indicate this buteo is declining (Sauer et al. 2012), and since Iowa is on the eastern edge of its range, that declining trend likely also applies to Iowa. Kleen et al. (2004) report that a small population of this Illinois Endangered hawk exists in the northeastern corner of the state, where all six atlas records were found and where confirmed nesting was reported in two of those blocks. Missouri, another state on the eastern edge of this hawk's range, reports that there are perhaps as many as five to ten nesting pairs in southwestern areas of the state each year (Jacobs and Wilson 1997).

It does not bode well for the future of Swainson's Hawks in Iowa that the current rate of land conversion of grassland to row crop agriculture has not been witnessed since before the Dust Bowl in the 1930s (Wright and Wimberly 2013). Gilmer and Stewart (1984) noted that in North Dakota, 75.4% of an area located within one kilometer of nests was either pasture or hayfield, and they noted that only two of twenty-seven pairs nested where more than 60% of that area was cultivated crops. During the breeding season, the major rodent prey for Swainson's Hawk includes ground squirrels, pocket gophers, voles, and deer mice (Bent 1937). As Iowa's grassland disappears, fewer of these species will be available as food items, and there is evidence in other parts of this bird's range that reproduction of the Swainson's Hawk has dropped following a decline in its main prey species (Bechard et al. 2010). As is true for so many other grassland associated birds, the future breeding status of this species in Iowa is dependent on how much effort is put into restoring and maintaining the upland grassland and savanna habitats on which this prairie hawk depends.

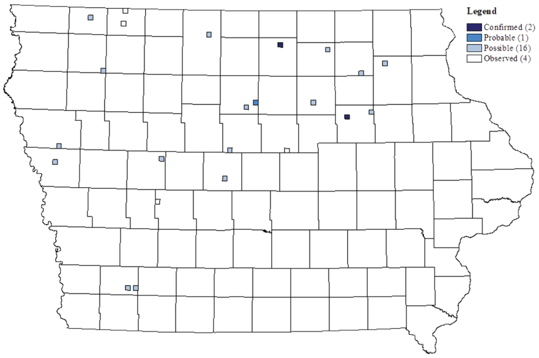
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	2	2	4
Possible	5	11	16
Probable	1	0	1
Confirmed	0	2	2
Conf & Prob	0.20%	0.50%	0.30%

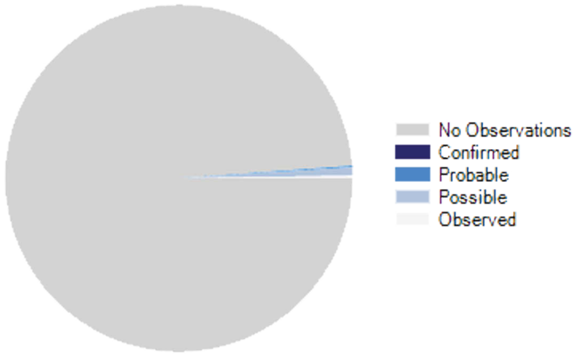
BBA I Results



BBA I



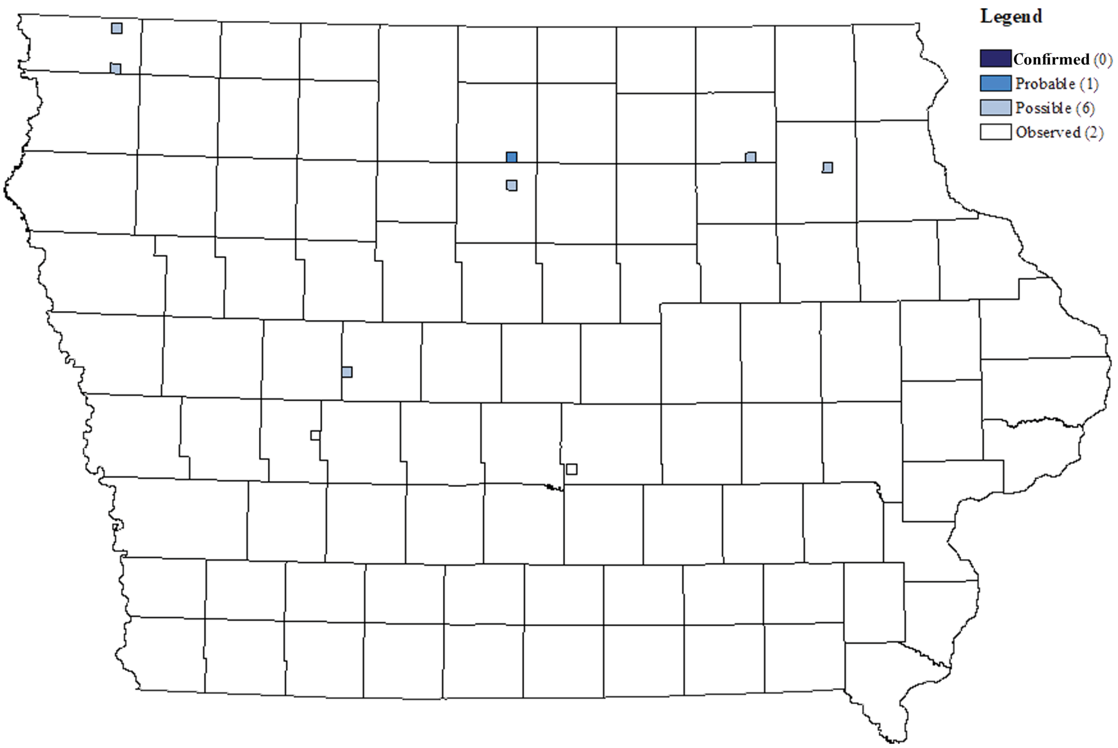
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	1	1	2
Possible	3	3	6
Probable	1	0	1
Confirmed	0	0	0
Conf & Prob	0.20%	0.00%	0.10%

BBA II



In Honor of Marlene Fern Ehresman
(Bruce Ehresman)

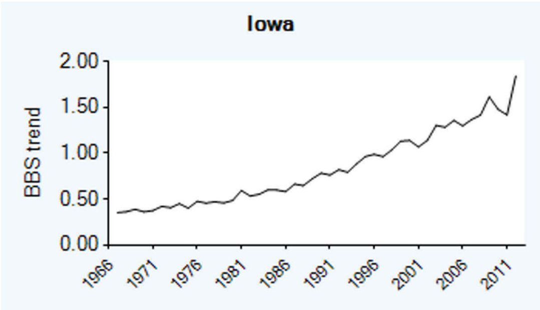
Red-tailed Hawk *Buteo jamaicensis*

© Linda Petersen

Habitat	Nests in variety of habitats; in Iowa especially nests in woodlands or scattered groves of trees associated with grassland
Breeding Dates	13 Feb (CO)–27 Aug (PR)
Nest Type	Substantial stick nest up to 3 ft. diameter and +1 ft. deep, often near the top of the tree away from the trunk; may re-use same nest
Clutch Size	Usually 2–3 eggs
Incubation	28–32 days
Fledging	42–46 days
Status	Most common nesting Iowa raptor species
BBS Trend	Increasing (trend = 4.2, 95% CI is 2.8, 5.5) [Iowa]

Patterns since BBA I

The Red-tailed Hawk is the most common and most widespread nesting raptor in Iowa. As testament to that statement, this diurnal raptor was documented in 760 (96.1%) of BBA II blocks, inhabiting almost every block in the state except for the northwestern corner, where as much as 95% of the groundcover, in each nine square mile block, was corn and soybean crops. During BBA I, this species was found in 598 (69.5%) of the blocks. For this habitat generalist species, there was little difference between nesting evidence in habitat (51%) and grid (49%) blocks. The high rate of confirmation (49.2%) can be related to the abundance of this raptor's nests and how easily the nests are seen. During 2012, adult pairs were building nests in late January, several months before the leaf-out of trees made spotting the nests more difficult.



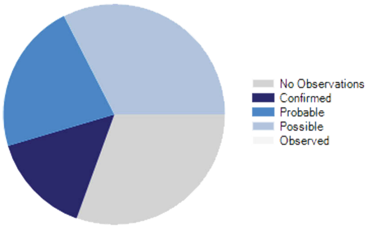
The distribution of Red-tailed Hawk changed little since the first atlas, but the number of blocks with confirmed nesting increased from 128 to 374, a 66% increase. The proportion of blocks with confirmed nesting was especially noted in southern Iowa, where a higher percentage of grassland habitat exists. Numerous blocks were noted to contain more than one active nest (Ehresman pers. obs.). Most noteworthy was a block near Essex in northern Page County in which three active nests were documented on 28 March 2011. The two closest nests were about 0.8 mile apart. All three nests were 35 to 50 feet up on branches of cottonwood (Populus deltoides) trees, and all three nests were located within an area of three square miles. On 26 March 2010, while traveling on Interstate 35 between Ames and the Missouri border, six inactive and 23 active Red-tailed Hawk nests were identified, several of which fell within the boundaries of atlas blocks (B. and M. Ehresman pers. obs.). In southeastern Wisconsin, Petersen (1979) found that nesting Red-tailed Hawks have an average nesting density of one pair per 1.8 square miles.

Populations of Red-tailed Hawks have increased throughout much of North America during the mid-to-late twentieth century. The BBS data for Iowa from 2001 to 2011 show a 4.2% annual increase (Sauer et al. 2012). This species is tolerant of urban development and agricultural development if the converted landscape holds adequate prey and trees and other structures to act as hunting perches and nest sites (Preston and Beane 2009). This species does successfully breed in towns and even large cities, especially those that contain wooded greenbelts and forested riparian corridors. In Wisconsin, cottontails made up about 38% of the biomass of a red-tailed's spring diet, and that percentage increased to 44% during winter (Petersen 1979). Considering the abundance of cottontails in urban environments, it is not difficult to see why this effective cottontail predator is moving into urban environments. Not surprisingly, Red-tailed Hawk was confirmed nesting in many Iowa urban atlas blocks. In a state that is known for being the most altered from its original landcover, apparently Red-tailed Hawks are adapting well to these changes.

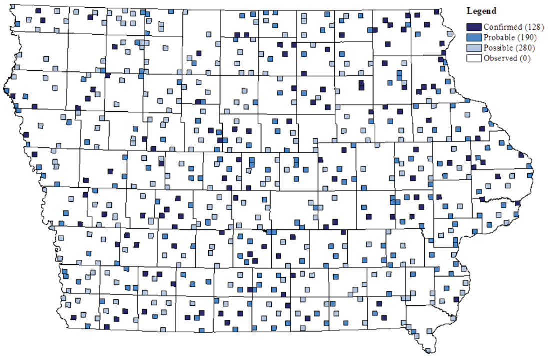
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	141	139	280
Probable	79	111	190
Confirmed	53	75	128
Conf & Prob	25.30%	46.60%	36.90%

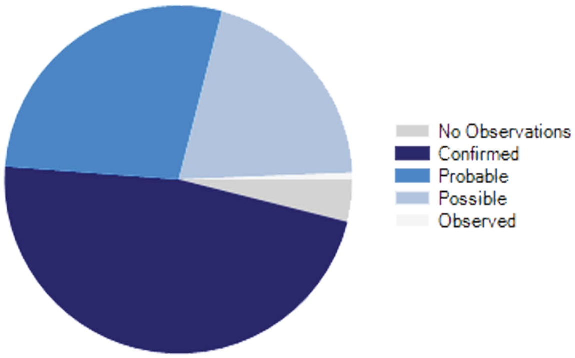
BBA I Results



BBA I



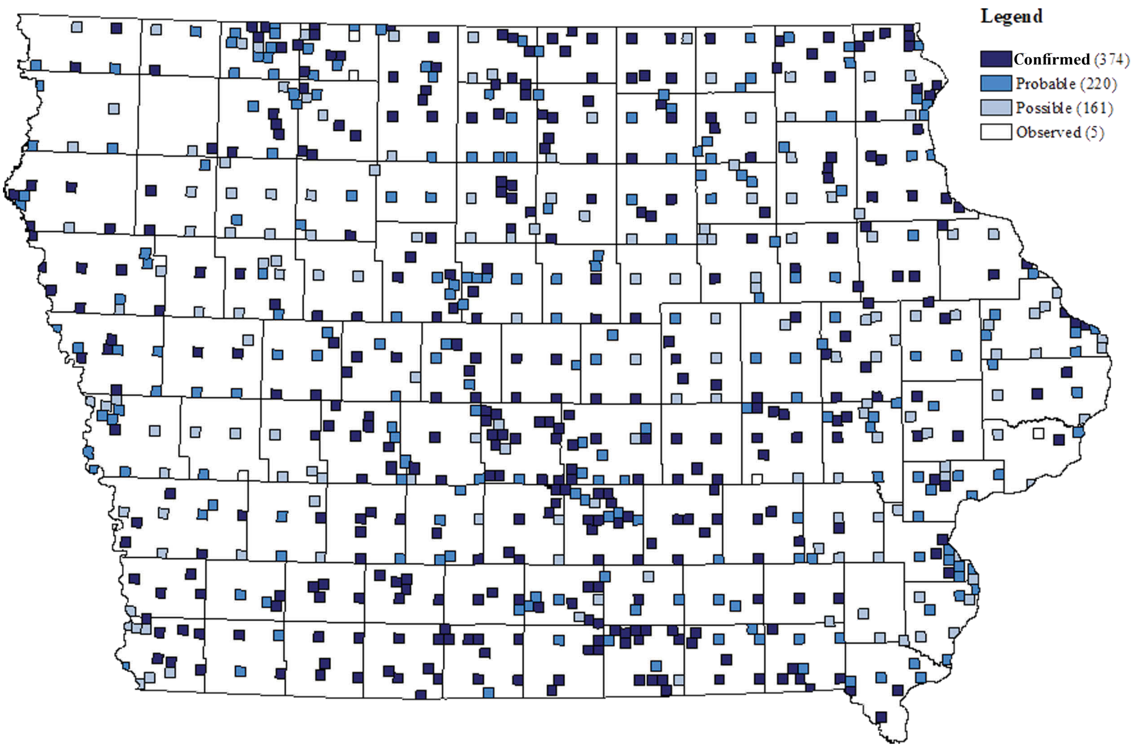
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	5	0	5
Possible	98	64	162
Probable	100	120	220
Confirmed	169	205	374
Conf & Prob	51.50%	81.50%	69.00%

BBA II



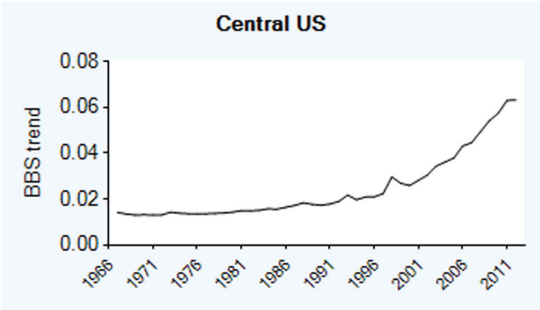
Sponsored by Prairie Rapids Audubon Society

© Bruce Ehresman

Habitat	Savanna; grasslands and meadows near large hollow trees, barns, and outbuildings
Breeding Dates	12 May (CO)–15 Aug (CO)
Nest Type	In tree cavity; nest box; or on ledges, platforms, and hay bales inside barns; hole in loess cut-bank
Clutch Size	3–11 eggs (typically 5–7 eggs)
Incubation	30–34 days
Fledging	49–56 days
Status	Rare nester
BBS Trend	Increasing (trend = 4.2, 95% CI is 0.7, 9.1) [Central US]

Patterns since BBA I

The Barn Owl is an Iowa Endangered species, and it is found chiefly in the southern half of the state where grassland and savanna habitats exist. This owl was detected in only nine (1.1%) blocks, eight of which were habitat blocks. Nesting was confirmed in three (33.3%) of the blocks: a nest with young in a barn in Washington County, a nest with eggs under a bridge in Lucas County, and fledgling young found at Honey Creek State Park in Appanoose County. Statewide, there were 21 confirmed Barn Owl nests during the atlas, 18 of which occurred at sites outside of blocks. Confirmed nesting outside of blocks (but during the atlas period) occurred at sites in the following 12 counties: Carroll, Clarke, Crawford, Decatur, Greene, Ida, Lucas, Marion, Taylor, Wapello, Wayne, and Van Buren. Barn owl nest sites in Iowa include barns, corn cribs, silos, tree cavities, abandoned houses, farm buildings, church belfries, grain elevator buildings, a deer blind, a hole in a loess soil cut-bank, and nest boxes placed on or in buildings (Iowa DNR unpublished).



Data for the Barn Owl from the Illinois BBA showed similar results to Iowa's. This owl was documented in just four blocks and was confirmed nesting in one block; with all records from the southern half of the state in priority blocks in four different counties (Kleen et al. 2004). Similarly, the Missouri BBA totaled 11 Barn Owl records from >1% of all blocks, with three confirmed records, all in the southern portion of the state (Jacobs and Wilson 1997).

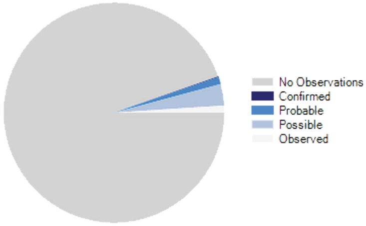
Except for a slight decline in records from northeastern Iowa, it appears that Barn Owl distribution changed little since BBA I. Most Iowa records are reported from southern Iowa, as was documented during the first atlas (Jackson et al. 1996). While there were 46 total records in BBA I blocks and 80% more records during the first atlas than the second, it is believed that many of those records were related to a DNR Barn Owl release program that occurred from 1983–1987. Because of this owl's propensity to roost and nest in buildings, this species is reported much more frequently than other similarly rare species.

The increased number of Iowa confirmed nests for this species in recent years may be related to the amount of CRP grasslands that exist in the state (Walk et al. 2010a), especially in southern Iowa. Even though about 376,000 acres of Iowa grassland habitat was converted to row-crop agriculture from 2006 to 2011 (Wright and Wimberly 2013), Iowa has averaged, during the last ten years, at least four Barn Owl nests per year with breeding dates 10 April–19 November (Iowa DNR unpublished). While the Barn Owl is considered area sensitive in Wisconsin and may require grassland landscapes larger than 250 acres (Sample and Mossman 1997), Iowa's Barn Owls may not be impacted by grassland fragmentation as much as other more area sensitive species like Short-eared Owl and Northern Harrier. A warming climate is another factor that might be favoring the Barn Owl (Walk et al. 2010a; S. Matteson pers. comm.), particularly since this species is at the northern end of its range in Iowa, Illinois, and Wisconsin. Adding grassland habitat in larger blocks, managing those grasslands to encourage and retain dense ground cover for voles (the favored Barn Owl food source), and protecting and enhancing current Barn Owl nest sites will ensure that future generations of Iowans can enjoy the presence of this unique owl, too.

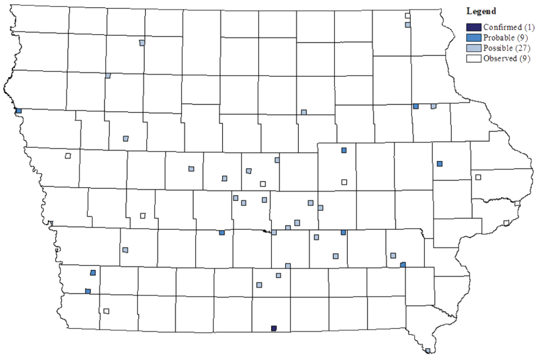
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	4	5	9
Possible	12	15	27
Probable	3	6	9
Confirmed	0	1	1
Conf & Prob	0.60%	1.80%	1.20%

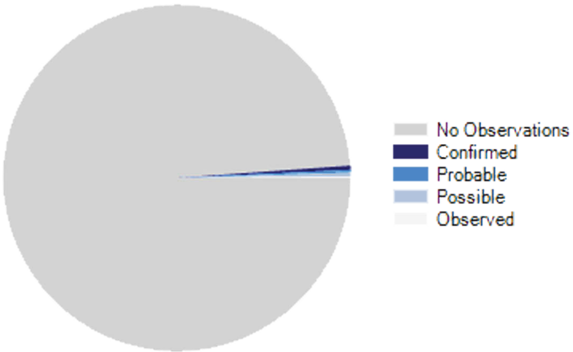
BBA I Results



BBA I



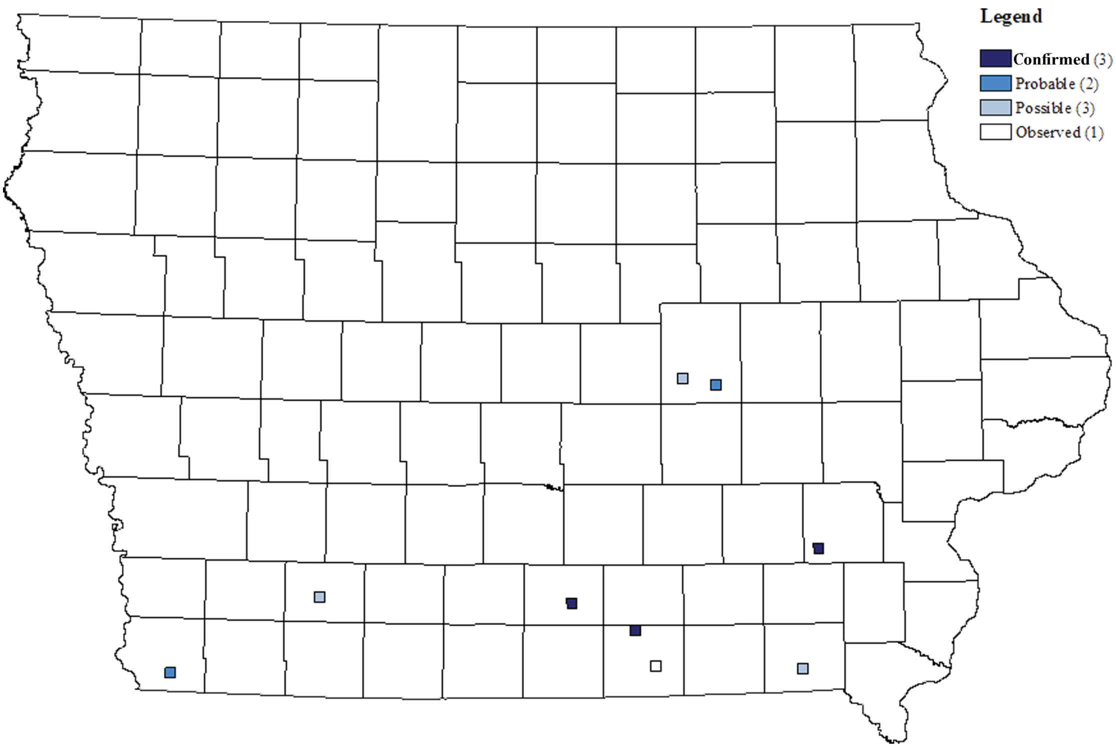
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	1	1
Possible	1	2	3
Probable	0	2	2
Confirmed	0	3	3
Conf & Prob	0.00%	1.30%	0.60%

BBA II



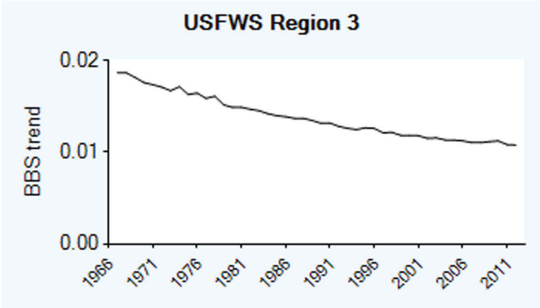
In Honor of Bruce Ehresman (Stephanie Shepherd)

© James Scheib

Habitat	Riparian woodland, deciduous woods, towns, parks
Breeding Dates	11 Apr (CO)–23 Aug (CO)
Nest Type	Usually in tree cavity, and will use nest boxes; may line nest with feathers and available debris
Clutch Size	2–8 eggs (usually 4–5 eggs)
Incubation	27–35 days
Fledging	28–32 days
Status	Fairly common nester and permanent resident
BBS Trend	Stable (trend = −1.3, 95% CI is −4.0, 0.5) [Central US]

Patterns since BBA I

The Eastern Screech-Owl is a permanent resident that has been found throughout the state in the past. While this owl was detected in 211 (25%) blocks during the first atlas, it was detected in only 65 (8%) blocks during the second atlas. Even though 74 more blocks were visited during the second atlas, this small owl was found in 69% fewer blocks during the second atlas than the first. The rate of nesting confirmation was similar for both atlases, with nesting confirmed in 22% of BBA I blocks and 28% of BBA II blocks. While screech-owls were found more in priority (58%) blocks than grid (48%) blocks during BBA I, it was especially found in habitat (71%) blocks during BBA II. The fact that there were substantially fewer records, during BBA II (than during BBA I) and that most of those records occurred on blocks containing public land, may reflect decreasing habitat on private land for this species. With too few BBS records to detect a trend for Eastern Screech-Owl, it is difficult to know for sure what is happening to Iowa's population. Illinois and Missouri BBA results were both more similar to Iowa's first atlas results. Eastern Screech-Owls were found in 31% of Illinois atlas blocks (Kleen et al. 2004) and in 31% of Missouri atlas blocks (Jacobs and Wilson 1997). The detection rate was much higher in the Indiana BBA, where this species was found in 61% of all blocks (Castrale et al. 1998).



There was some apparent change in distribution for the screech-owl since Iowa's first atlas. For instance, there was a total lack of detection exhibited in much of western Iowa during BBA II. Similarly, there were no screech-owl records for a large portion of eastern Iowa, particularly on long stretches of the Wapsipinicon, Cedar, and Iowa rivers; the same areas where there were records for this species during the first atlas. During BBA I, Eastern Screech-Owls were detected in 81 counties, while they were found in just 40 counties during BBA II. Perhaps not surprisingly, almost all records found in the second atlas were associated with fourth (or higher) order streams, where riparian woodland habitat still exists.

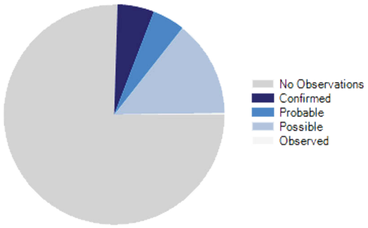
For the most part, the small size and cryptic coloration of the Eastern Screech-Owl help it to not be easily detected. This may be the main reason that so few records of this owl were collected during the daytime. This species is vocal during nesting season, however, especially in defense of its young. The presence of young can elicit aggressive behavior, and adults often attack intruders that come too close to the nest or to fledglings. Fledgling young also are quite vocal. Overall, a significant proportion (28%) of all block records were of confirmed nesting, and most of these records were recently fledged young. Probable nesting records made up 19% of all reports, and 58% of records were listed as possible nesting. Many records of detection came about because of atlassers playing screech-owl calls, since this species readily responds to defend its territory against perceived intruders.

A very limiting factor for this owl is whether it can find a suitable nest site, either a cavity in a tree or perhaps a nest box (Belthoff and Ritchison 1990). Creating secure nesting sites helps, and a most important action to support this species is conserving and maintaining woodland habitat, particularly on Iowa's riparian corridors.

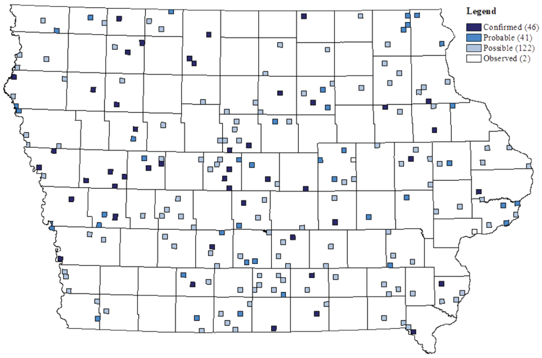
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	1	1	2
Possible	54	68	122
Probable	14	27	41
Confirmed	19	27	46
Conf & Prob	6.30%	13.50%	10.10%

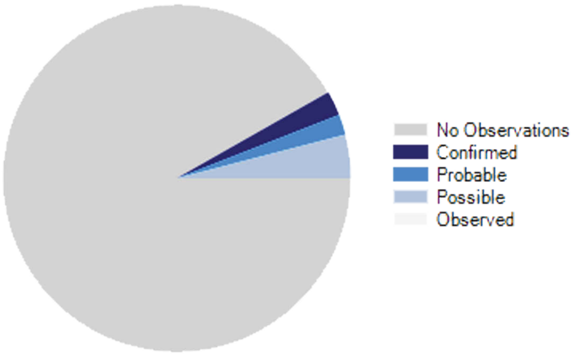
BBA I Results



BBA I



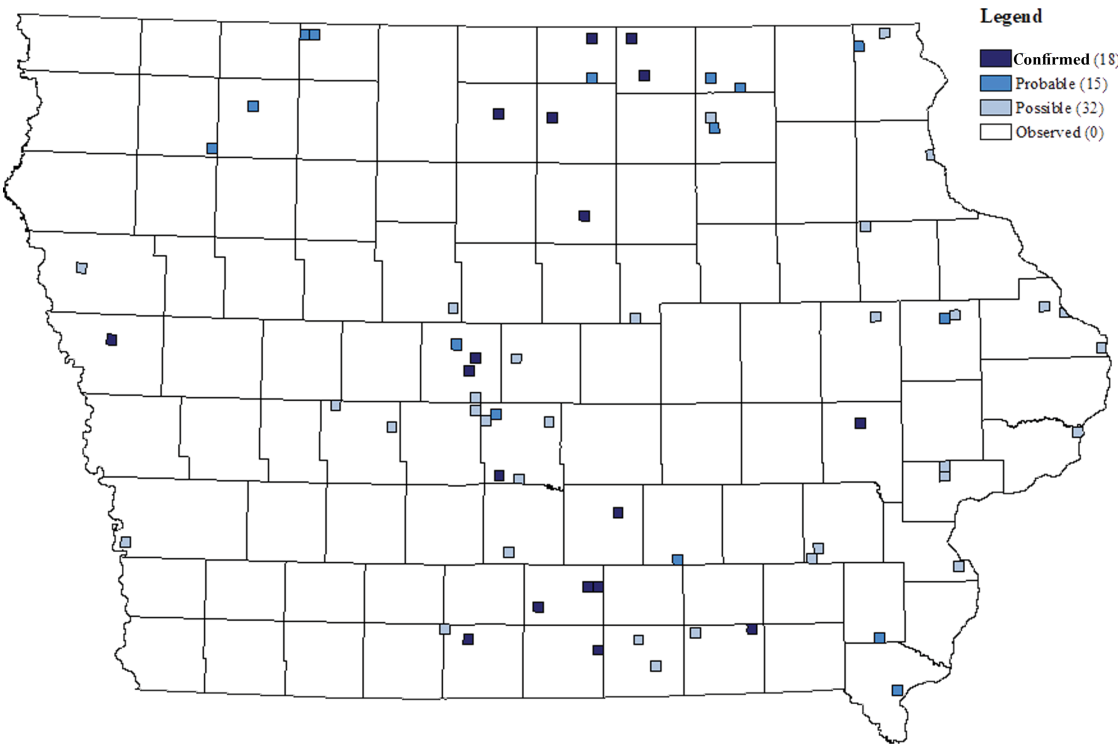
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	10	22	32
Probable	5	10	15
Confirmed	4	14	18
Conf & Prob	1.70%	6.00%	3.80%

BBA II

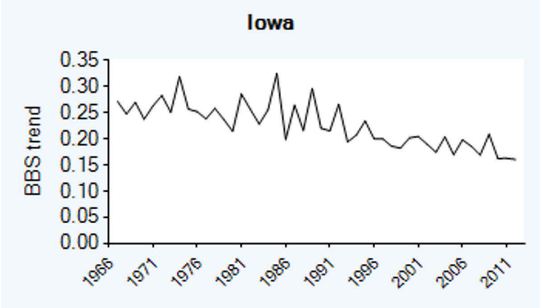


© Kip Ladage

Habitat	Woodland edge, open areas with woodlots, urban parks
Breeding Dates	20 Jan (PR)–12 Aug (CO)
Nest Type	Large cavity in tree or broken off tree-top, but often uses abandoned stick nest of Red-tailed Hawk and Bald Eagle; may line with feathers and down
Clutch Size	2–3 eggs
Incubation	26–35 days
Fledging	~35 days
Status	Common nester and permanent resident
BBS Trend	Stable (trend = –0.9, 95% CI is –3.6, 1.4) [Iowa]

Patterns since BBA I

The Great Horned Owl is a permanent Iowa resident that, in the past, has been found nesting statewide. This species traditionally has required little habitat in which to exist; partly because it eats a wide range of prey species, from mice to rabbits to striped skunks. This largest Iowa nesting owl was found in 420 (49%) of BBA I blocks, while it was found in just 229 (29%) of BBA II blocks. Even though 74 more blocks were visited during the second atlas, this owl was found in 45% fewer blocks overall. During both atlases this owl was found predominately in blocks with public land. The horned owl was found in far more blocks than any other owl during the first atlas, and Barred Owl was found in the most blocks during BBA II. While there were fewer atlas records found recently, Iowa BBS data from 2001–2011 indicate a somewhat stable population trend for Great Horned Owl (Sauer et al. 2012). Illinois and Missouri BBA results were both similar to Iowa's first atlas results. Great Horned Owls were found in 40% of Illinois atlas blocks (Kleen et al. 2004) and in 44% of Missouri atlas blocks (Jacobs and Wilson 1997).



Distribution of this species, which is statewide, changed somewhat since the first atlas. The main difference in data collected for the two time periods is that Great Horned Owls were found in all counties in BBA I, and during BBA II there were many areas where there were no occurrence records for this species. For instance, in western Iowa, no records were documented in the following counties: Osceola, Sioux, Humboldt, Ida, Crawford, Shelby, Cass, Montgomery, and Page. In eastern Iowa, no records were found within blocks in Fayette, Dubuque, Keokuk, and Washington counties. During the early 2000s, raptor rehabilitators in Iowa documented far more Great Horned Owl deaths from West Nile Virus than any other owl species. While the overall effects of that disease on the larger population are not known, there has been speculation that the disease may have affected local populations.

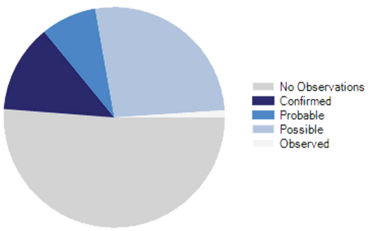
The Great Horned Owl is especially active at dusk and dawn and it is quite vocal. Therefore, this species was, much like the Barred Owl, more easily detected than several other owl species. Nestling and fledgling young also are vocal and visible; and a decent proportion (29%) of all block records were of confirmed nesting (mostly recently fledged young). Many, if not most, of the nest with young reports were young discovered in nests built by Red-tailed Hawks. As an example of this species' propensity to nest in the same location for several years, this owl successfully nested twelve years in-a-row (2009–2020) in dead hollow trees at Brookside Park in Ames, Iowa. Fledging dates ranged from 1 April 2012 to 28 May 2018, with one young fledged in 2018, three young fledged each year in 2010 and 2013, and two young fledged during each of the other nine years (Ehresman pers. obs.). The earliest egg was laid ~20 January at this site.

Because the Great Horned Owl has the most extensive range, the widest prey base, few predators, and the most variable nesting sites of any North American owl (Artuso et al. 2013), its future seems secure. While it is unknown why there were 45% fewer block records for this species during the second atlas than in the first, it will be interesting to see how this adaptable generalist owl species fares in Iowa's industrial farming landscape in the future.

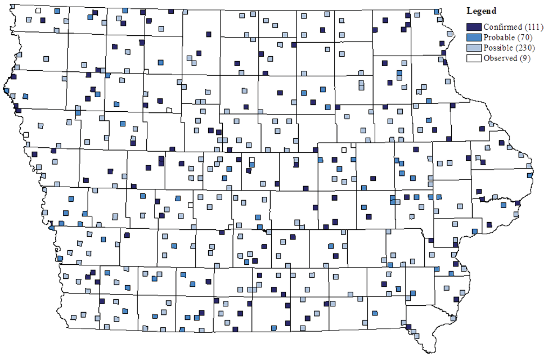
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	4	5	9
Possible	108	122	230
Probable	28	42	70
Confirmed	37	74	111
Conf & Prob	12.50%	29.10%	21.00%

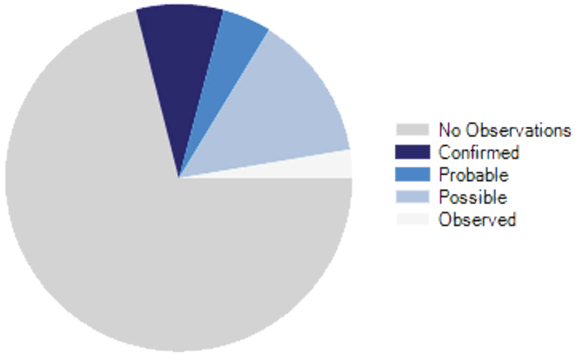
BBA I Results



BBA I



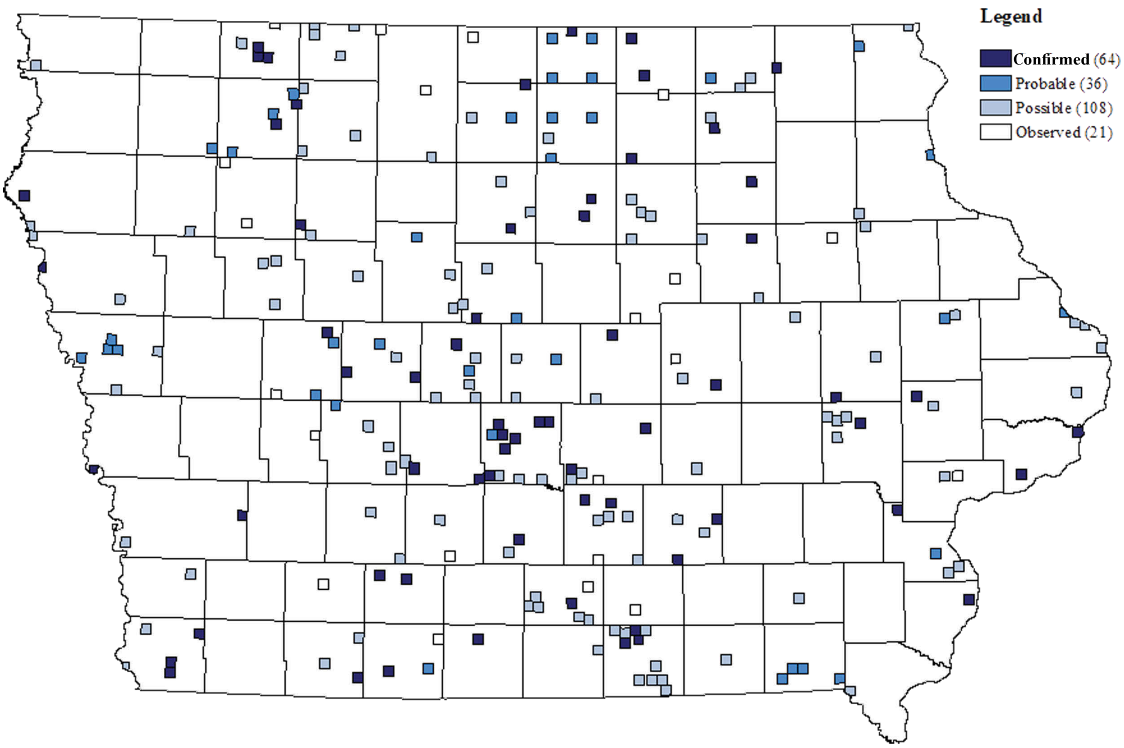
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	11	10	21
Possible	35	73	108
Probable	16	20	36
Confirmed	18	46	64
Conf & Prob	6.50%	16.50%	11.60%

BBA II

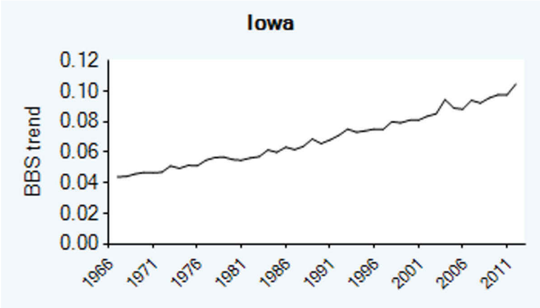


Sponsored by Tara Reiter-Marolf

Habitat	Larger woodlands, especially along river corridors
Breeding Dates	26 Mar (PR)–18 Aug (PR)
Nest Type	Usually large cavity in tree but sometimes uses an abandoned stick nest; typically no nest material added
Clutch Size	1–5 eggs (normally 2–3 eggs)
Incubation	28–33 days
Fledging	28–35 days
Status	Common nester
BBS Trend	Stable (trend = 1.5, 95% CI is –2.0, 5.0) [Iowa]

Patterns since BBA I

The Barred Owl was found nesting statewide, especially along the larger more wooded river corridors. During the first atlas, Barred Owl was detected in 279 (32.4%) blocks, and it was detected in 328 (41.5%) blocks during the second atlas, an increase of detection of 15%. Compared to BBA I, where 37% of the block records were confirmed or probable nesting, 56% of all final records were confirmed or probable during BBA II. Most confirmed nesting records, for both atlases, were recently fledged young. This owl seems somewhat dependent on forest size, and while it can be found nesting in large woodlots, it is more likely to nest in woodlands 40 hectares or larger (Peterjohn and Rice 1991). Habitat blocks tend to contain larger patches of woodland than do grid blocks, and 73% of BBA II records came from habitat blocks. These results were like the first atlas when 67% of reports came from priority blocks. Missouri BBA results were quite similar to Iowa's atlas results, and Barred Owls were found in 39.8% of Missouri atlas blocks (Jacobs and Wilson 1997). In contrast, this owl was found in just 24.3% of Illinois atlas blocks (Kleen et al. 2004). Iowa BBS data, for 2001–2011, indicate a stable population trend for this owl (Sauer et al. 2012).



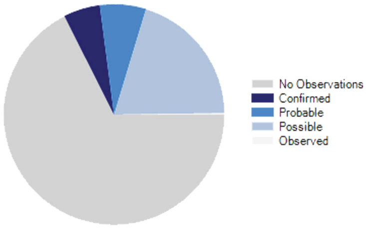
Distribution of this species changed little since the first atlas. There are no records from blocks in Lyon and Osceola counties in the northwestern corner of the state in either atlas, and records in western Iowa are mostly from blocks containing rivers or lakes that are bordered by larger patches of trees. For both atlases, most reports came from forested areas of eastern, central, and south-central Iowa.

The Barred Owl is especially nocturnal, but because it is very vocal, its presence is more easily documented than most other owl species. Nestling and fledgling young are vocal, as well, and a high proportion of nesting confirmation was related to hearing and tracking down these vocal youngsters. Throughout its range, the Barred Owl is found in association with mature and older growth forests, and large, unfragmented forests are preferred (Mazur and James 2000). The fact that Iowa forests have matured since the first atlas and that there has been an increase in forest cover likely increased the amount of suitable habitat for this owl species. Most public forests are now being managed with a 125-year rotation, which also benefits this owl by creating the potential for more nest cavities. During the second atlas, more records were found for Barred Owl than any other owl species, and the status of this species as common seems assured.

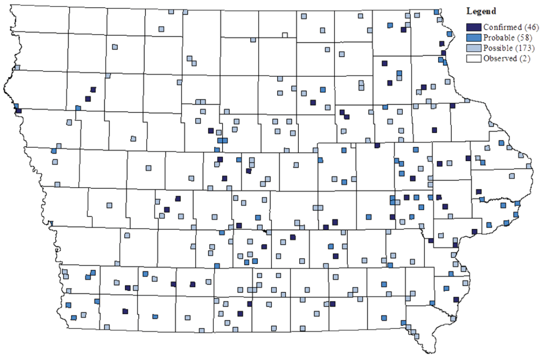
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	1	1	2
Possible	61	112	173
Probable	16	42	58
Confirmed	15	31	46
Conf & Prob	5.90%	18.30%	12.10%

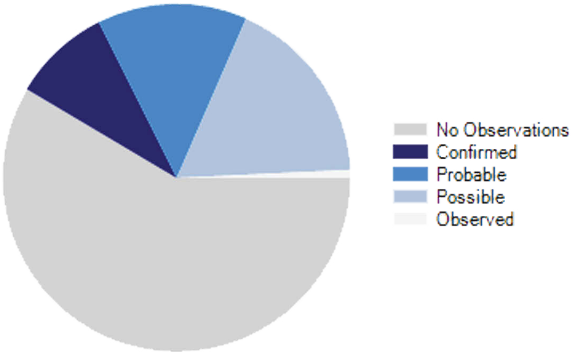
BBA I Results



BBA I



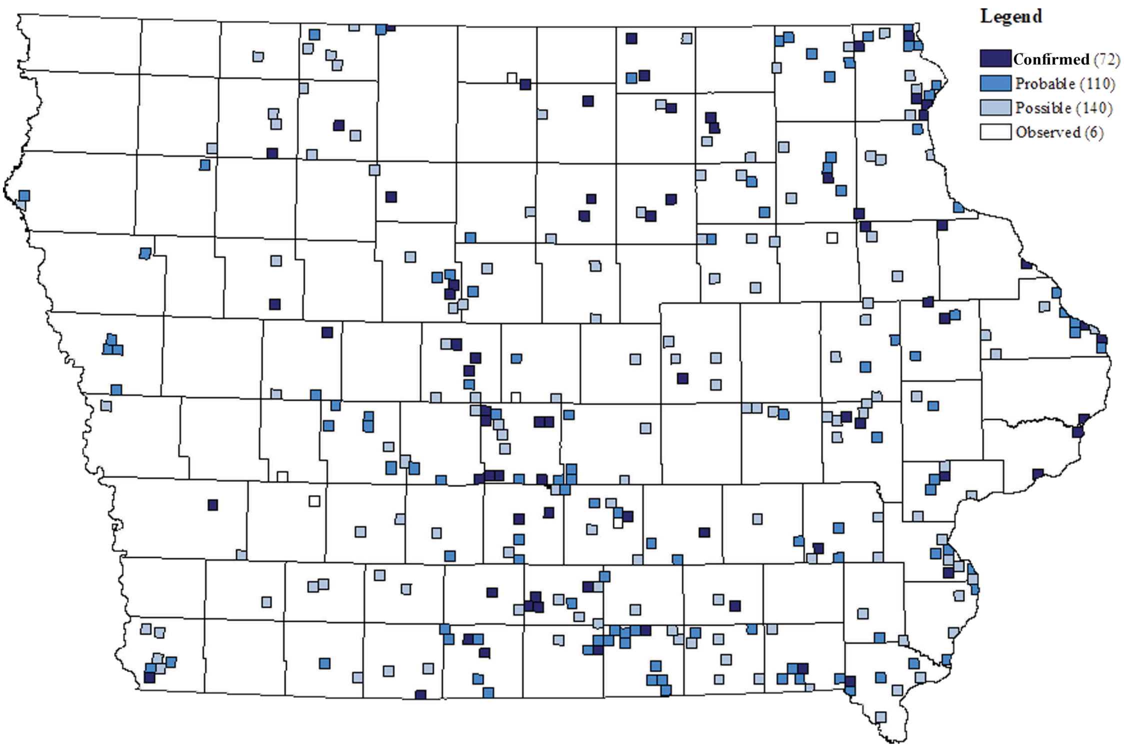
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	4	2	6
Possible	44	96	140
Probable	29	81	110
Confirmed	12	60	72
Conf & Prob	7.90%	35.30%	21.10%

BBA II

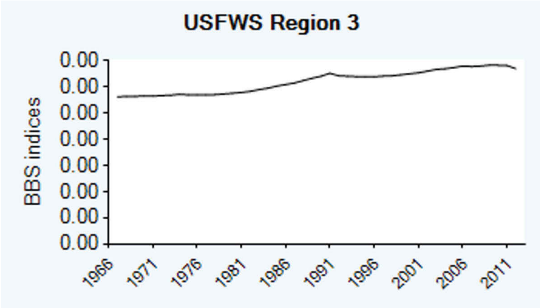


© Elizabeth Partridge Blessington

Habitat	Open woodland edge (especially conifer groves) adjacent to grasslands
Breeding Dates	15 May (PR)–15 May (PR)
Nest Type	Especially in conifer trees, lays eggs in abandoned stick nests of other species like American Crow
Clutch Size	3–8 eggs (normally 4–5 eggs)
Incubation	26–28 days
Fledging	~35 days
Status	Irregular nester
BBS Trend	No Trend Available

Patterns since BBA I

The Long-eared Owl is a state Threatened Species and is rarely found nesting in the state. It was detected in 14 (1.6%) BBA I blocks and only three (0.4%) BBA II blocks. All BBA II reports came from public land in habitat blocks. The highest evidence of nesting was territorial behavior exhibited at Ledges State Park in Boone County where an owl was heard calling on at least two occasions. A single owl (possible nesting status) was noted at Tubaugh WMA in Appanoose County, and a single owl was heard hooting at Backbone State Park in Delaware County. Similarly, during the first atlas, 86% of reports were from public land in priority blocks.



Because there were so few records during BBA II, it is difficult to assess Long-eared Owl distribution changes since the first atlas. There were three confirmed nesting records in blocks during BBA I and 14 records (in 13 counties), and the decreased number of records (in three blocks in three counties) during BBA II is not a good sign for this species. On a positive note, there was one confirmed nest outside a block in Plymouth County on 21 May 2009. There were at least two (~21 days-old) young in a crow nest in a pine tree. Using the age of the young and backdating, egg-laying would have occurred about April 1. Because of this owl's rareness and because it is mostly nocturnal, it is very likely more nests of this species occur than are documented. Long-eared Owls' main nesting range is north of Iowa, so the nest in Plymouth County fits with the expectation for nesting to be in more northerly Iowa habitats. It is likely more nesting occurs in northeastern Iowa, where much more suitable nesting habitat exists.

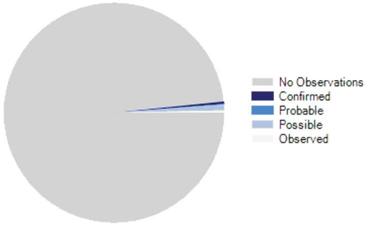
Likely factors influencing Long-eared Owl population numbers include fluctuating prey numbers, high nest predation (Marks 1986), habitat changes (Bloom 1994), and nest-site availability (Marks et al. 1994). This owl especially prefers to nest in used corvid stick nests, particularly in conifer trees. Of 112 nest attempts in Idaho, all sites were corvid stick nests in trees (Marks 1986), and 40 of 48 nest sites in Ontario were in conifers (Peck and James 1983).

Long-eared Owl numbers fluctuate with those of its principal prey, *Microtus* voles (Marks et al. 1994). Meadow voles (*Microtus pennsylvanicus*) and prairie voles (*M. ochrogaster*) dominate Long-eared Owl diet in states like Wisconsin and Iowa (Errington 1932, Weller et al. 1963), and Marti (1976) noted that voles are the most common prey in 31 of 42 studies. Although it prefers to nest and roost in dense vegetation, this owl hunts almost exclusively in open habitats, with roost groves typically adjacent to open habitats used for foraging (Marti et al. 1986). Wintering habitat is quite similar to breeding habitat, and the same tree groves used for wintering are often used for breeding. Two Long-eared Owl nesting sites, documented during the first atlas, also were known winter roost sites (Ehresman pers. obs.). The preservation of grassland and marshes and the planting of or retention of conifers near open habitats are important management actions for Long-eared Owl (Bosakowski et al. 1989).

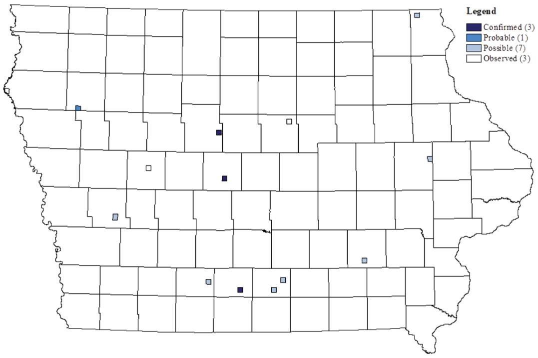
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	3	3
Possible	2	5	7
Probable	0	1	1
Confirmed	0	3	3
Conf & Prob	0.00%	1.00%	0.50%

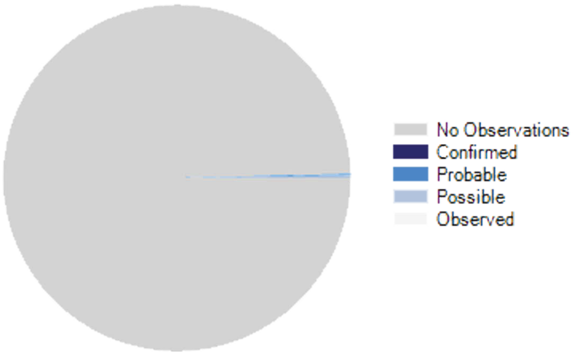
BBA I Results



BBA I



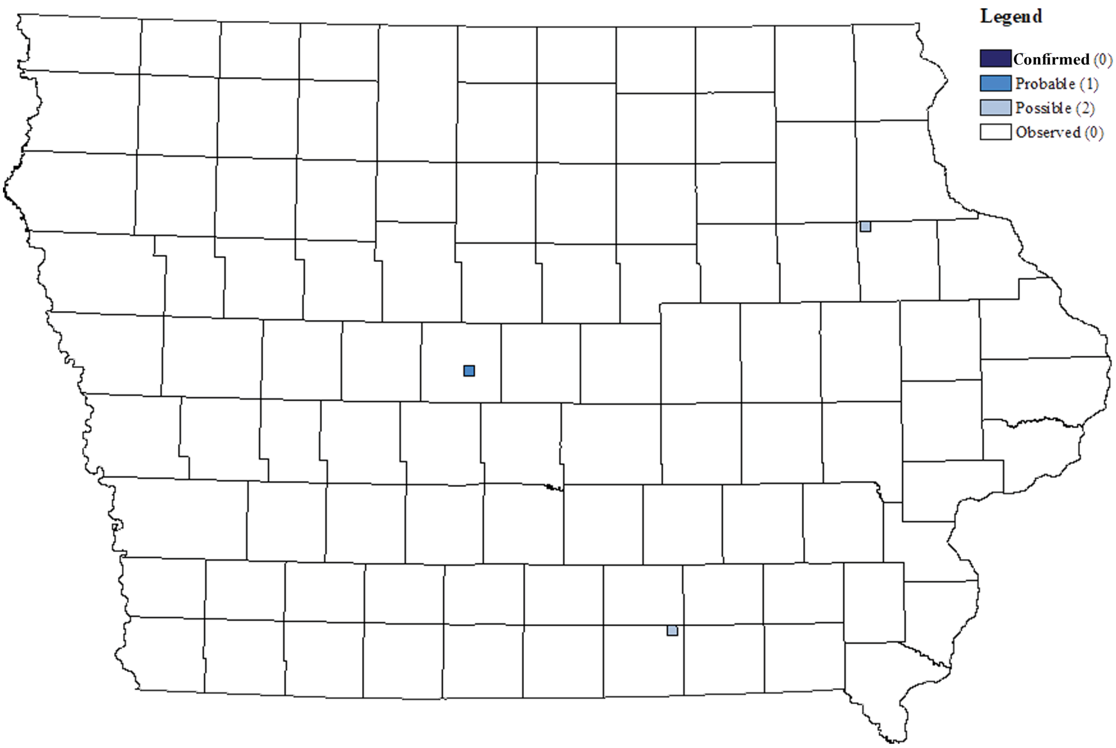
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	0	2	2
Probable	0	1	1
Confirmed	0	0	0
Conf & Prob	0.00%	0.30%	0.10%

BBA II



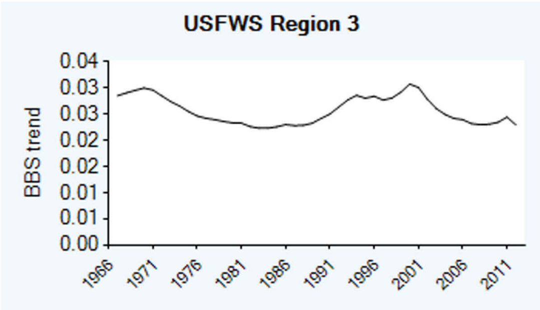
In Honor of Jaxson Hunter Ehresman
(Bruce Ehresman)

Short-eared Owl *Asio flammeus*

© Karen Viste-Sparkman

Habitat	Large open grasslands and marshes, especially prefers prairie
Breeding Dates	18 Apr (PR)–22 Apr (PR)
Nest Type	On dry ground; slight depression created by female and lined with grasses and downy feathers
Clutch Size	4–9 eggs (mean = 6 eggs)
Incubation	~21 days
Fledging	~30 days
Status	Occasional nester
BBS Trend	Stable (trend = 0.4, 95% CI is −3.6, 3.4) [Central US]

Patterns since BBA I



Before most of Iowa's prairie was converted to agricultural cropland, the Short-eared Owl was considered a common Iowa resident (Keyes and Williams 1888). It is now a state Endangered Species and Iowa's most area sensitive owl species. This owl of the prairie prefers grassland areas of 50 hectares or larger for wintering habitat and perhaps 100 hectares or larger for breeding habitat (Tate 1992, Dechant et al. 2003a). This owl was detected in only six (1%) BBA II blocks, all habitat blocks holding substantial amounts of grassland. The highest evidence of nesting was territorial behavior exhibited by an adult at Kellerton Grassland Bird Conservation Area in Ringgold County and a pair of Short-eared Owls observed at Copeland Bend WMA in Fremont County. There was one report of possible nesting at Whitetail Flats in Palo Alto County. There also was a possible nesting (9 May 2008) in a habitat block in Guthrie County. That record was inadvertently not entered in the database. Three records (one block each in Kossuth, Worth, and Warren counties) were at the observed level. Data collected during the first atlas are similar, with only seven records. The highest level of nesting during BBA I was a courting pair at Kellerton Grasslands BCA. There were four BBA records found in Missouri, and three of those were confirmed nesting (Jacobs and Wilson 1997). It was noted that it appeared that the Federal Farm Program, or Conservation Reserve Program, created the type of grassland habitat that benefitted this owl during the atlas project. Illinois documented two confirmed nests from the five records total reported for that state's BBA (Kleen et al. 2004; Herkert et al. 1999).

There are insufficient data from the BBS to predict a population trend for this owl. The population status of this species is difficult to assess because individuals are nomadic and prone to annual fluctuations in numbers (Wiggins et al. 2006).

Short-eared Owl distribution changed little since BBA I. Because this owl prefers to nest in large grasslands, the number of potential suitable nest sites in Iowa is limited. Such habitat rarely is found in private ownership, which might help explain why no records for this species occurred on private land during either atlas. This nomadic owl historically nested throughout the state, and it appears to continue to frequent large grassland habitats, wherever they occur. The most recent confirmed nesting for Short-eared Owl in Iowa was 5 June 2002 (Iowa DNR unpublished data) at Kellerton Grassland BCA in Ringgold County. The loss of 439,000 acres of Iowa grassland habitat converted to row-crop agriculture from 2007–2012 (USDA 2012) undoubtedly impacted this species. Another negative impact to this species is burning of grasslands during spring, especially after March. Conservation agency personnel reported flushing Short-eared Owls during spring burning. During one such burn event, in mid-to-late April 1999, a Fish and Wildlife Service wildlife biologist reported watching two Short-eared Owls flush from a Union Slough National Wildlife Refuge site in Kossuth County, and then found the burned-over nest containing either four or five eggs (Tom Skilling pers. comm.).

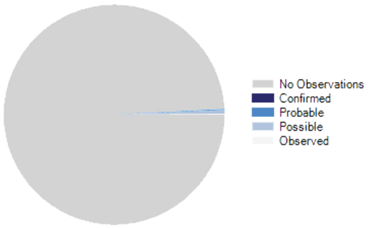
Like the Long-eared Owl, microtone voles are the favored prey of Short-eared Owls, and if the small mammal food supply is abundant on the wintering grounds, this owl may remain in the area to breed (Johnsgard 2001). In short, managing to enhance small mammal populations in Iowa's largest grassland areas should benefit this prairie owl.

Short-eared Owl

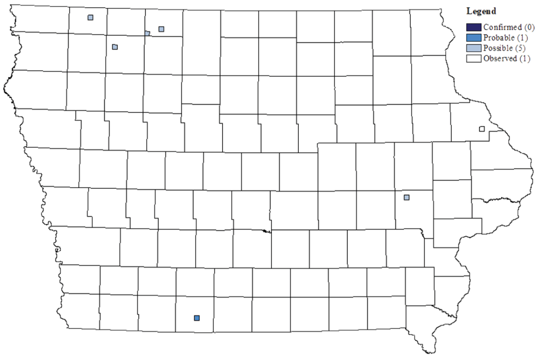
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	1	1
Possible	0	5	5
Probable	0	1	1
Confirmed	0	0	0
Conf & Prob	0.00%	0.30%	0.10%

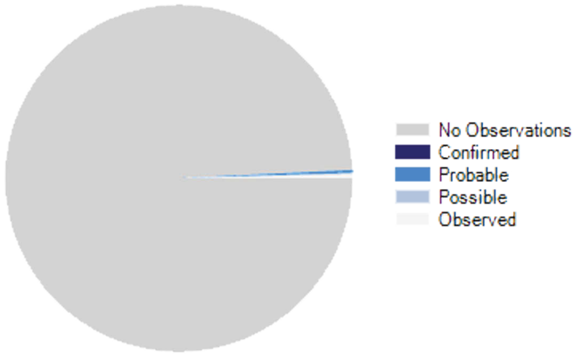
BBA I Results



BBA I



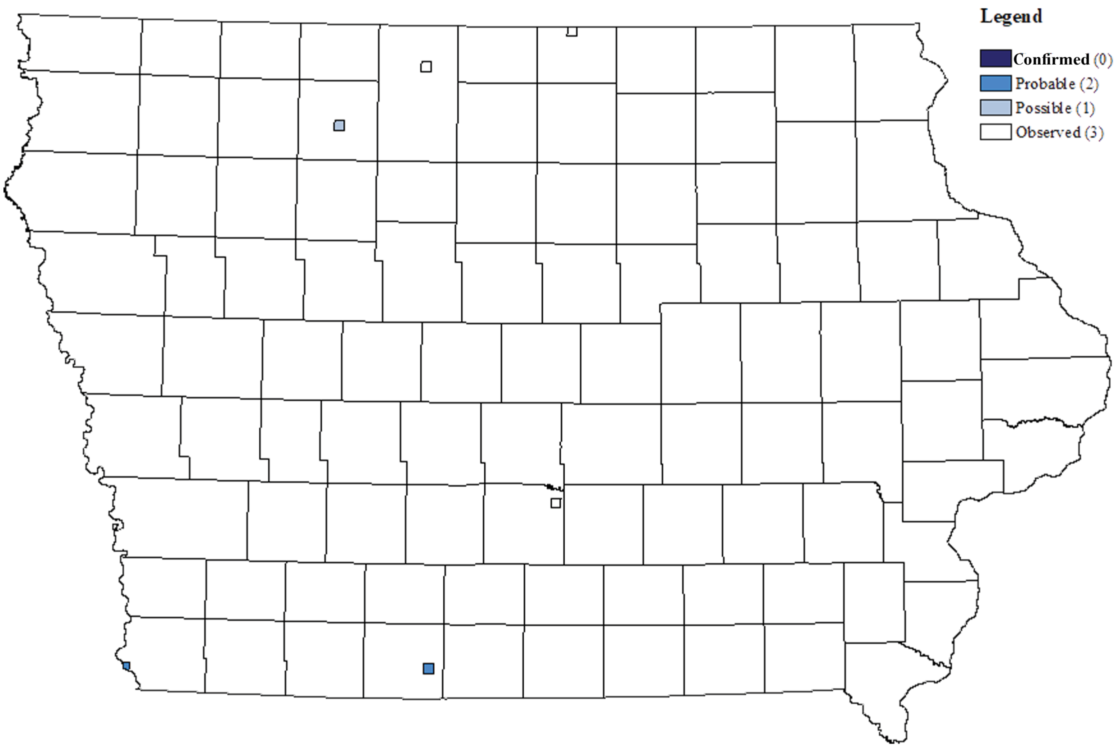
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	3	3
Possible	0	1	1
Probable	0	2	2
Confirmed	0	0	0
Conf & Prob	0.00%	0.50%	0.20%

BBA II

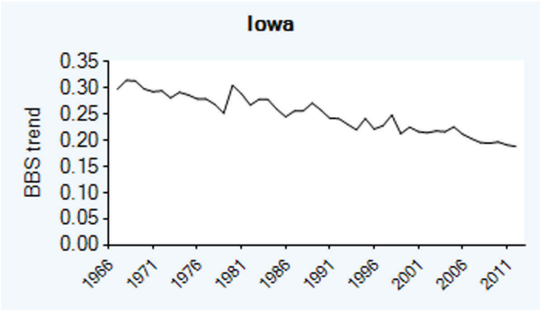


© Stanley Buman

Habitat	River and stream corridors with vertical earthen bank for nest site
Breeding Dates	1 Apr (PR)–27 Aug (PR)
Nest Type	Excavated cavity in vertical earthen bank with terminal unlined chamber
Clutch Size	5–8 eggs; 6–7 eggs typical
Incubation	23–24 days
Fledging	27–29 days
Status	Common statewide nesting species
BBS Trend	Stable (trend = 0.0, 95% CI is –1.6, 1.7) [Iowa]

Patterns since BBA I

The Belted Kingfisher is one of only three Iowa bird species to regularly build its nest in an earthen bank, and its rattling call can be heard throughout the state wherever its preferred watery habitat occurs. Both long-term and short-term data from the BBS indicate this species is slightly decreasing nationally, but Iowa BBS data indicate a stable population trend (Sauer et al. 2012). Data collected from both Iowa atlas periods were similar. There were 516 (65.2%) BBA II records for kingfisher, compared to 458 (64%) records gathered during the first atlas. As was found in the first atlas, about 61% of all records were recorded in habitat blocks (priority blocks in BBA I). Since this species is noticeably absent from turbid waters, where it is difficult for it to spot its underwater prey (Kelly et al. 2009), the cleaner water conditions found on many public-owned areas may favor the presence of this species. Illinois BBA results were even more striking, where 83% of all records for Belted Kingfisher were logged in priority blocks (Kleen et al. 2004).



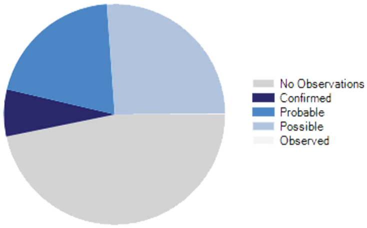
While most kingfisher data from both atlases are similar, the rate of confirmed nesting differed. During the first atlas, the kingfisher was confirmed nesting in 59 (12.9%) blocks, and during BBA II it was confirmed nesting in 102 (19.8%) blocks. This increase in number of confirmed nesting records was likely related to the fact that more effort was directed to document nesting of this species during this second atlas than during the first atlas. Since this species is easily identified by both sight and its rattling sound, it was probably not easily overlooked when it was present in a block. Fledglings remain with their parents, near a nest site, and are fed by them for about three weeks post-fledging (Kelly et al. 2009). This tendency for a prolonged fledging period also increases opportunities for atlassers to confirm nesting of this species. Most confirmed records were those of recently fledged young, followed by records of attending young. Probable nesting records were documented in 40.5% of all BBA II blocks, while possible records were noted in 38.4% of blocks.

The overall distribution of the Belted Kingfisher was similar for both atlases, with at least one record tallied for almost every county. As might be expected, there is a high correlation of atlas records with river corridors, and even drainage ditches were observed to provide suitable nest sites and enough small fish and crayfish prey to sustain broods of fledgling young. In general, it appeared that records for both atlases were tallied for this vocal species wherever adequate habitat quality existed. The main requirements for this species, during the nesting season, are permanent water to support its favored prey, small fish and crayfish, and nearby earthen banks in which it can excavate its nesting burrows (Hamas 1994). The other major requirement is clear water in which it can see its underwater prey (Kelly et al. 2009). It is anticipated that if Iowa can improve its current dismal water quality conditions, Iowa's kingfisher population may increase to reflect those changes.

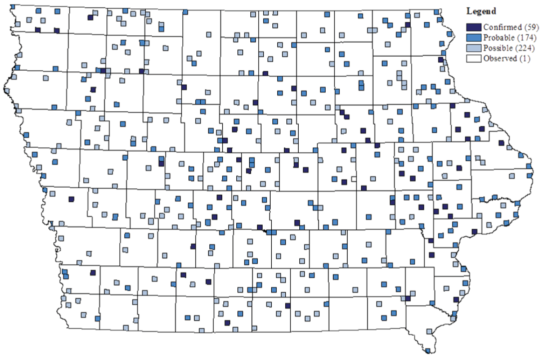
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	1	0	1
Possible	98	126	224
Probable	57	117	174
Confirmed	23	36	59
Conf & Prob	15.30%	38.30%	27.10%

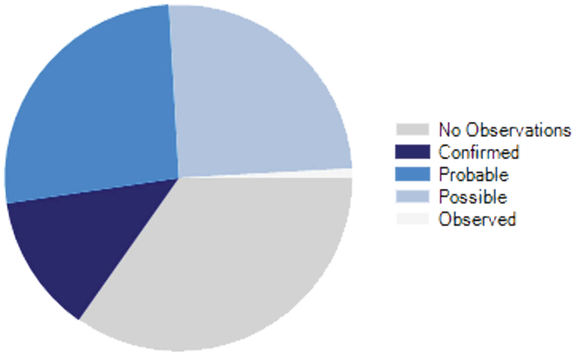
BBA I Results



BBA I



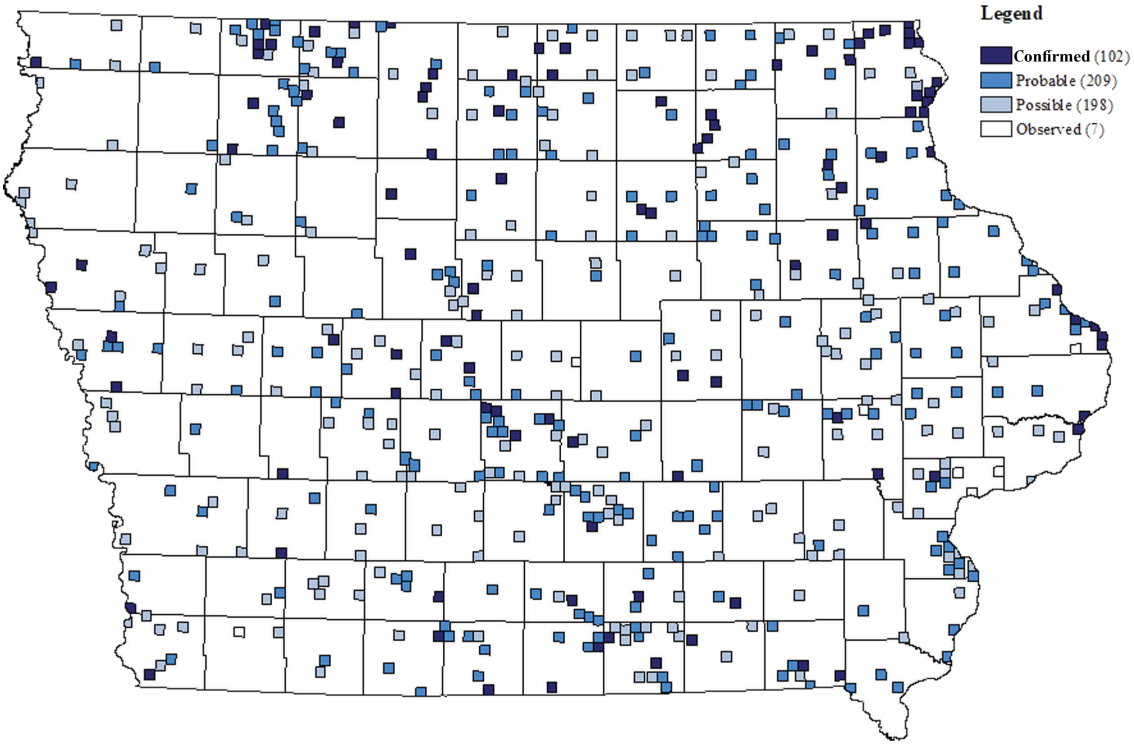
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	4	3	7
Possible	96	102	198
Probable	74	135	209
Confirmed	28	74	102
Conf & Prob	19.50%	52.40%	36.10%

BBA II



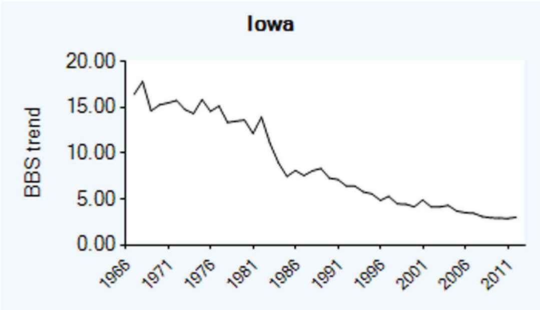
Sponsored by Olivia Patterson

© Stanley Buman

Habitat	Oak savanna, deciduous woodlands, forest clearings and edges, parks, and wooded farmsteads; typically with a dead snag component
Breeding Dates	2 May (PR)–4 Sep (CO)
Nest Type	An excavated cavity lined with wood chips, typically in a dead tree or dead limb
Clutch Size	3–10 eggs (usually 4–5 eggs)
Incubation	12–13 days
Fledging	27–30 days
Status	Regular and common nesting species
BBS Trend	Decreasing (trend = −4.2, 95% CI is −5.1, −3.3) [Iowa]

Patterns since BBA I

While the Red-headed Woodpecker inhabits a variety of wooded habitats, in Iowa this woodpecker seems best suited for oak savanna, where large trees and grassland occur together. This species typically nests in dead trees or dead limbs of live trees, and it also uses natural cavities, telephone poles, and other wood structures (Smith et al. 2000). This woodpecker exhibits strong fidelity to nest sites and may use the same nest cavity for several years in a row (Ingold 1991). Populations have fluctuated over time, and while this species benefited by an increase of potential nest sites following the spread of Dutch elm disease through Iowa during the 1960s and 1970s (J. J. Dinsmore et al. 1984), BBS data for 1966–2011 show a significant decreasing trend of 2.35%/year over the entire Red-headed Woodpecker range and 4.2%/year for Iowa from 2001–2011 (Sauer et al. 2012). Despite this significant decline, this species was documented in 666 (77.4%) blocks during BBA I and 700 (88.5%) blocks during BBA II.



Red-headed Woodpecker was confirmed nesting in 41.6% of BBA I blocks and in 51.7% of BBA II blocks. This high confirmation rate may be because this species (adults and young) are very vocal, it typically nests in dead trees or dead snags where it is quite visible, often quite close to human habitation, and it nests in a wide variety of habitats. Most confirmations were coded recently fledged young or attending young.

The distribution of this species has not significantly changed since the first atlas. Evidence of breeding for Red-headed Woodpecker was found in every county, just as it was in BBA I (Jackson et al. 1996). Because this species continues to decline, the main reason this bird was documented in more blocks in BBA II may be because there were 140 more blocks completed in the second atlas than in the first.

In the Midwest, the primary reason for Red-headed Woodpecker population decline is habitat loss. Smith et al. (2000) suggest that one main factor that contributes to this species' decline is the change from diversified farming to industrial agriculture. Another major threat is loss of nesting habitat due to the reduction in the number of dead trees and snags (Raphael and White 1984). Certainly, the loss of more than 99% of oak savanna in the Midwest is a major contributing factor. As evidence that this trend is reversible, Brawn (1998) found that Red-headed Woodpecker population densities were increasing in areas of oak savanna restoration.

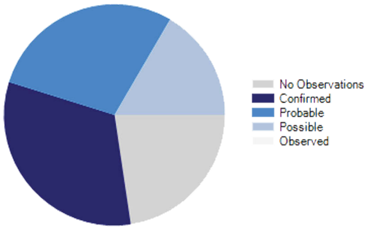
Important management considerations for the Red-headed Woodpecker include improving habitats by (1) diversifying size selection of dead limbs and snags, preferably in groups, because birds require multiple snags for nesting, roosting, and foraging (Sedgewick and Knopf 1990); (2) creating and maintaining open savanna-like areas with low density ground cover for aerial and ground foraging (Conner and Adkisson 1977); and (3) increasing mast production by improved management for mast producing plants (especially oaks), since there appears to be a correlation of wintering Red-headed Woodpecker numbers with mast crop abundance (Smith 1986, Smith et al. 2000).

During the winter of 2017–2018, nearly 50 Red-headed Woodpeckers were observed in Ledges State Park during the Boone County Christmas Bird Count (CBC), which is the highest number of this species documented during this count. Many of these woodpeckers were observed feeding on insect infested dead and dying ash trees (Ehresman pers. obs.). The Emerald Ash Borer disease may temporarily provide more nesting habitat and forage for Red-headed Woodpeckers.

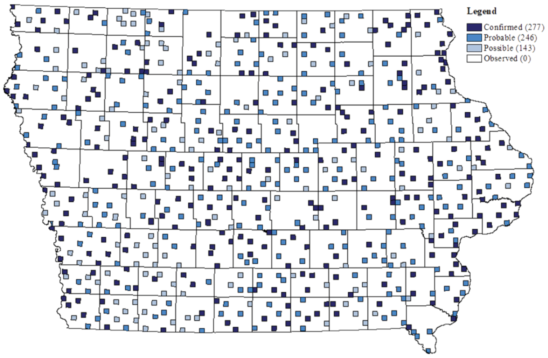
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	98	45	143
Probable	125	121	246
Confirmed	107	170	277
Conf & Prob	44.40%	72.90%	60.70%

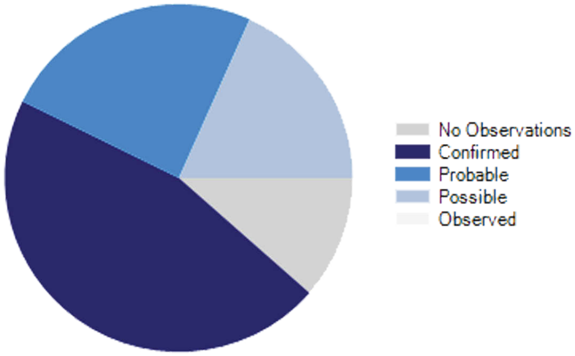
BBA I Results



BBA I



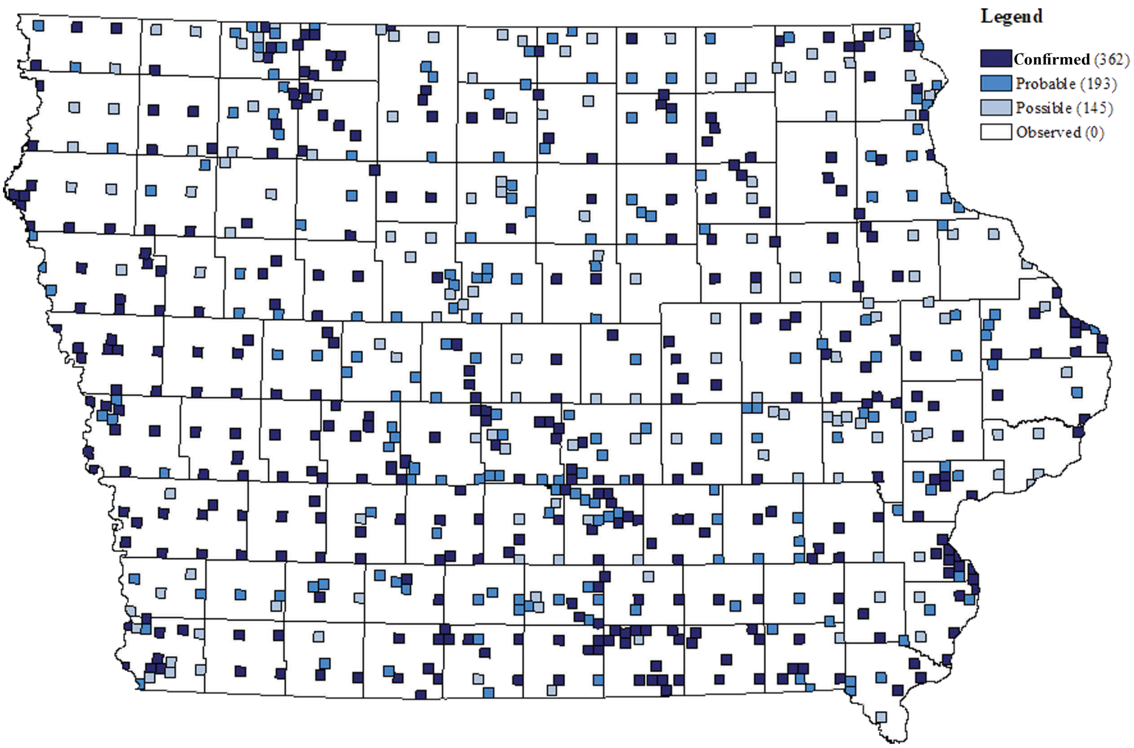
BBA II Results

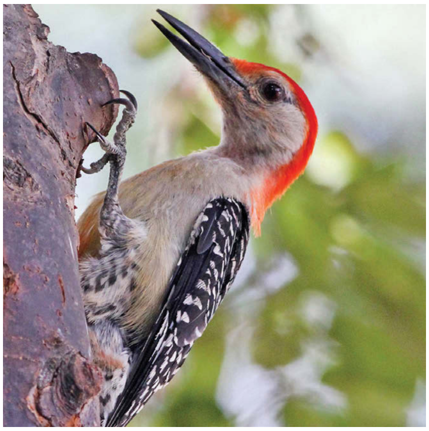


BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	83	63	146
Probable	83	110	193
Confirmed	168	196	364
Conf & Prob	48.10%	76.70%	64.70%

BBA II

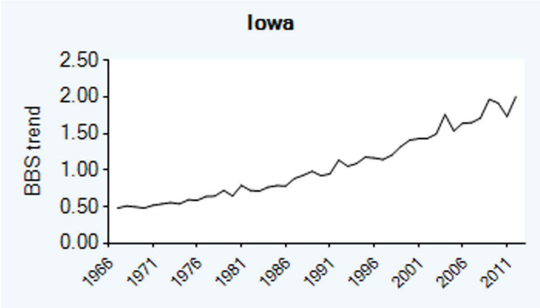




© Adam Ciha

Habitat	Upland and bottomland deciduous forests and woodlands; also wooded parks and towns
Breeding Dates	17 Apr (PR)–24 Aug (PR)
Nest Type	An excavated cavity lined with wood chips, typically in a dead limb of a deciduous tree
Clutch Size	2–6 eggs (usually 4 eggs)
Incubation	12 days
Fledging	24–27 days
Status	Regular and common permanent resident
BBS Trend	Increasing (trend = 2.8, 95% CI is 1.4, 4.2) [Iowa]

Patterns since BBA I



Noisy, like its red-headed relative, the Red-bellied Woodpecker is a common permanent resident of upland and bottomland forests throughout the state. It is a generalist species and inhabits a wide range of wooded habitats. It is a common nester in suburban and residential neighborhoods where human activity is high (Miller et al. 2019), typically nesting in older deciduous trees. This woodpecker excavates nesting and roosting cavities, usually in large dead tree limbs on the underside surface. While it often occurs in the same areas as Red-headed Woodpecker, this species generally breeds in larger, denser forests (Jackson et al. 1996). There was a substantial increase in records for this woodpecker from the first atlas to the second, and it was found in 411 (47.7%) blocks in BBA I and 648 (81.9%) blocks in BBA II. This increase also is reflected in BBS data for 1966–2011, which show a significant increasing trend of 2.8%/year for Iowa from 2001–2011 (Sauer et al. 2012). For the period 1970–2014, BBS data indicated that the survey-wide population of Red-bellied Woodpecker increased by an estimated 63% (Rosenberg et al. 2016).

Red-bellied Woodpecker was confirmed nesting in 21.2% of BBA I blocks and in 40.3% of BBA II blocks. This near doubling of confirmation rate seems due to more effort being expended in the second atlas to confirm nesting. Like results found for other woodpeckers, most confirmations were coded recently fledged young or attending young. Combined probable and confirmed records made up 59.4% of all records during BBA I and 80.6% of BBA II records, indicating that this species likely nested in every block where it was found. Because this species is more prone to nest in the woodland interior than species like Red-headed Woodpecker and Northern Flicker, public land blocks allowed atlassers easier access to more hidden nest sites, making possible both higher detection and higher confirmation rates.

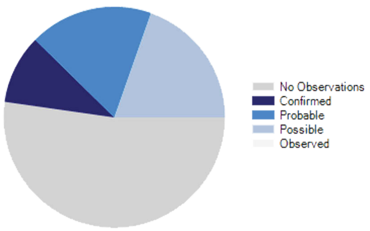
While Red-bellied Woodpecker occurs statewide, distribution appears to have changed since BBA I. Overall, there were far more records (especially confirmed nesting) in northern Iowa during BBA II. This was evident (particularly in Dickinson, Emmet, Clay, and Palo Alto counties) during the second atlas. There were no records found in Emmet or Grundy counties during BBA I (Jackson et al. 1996), while there were records in eight blocks in Emmet County and three blocks in Grundy County during BBA II. Ida is the only county with no BBA II records, probably because few hours were spent atlassing in that county and this species was missed. Aside from the increase in records for the four counties just mentioned, most of northwestern Iowa (aside from wooded riparian habitats) appears to hold many fewer Red-bellied Woodpeckers than Red-headed Woodpeckers, a species requiring much less woodland habitat. Red-bellied Woodpecker was considered rare in northern Iowa in the early 1900s (Anderson 1907), and since that time it has continued to expand its population north into Minnesota and Wisconsin (Kent and Dinsmore 1996). This bird's breeding population of Illinois nearly doubled from the early 1900s to the late 1950s, as it expanded its range north (Graber and Graber 1963).

Increasing flooding events (caused by a changing climate) and increasing dead trees (resulting from Emerald Ash Borer disease), help make this bird's future looks bright. In an area where flooding killed trees in Illinois, local abundance of Red-bellied Woodpecker increased more than 100% in an eight-year period, because these dead trees provided a prime food source for wood-boring beetles (Yeager 1955). The Red-bellied Woodpecker's future appears secure.

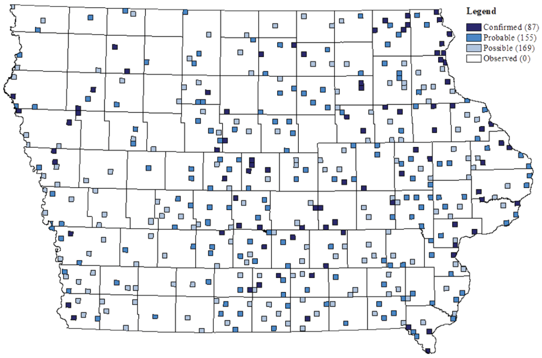
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	71	98	169
Probable	68	87	155
Confirmed	17	70	87
Conf & Prob	16.30%	39.30%	28.10%

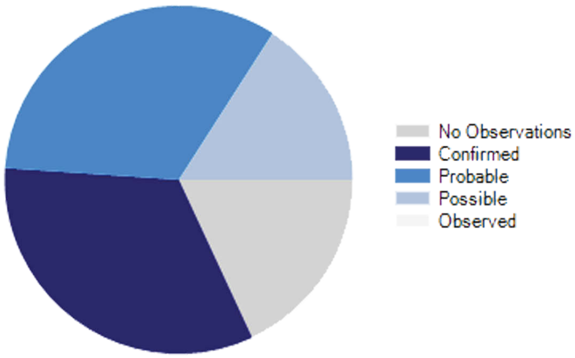
BBA I Results



BBA I



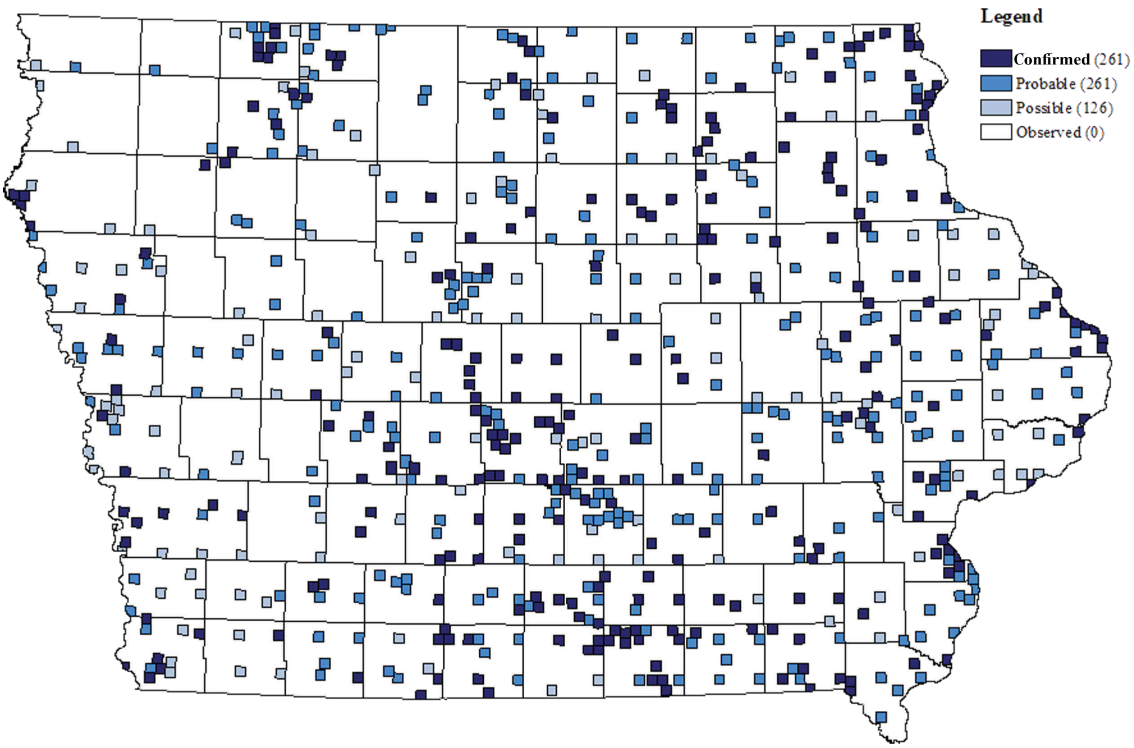
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	82	44	126
Probable	112	149	261
Confirmed	80	181	261
Conf & Prob	36.80%	82.70%	60.60%

BBA II



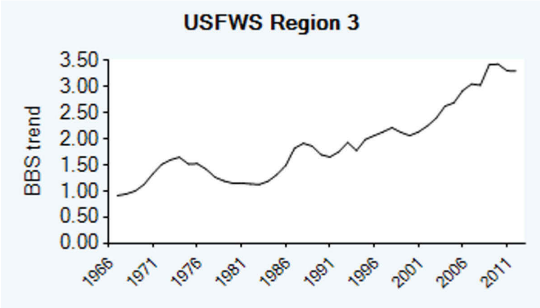
Sponsored by Carolyn Fischer

© Billy Reiter-Marolf

Habitat	Upland deciduous forests, particularly those with quaking aspen, as well as mature floodplain forests and swamps
Breeding Dates	18 May (PR)–15 Aug (CO)
Nest Type	Excavated in rotting portion of trunk or large branch of mature tree; nest cavity up to 10 inches deep with small (1.5 inches) opening for adults; base softened with chips remaining from excavation
Clutch Size	2–7 eggs (typically 4–6)
Incubation	10–13 days
Fledging	25–30 days
Status	Regular but uncommon nester
BBS Trend	Increasing (trend = 3.1, 95% CI is 1.8, 4.5) [Central US]

Patterns since BBA I

The Yellow-bellied Sapsucker was previously considered an uncommon breeder in far northeastern Iowa and rare or absent in summer elsewhere in the state (Kent and Dinsmore 1996). BBA II, however, indicates significant range expansion since that time. Instances of probable/confirmed nesting more than tripled from BBA I (18) to BBA II (61). This striking increase was not merely the result of finding more data within established areas. Nearly half (23) of the 48 confirmations on BBA II occurred in blocks well outside the species' historic stronghold of the Paleozoic Plateau. The BBS data are insufficient for Yellow-bellied Sapsucker in Iowa, but positive population trends are evident nearby in Wisconsin, Minnesota, Michigan, and North Dakota (Sauer et al. 2017).



Owing to this sapsucker's preference for forested landscapes, more than three-fourths of total detections were found within habitat blocks. And when it was found, it was usually confirmed. Atlassers confirmed nesting in 64.9% of the blocks in which this species was discovered—the highest confirmation rate of any woodpecker on BBA II. Such success likely stemmed from the vocal conspicuousness of adults and young and the predictability of nest-site locations within a territory. Distribution of the Yellow-bellied Sapsucker increased noticeably from BBA I to BBA II, both within and beyond the range established during the first atlas. This dual expansion occurred in two distinct habitats where favored trees are affected by dynamic processes.

The Yellow-bellied Sapsucker shows a predilection to mature quaking aspen (Walters et al. 2002), especially those with heartwood fungal infections (Kilham 1971). The quaking aspen is a pioneer of disturbed edges, such as those found in the hilly wooded terrain of the Paleozoic Plateau, which has long held this sapsucker. In areas where farmland, savannas, meadows, and forestry plantations have transitioned to enclosed woodland, the aspen and sapsucker have visibly increased. On BBA II, the plateau's western boundary is outlined by sapsucker nesting confirmations along Fayette, Winneshiek, and Howard counties. The core of the sapsucker's Iowa range shows a concentration of confirmed nesting in heavily forested public lands, such as Yellow River Forest and Effigy Mounds. Moving westward, the aspen-sapsucker association contributed to islands of confirmations in former savanna across four more landforms: the Iowan Surface, Des Moines Lobe, Northwest Plains, and the Loess Hills at the state's western frontier.

The most conspicuous expansion occurred southward along the Mississippi River corridor. Beginning with a cluster of eight confirmations in Jackson County, this migrant colonized downriver to Louisa and Des Moines counties in southeastern Iowa and inland along the Skunk River to Mahaska County. Flooding in the Mississippi River basin intensified in the late twentieth and early twenty-first centuries, thereby increasing the prevalence of dead/dying trees. This sapsucker excavates cavities in the floodplain trees (Mossman 1988, Danz et al. 2007, S. Patterson pers. obs.), and remains a common nester in riparian zones of southern Wisconsin (Temple 2006b, unpublished WBBA II data). If erratic weather and flooding continue in the region, there may be sufficient habitat to bolster sapsucker populations within the Mississippi watershed in Iowa.

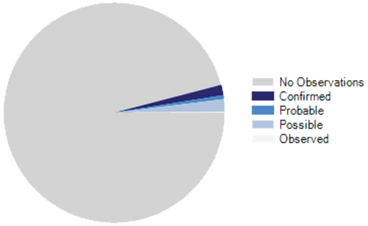
Confirmations in the northern Loess Hills and the Little Sioux River bluffs, as well as an isolated nest along the Big Sioux River, all hint at colonization. The Yellow-bellied Sapsucker may be well equipped to further consolidate its Iowa nesting range into BBA III.

By Shane S. Patterson

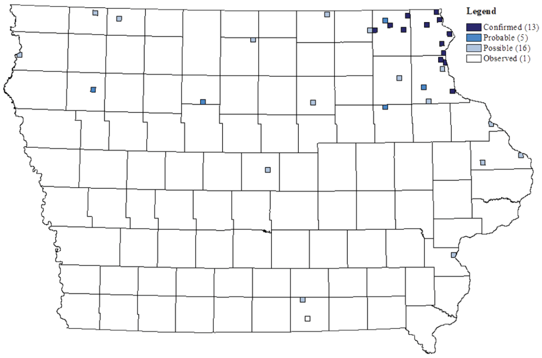
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	1	1
Possible	4	12	16
Probable	1	4	5
Confirmed	1	12	13
Conf & Prob	0.40%	4.00%	2.10%

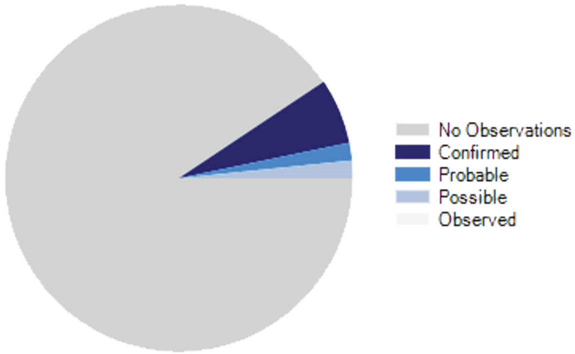
BBA I Results



BBA I



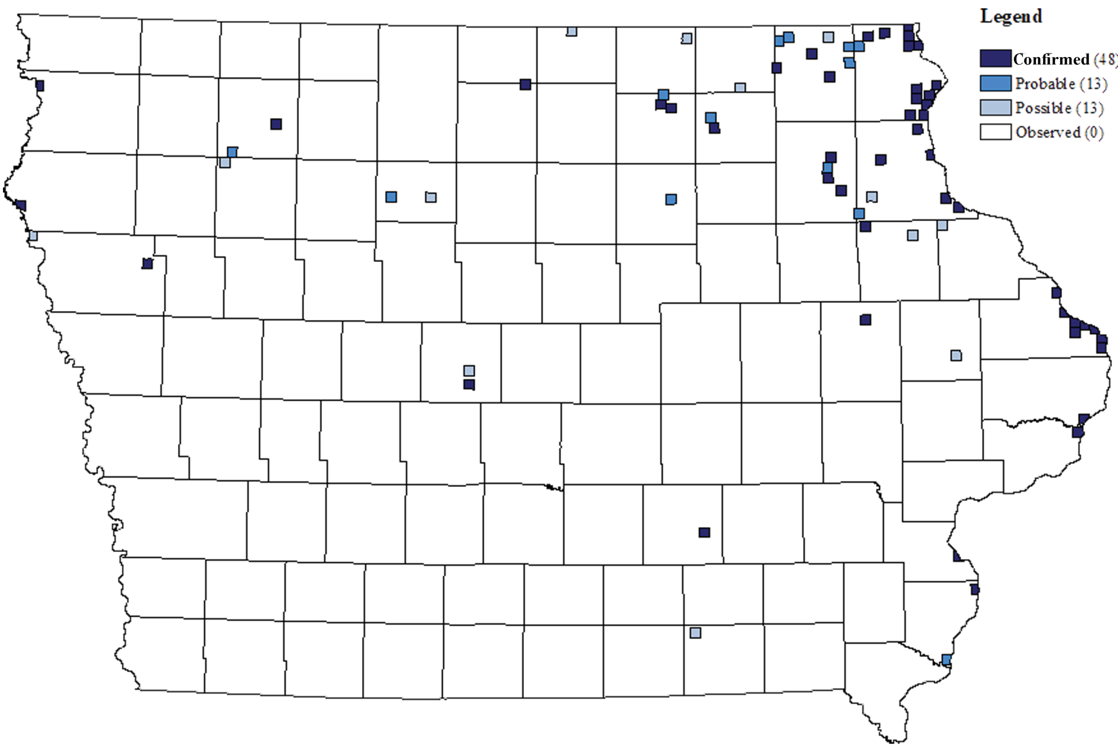
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	5	8	13
Probable	5	8	13
Confirmed	7	41	48
Conf & Prob	2.30%	12.30%	7.10%

BBA II

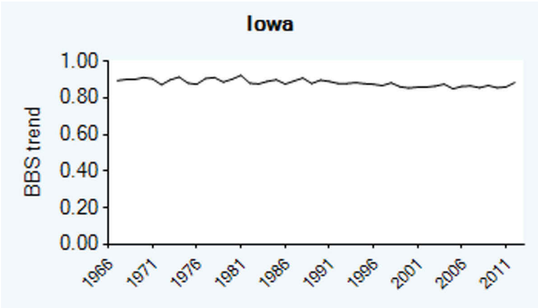


In Honor of Carol Winter (Kirsten Winter)

© Adamn Ciha

Habitat	Woodlands of all sizes, including upland and bottomland deciduous forests and woodlands, small woodlots, and shelterbelts
Breeding Dates	11 Apr (PR)–31 Aug (PR)
Nest Type	An excavated cavity lined with wood chips, typically in a dead limb of a deciduous tree or trunk of a dying tree
Clutch Size	3–8 eggs (usually 4–6 eggs)
Incubation	12 days
Fledging	18–21 days
Status	Regular and common permanent resident
BBS Trend	Stable (trend = −0.2, 95% CI is −1.3, 0.8) [Iowa]

Patterns since BBA I



A common permanent resident, Downy Woodpecker is Iowa's smallest and most abundant woodpecker. It is readily found in orchards and wooded, human-modified habitats such as urban and suburban parks and residential areas (Jackson and Ouellet 2018), and it inhabits the least mature forests and forests of moderate openness among the habitats of five species of Virginia woodpeckers (Conner and Adkisson 1977). Its propensity to frequent Iowa backyard bird feeders is supported by the fact that it was reported at 60% of feeders in mid-winter (Hollis 1986). Like the Red-bellied Woodpecker, Downy Woodpecker nesting cavities are usually at the interior of woodlands (Jackson et al. 1996), which can make it difficult to find nest sites. Still, there was a significant increase in records for this woodpecker from the first atlas to the second. It was found in 568 (66%) blocks in BBA I and 721 (91.2%) blocks in BBA II. Since BBS data for 1966–2011 indicate a stable population trend for Iowa from 2001–2011 (Sauer et al. 2012), the increase in number of records is probably related to increased effort during BBA II. Analyses of 50 years of BBS data (1966–2015) indicated a stable overall population trend for the United States (Sauer et al. 2017).

Downy Woodpecker was confirmed nesting in 22.5% of BBA I blocks and in 49% of blocks during the second atlas, more than doubling the confirmation rate from BBA I to BBA II and reflecting the fact that more effort was expended in the second atlas to confirm nesting. Like results found for Red-headed Woodpecker, most confirmations were coded attending young or recently fledged young. Combined probable and confirmed records made up 62.1% of all records during BBA I and 81% of BBA II records. While 55% of all BBA I records were found in public land (priority) blocks, only 33.5% of BBA II records were documented in public land (habitat) blocks: a change signifying that this woodpecker is common on private land and public land alike. The fact that 66.9% of BBA II confirmed nesting records occurred in habitat blocks, however, indicates that access did matter regarding confirming nesting.

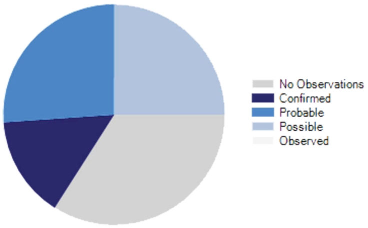
Like Red-bellied Woodpecker, Downy Woodpecker occurs statewide and its distribution is tied closely to the occurrence of wooded areas of the state. Also like its larger relative, distribution appears to have changed since BBA I. Overall, there were far more confirmed nesting records in northern Iowa during BBA II. Like what was observed for Red-bellied Woodpecker, confirmed nesting was most evident in Dickinson, Emmet, Clay, and Palo Alto counties. During BBA I, records were found for all counties (Jackson et al. 1996), and that was true during BBA II, too. Generally, it appears that more records were found in every region of the state except the northwest, where industrial agriculture leaves a scarce amount of wooded habitat.

Graber and Graber (1963) found that the Downy Woodpecker was four times as common as the Hairy Woodpecker in Illinois, and Kleen (2000) found the ratio was about five to one during the 2000 Spring Bird Count in Illinois. Graber et al. (1977) discovered that the number of Downy Woodpeckers at a site correlated positively with the number of trees that were 10 to 22 inches in diameter and negatively correlated with the number of large trees at a site. Because Iowa has an abundance of small woodlands and woodlots that contain the tree sizes this woodpecker prefers, Downy Woodpecker will likely continue its reign as the most common woodpecker in eastern North America (Jackson and Ouellet 2018).

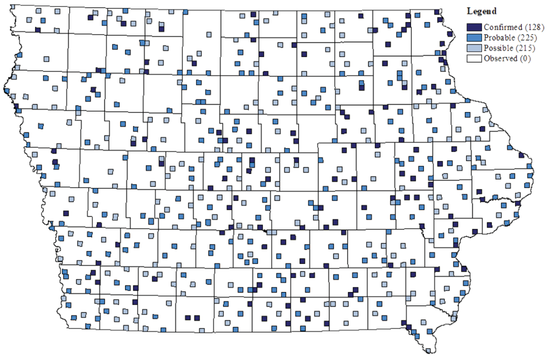
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	115	100	215
Probable	101	124	225
Confirmed	40	88	128
Conf & Prob	27.00%	53.10%	41.00%

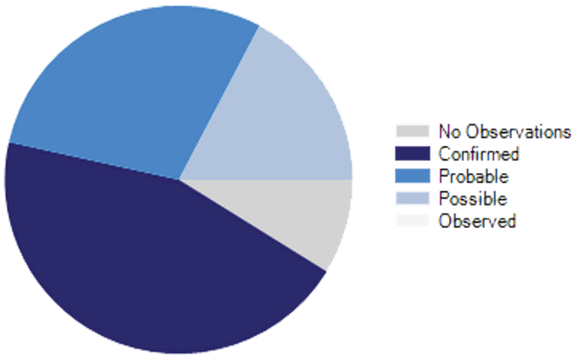
BBA I Results



BBA I



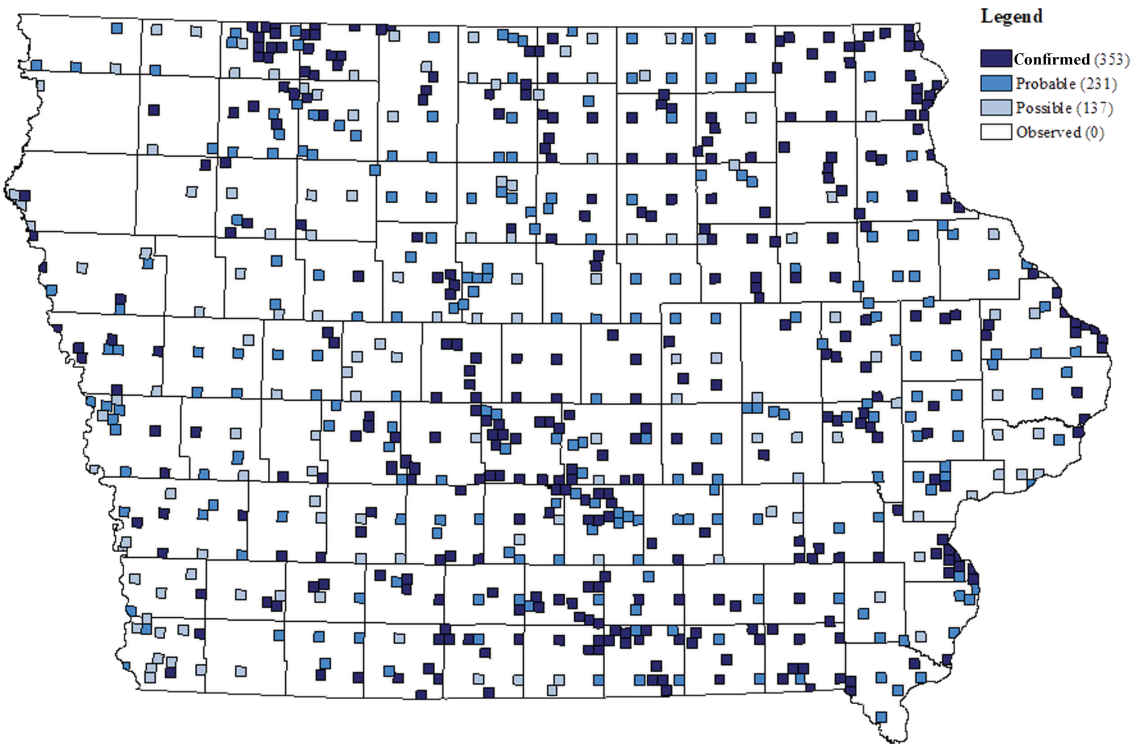
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	96	41	137
Probable	122	110	232
Confirmed	117	236	353
Conf & Prob	45.80%	86.70%	67.90%

BBA II



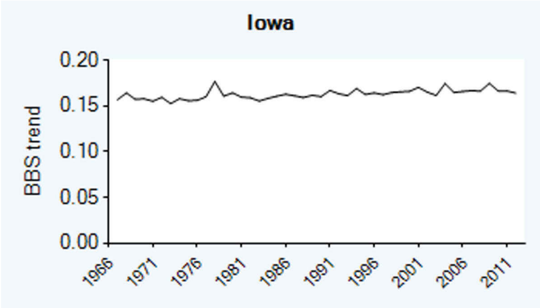
Sponsored by Michael Thomas

© Linda Petersen

Habitat	Deciduous forests and woodlands with dead snags and limbs
Breeding Dates	1 May (CO)–24 Aug (PR)
Nest Type	Excavated cavity lined with wood chips, typically in a dead limb of a deciduous tree or trunk of a dying tree
Clutch Size	3–7 eggs (usually 4 eggs)
Incubation	11–15 days
Fledging	28–30 days
Status	Regular and uncommon statewide permanent resident
BBS Trend	Stable (trend = −0.4, 95% CI is −2.6, 1.4) [Iowa]

Patterns since BBA I

While Hairy Woodpecker and Downy Woodpecker share similar winter habitat, during the nesting season the Hairy Woodpecker appears to prefer larger, more mature forests and woodlands. Robbins (1979) suggested that a woodland size of 10–25 acres was needed to sustain Hairy Woodpecker nesting. Blake and Karr (1984) found Hairy Woodpecker in 40-acre woodlands and noted that this species preferred woodlands with larger trees than those frequented by Downy Woodpecker. Hairy Woodpecker also occurs in small woodlots, wooded parks, cemeteries, shaded residential areas, and other urban areas with mature shade trees, although it often is uncommon within these habitats (Jackson et al. 2018). Like red-bellied and downy woodpeckers, nesting cavities of this species are usually in the interior of woodlands (Jackson et al. 1996). This factor and the fact that most nest cavities occur on the underside of a limb can make it difficult to find nest sites (Kleen et al. 2004). The Hairy Woodpecker often forages far from the nest site, which makes it even more difficult to confirm as a breeder (Jacobs and Wilson 1997). This species indeed is a difficult one for which to confirm nesting, since only 18.3% of BBA I records and 19.1% of BBA II records were of nest confirmation. Like results found for other woodpeckers, most confirmations were coded recently fledged young or attending young.



There was a significant increase in records for this woodpecker from the first atlas to the second. It was found in 349 (40.5%) blocks in BBA I and 466 (58.9%) blocks in BBA II, with nearly two-thirds of all records found in public land blocks. Iowa BBS data for 1966–2011 indicate a stable population trend from 2001–2011 (Sauer et al. 2012). Analyses of 50 years of BBS data (1966–2015) indicated a slight positive population trend for the United States (0.56%/year) (Sauer et al. 2017).

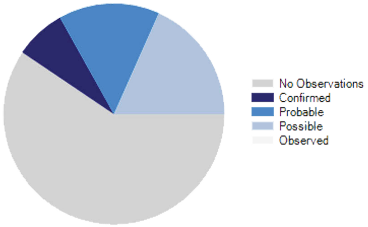
Even with nearly 100 more records for BBA II than BBA I, the distribution of Hairy Woodpecker remained largely the same. Like Red-bellied and Downy woodpeckers, Hairy Woodpecker occurs statewide and its distribution is closely tied to the occurrence of wooded areas of the state. In the first atlas, records for Hairy Woodpecker were documented in all except three counties (Jackson et al. 1996): Grundy, Union, and Pocahontas. In BBA II, counties with no records included O'Brien, Ida, Page, and Grundy. Also, like what was evidenced during BBA I, distribution remained most dense in northeastern and south-central Iowa, where large forest tracts exist. Similar to results for Red-bellied and Downy woodpeckers, an increased number of block records occurred for Hairy Woodpecker in Dickinson, Emmet, Clay, and Palo Alto counties in Iowa's Great Lakes region.

According to Kent and Dinsmore (1996), Downy Woodpecker out-numbers Hairy Woodpecker by about four to one in Iowa. Along with requiring larger woodlands and larger trees than Downy Woodpecker, the presence of dead trees and dead branches on live trees is essential for nesting and feeding (Kleen et al. 2004). Both sexes forage on trunks, as well as on limbs. Kilham (1965) found that female Hairy Woodpeckers fed on elm bark beetle (*Scolytus multistriatus*) more than did males. Larvae of cerambycid and buprestid beetles, with a few larvae of other wood-boring insects, comprise more than 31% of annual food intake for this species (Beal 1911). While emerald ash borer disease is creating more foraging habitat for Iowa woodpeckers, maintaining large tracts of hardwood or mixed forest and providing habitat corridors are two more important factors to ensure a stable future for Hairy Woodpecker (Hess et al. 2000).

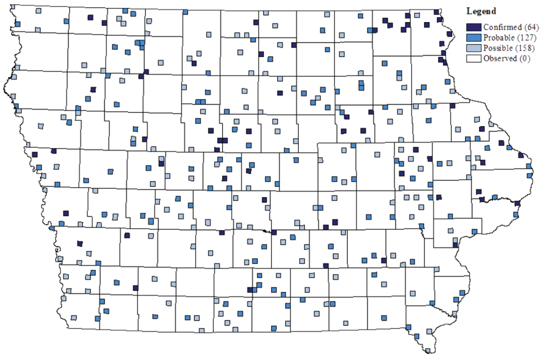
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	65	93	158
Probable	48	79	127
Confirmed	17	47	64
Conf & Prob	12.50%	31.60%	22.20%

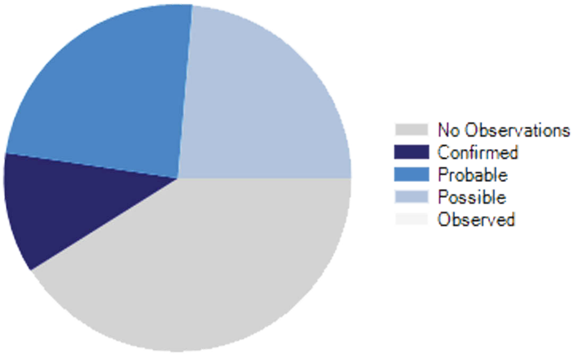
BBA I Results



BBA I



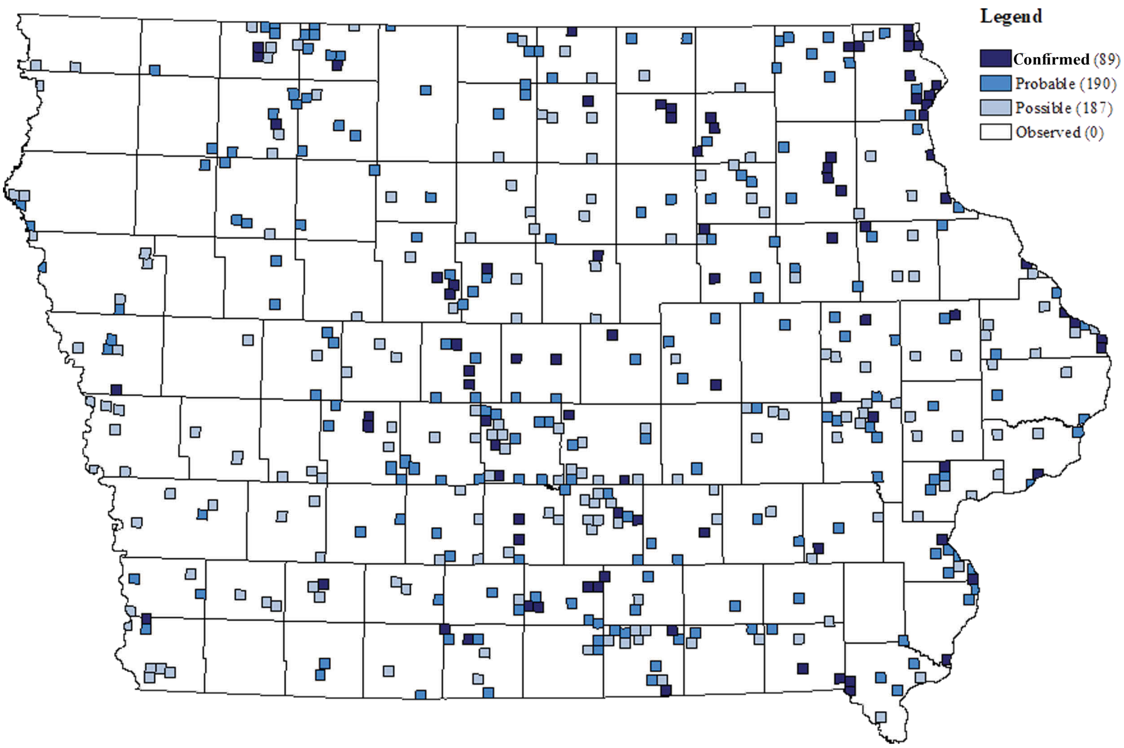
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	73	114	187
Probable	58	132	190
Confirmed	17	72	89
Conf & Prob	14.40%	51.10%	32.40%

BBA II



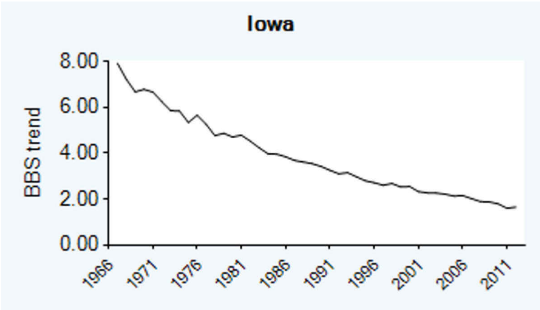
Sponsored by Sharon Somers

© Stanley Buman

Habitat	Savanna, woodland edge, woodlots, scattered trees in grassland
Breeding Dates	24 Apr (PR)–2 Sep (CO)
Nest Type	Excavated cavity lined with wood chips, typically in a dead limb of a deciduous tree or trunk of a dying tree
Clutch Size	3–12 eggs (usually 7–8 eggs)
Incubation	11–14 days (usually 12 days)
Fledging	24–27 days
Status	Regular and common statewide nesting species
BBS Trend	Decreasing (trend = −3.8, 95% CI is −4.7, −3.0) [Iowa]

Patterns since BBA I

Northern Flicker is a keystone species and plays a central role in the ecology of woodland communities, where it excavates many of the cavities later used by both secondary cavity nesters and a wide variety of other species (Wiebe and Moore 2017), such as squirrels, tree-frogs, Eastern Screech-Owl, American Kestrel, and Bufflehead. Flicker is a woodpecker of open or semi-open areas with a scattering of large trees (Kleen et al. 2004). Ants are its favorite food, and it spends a great deal of time on the ground foraging for them. It is a very vocal species and is conspicuous because of its large size, distinctive markings, habit of frequenting and nesting in rather open areas, and propensity to spend more time on the ground than any other North American woodpecker (Castrale et al. 1998). For these reasons especially, there were more atlas records collected for flicker than for any other of Iowa's seven woodpeckers. It was found in 644 (74.8%) blocks during BBA I and 742 (93.8%) blocks during BBA II. The BBS data for 1966–2011 indicate a declining population trend of 3.8% annually for Iowa from 2001–2011 (Sauer et al. 2012), while long-term population trends from the BBS (1966–2015) indicate widespread annual declines of 1.57% in Northern Flicker populations within the United States (Sauer et al. 2017). Despite these troubling population declines, this species appears to remain relatively common in Iowa.



Unlike the more secretive nesting Hairy Woodpecker, atlassers more readily confirmed nesting for the flicker, whose typical nest site is in a very large tree in a more open area. For instance, 28% of BBA I records and 30.1% of BBA II records were of nest confirmation. Interestingly, similar results were found for both atlases, no matter what category was compared. Regarding confirmed records, most were of recently fledged young, followed by attending young. With more than 60% of records from both atlases found in public land, it can be argued that public land is more effectively managed for wildlife than private land. In this case, when the fact is considered that Iowa public conservation agencies typically manage forest lands to include 7–10 snags per acre, public forests are quite beneficial for woodpeckers (Ehresman pers. obs.).

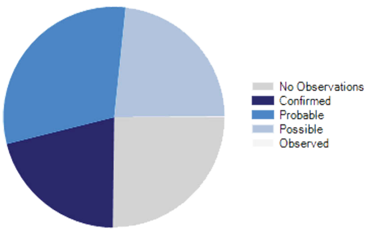
Even with nearly 100 more records documented for BBA II than BBA I, the distribution of Northern Flicker remained largely the same. Evidence of breeding for Northern Flicker was found in every county, just as it was in BBA I (Jackson et al. 1996). Because Red-headed Woodpecker and Northern Flicker are both savanna species that nest in similar habitat, their distribution across Iowa's landscape also appears most alike.

Like Illinois, Iowa is known for its industrial agriculture landscape. Graber et al. (1977) compared survey results from 1907 to 1909 to survey results from 1957 to 1958 and found that flicker populations in Illinois declined by 90%. Graber and Graber (1963) listed the suspected reasons for flicker population declines as: conversion of savannas, open fields and grasslands to row crops, loss of isolated nesting trees, and the invasion of the European Starling (*Sturnus vulgaris*) beginning in the 1930s. Wiebe and Moore (2017) expressed that the most likely explanations for Northern Flicker declines are habitat loss and competition with the starling for nest cavities. They further expressed that the loss or even the diminishing of Northern Flicker populations is likely to have a large impact on most woodland ecosystems in North America.

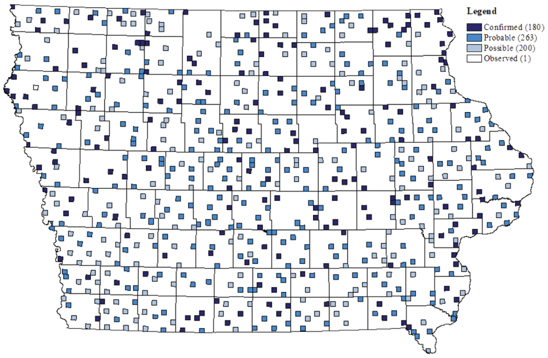
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	1	0	1
Possible	119	81	200
Probable	126	137	263
Confirmed	65	115	180
Conf & Prob	36.60%	63.20%	51.50%

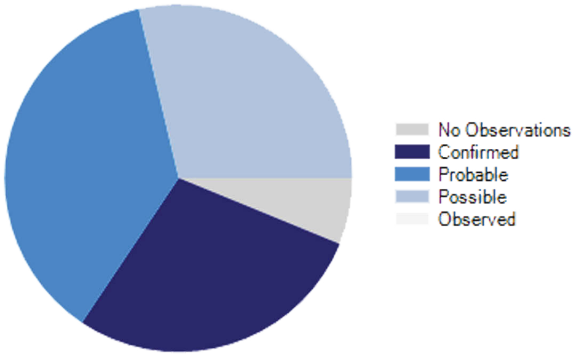
BBA I Results



BBA I



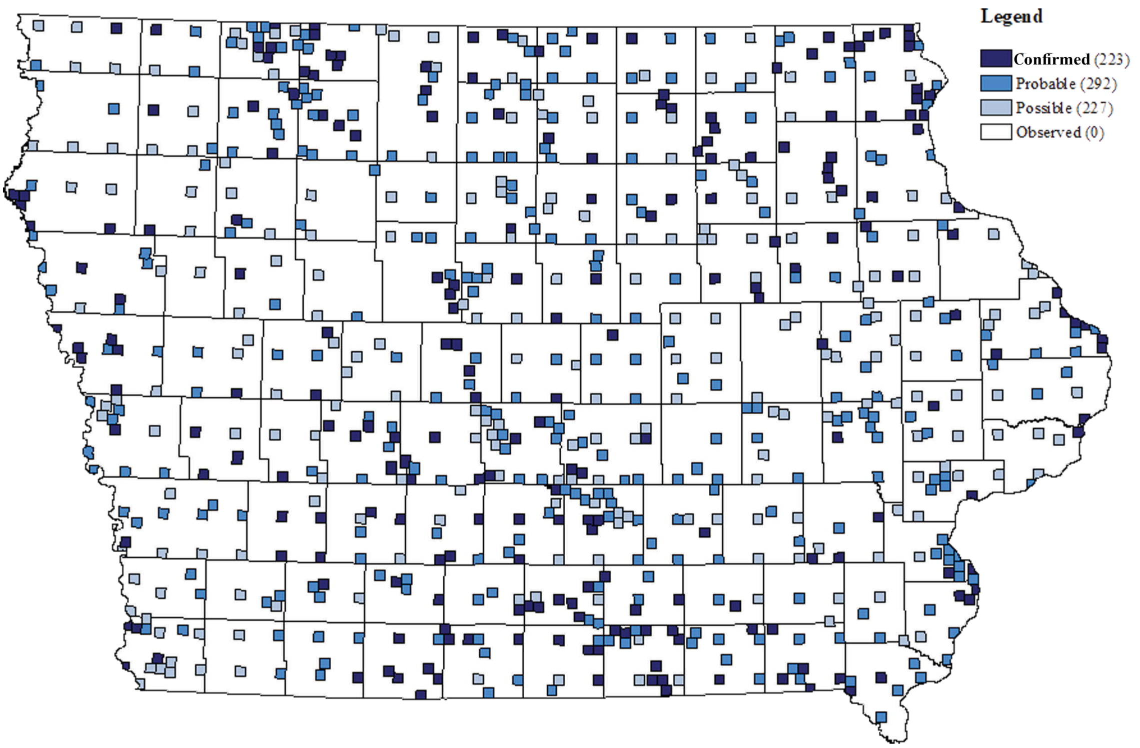
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	148	79	227
Probable	122	171	293
Confirmed	86	139	225
Conf & Prob	39.80%	77.70%	60.20%

BBA II



Sponsored by Scott & Rachel Hau Anderson

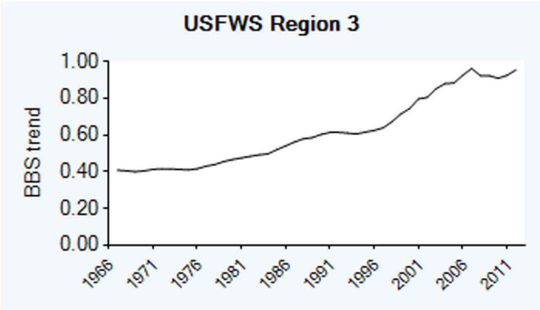
Pileated Woodpecker *Dryocopus pileatus*

© Larry Dau

Habitat	Large forests with large dead and deteriorating live trees in which to excavate nest and roosting cavities
Breeding Dates	15 Mar (PR)–19 Aug (PR)
Nest Type	Excavated cavity lined with wood chips, typically in the trunk of a dying deciduous tree
Clutch Size	1–6 eggs (usually 4 eggs)
Incubation	15–18 days
Fledging	24–30 days
Status	Regular and uncommon permanent resident
BBS Trend	Stable (trend = −0.2, 95% CI is −0.7, 0.3) [Central US]

Patterns since BBA I

Pileated Woodpecker is Iowa's largest (crow-size) woodpecker, and it is Iowa's best woodpecker representative of large mature forests. Its loud raucous calls are distinctive, and the heavy hammering sound produced by its chisel-shaped beak can be heard for a great distance. It is quite fond of eating carpenter ants, as well as wood-boring beetles, grubs, acorns, seeds, and nuts (Kleen et al. 2004). Its nest cavity entrance is a large oval hole, often in a standing dead tree, and it requires a plentiful supply of downed or standing dead trees for foraging (Bull and Jackson 2011). In about 20 years of time, the atlas records for this species more than doubled, going from 95 (11%) in BBA I to 203 (25.7%) in BBA II. This species is not abundant enough in Iowa to establish a BBS trend, although Central Region BBS data indicate an annual 1.5% increase from 1980–2007 (Sauer et al. 2008).



Even though Pileated Woodpecker is large and loud, it can become secretive and quiet during much of the nesting season. During the first atlas, this woodpecker was confirmed in just 12 (12.6%) blocks, increasing to 59 (29.1%) during BBA II. This increase in confirmed nest detection probably reflects both an increase in population since BBA I and an increase in atlassing effort exhibited during BBA II. Confirmed and probable records combined comprised more than two-thirds of all atlas records. Regarding confirmed records, most were of recently fledged young, followed by attending young. These results were quite similar to those observed for Northern Flicker. More than three-fourths of all atlas records were found in public land blocks, and state forests hold a great many of Iowa's largest forest tracts that are managed for wildlife diversity.

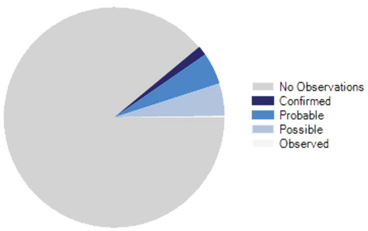
Jackson et al. (1996) indicated that Pileated Woodpecker records were found in 37 counties, mostly in northeastern and eastern Iowa. Distribution of Pileated Woodpecker changed much since the first atlas, with populations of this species expanding most in southeastern, south-central, and central Iowa. During BBA II, Pileated Woodpecker was found in at least 60 counties, with confirmed nests as far west as Ringgold County in the south and Emmet County in the north and probable nesting as far west as the Little Sioux River in Clay County and along Brushy Fork Creek in Carroll County. Jackson et al. (1996) correctly predicted that this large woodpecker would continue to colonize new areas of Iowa that fit its habitat requirements. Graber et al. (1977) found this species is particularly associated with floodplain forest and found that (in Illinois) the number of this species increased as the number of trees increased that were >22 inches in diameter. Anderson and Robins (1981) found highest populations of Pileated Woodpecker in forests comprising 320 to 4,200 acres.

Pileated Woodpecker is considered a keystone species that plays a crucial role in North American forest ecosystems by excavating large nesting, roosting, and foraging cavities that are subsequently used by a diverse array of birds and mammals for nesting and shelter (Bull et al. 1997, Bonar 2000, Aubry and Raley 2002). This woodpecker helps control some forest beetle populations (Bull and Jackson 2011). As emerald ash borers continue to spread disease to ash trees across the state, it will be interesting to observe what impact those dead and dying trees have on pileated and Iowa's six other woodpeckers. During BBA III, it is quite likely that Iowa's largest woodpecker will be found nesting as far west as Loess Hills State Forest.

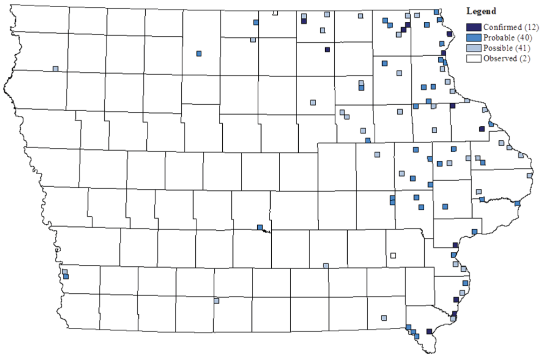
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	1	1	2
Possible	15	26	41
Probable	6	34	40
Confirmed	1	11	12
Conf & Prob	1.30%	11.30%	6.00%

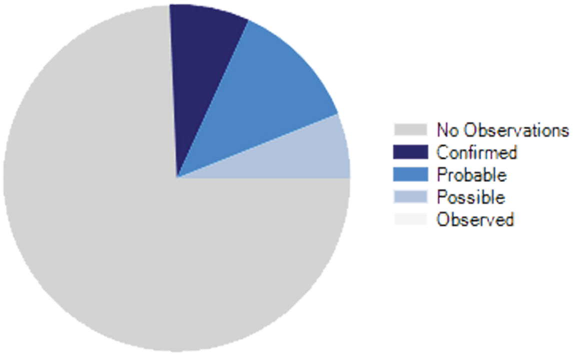
BBA I Results



BBA I



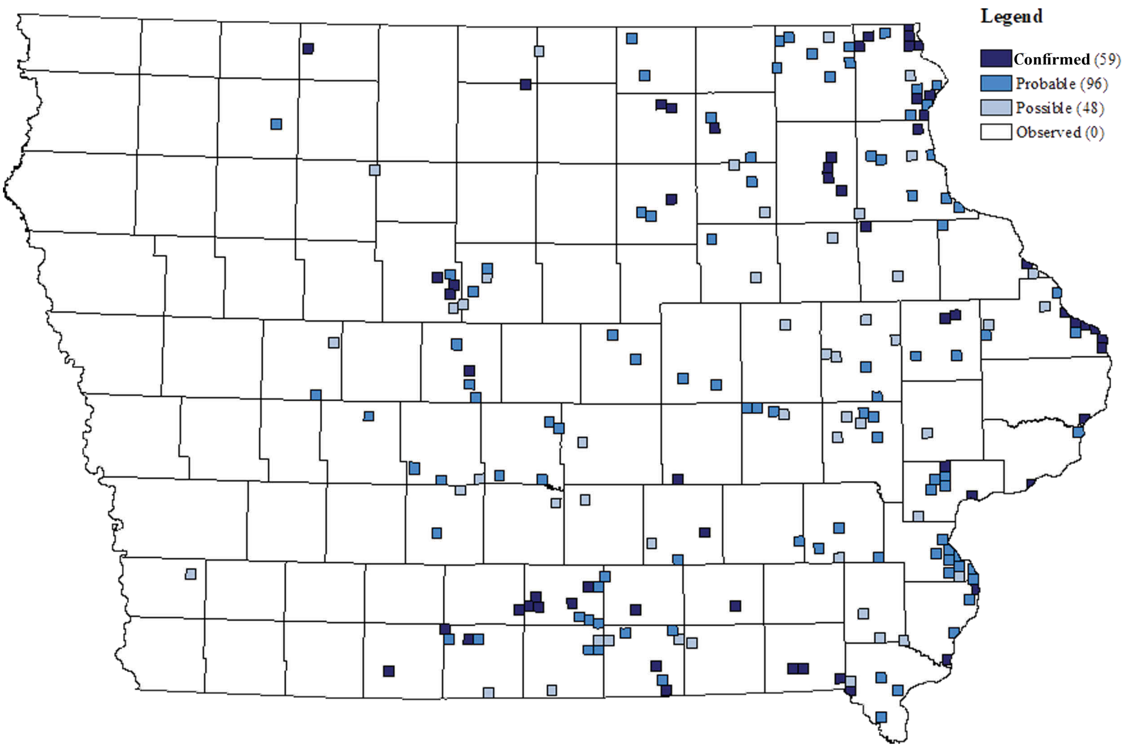
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	14	34	48
Probable	24	72	96
Confirmed	8	51	59
Conf & Prob	6.10%	30.80%	18.00%

BBA II

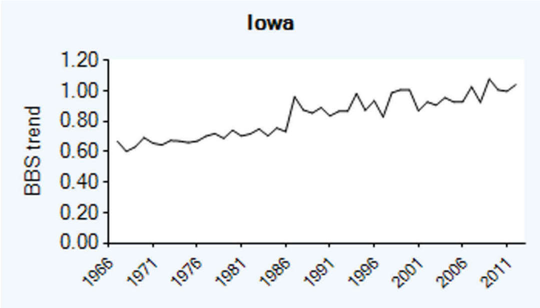


Sponsored by Ann Johnson

© Adam Ciha

Habitat	Savanna-like habitats; in Iowa especially nests in woodlots with nearby grassland
Breeding Dates	15 Mar (PR)–27 Aug (CO)
Nest Type	Tree cavity excavated by woodpeckers and readily uses nest boxes; especially those placed on grassy roadsides
Clutch Size	4–6 eggs (Iowa mean = 5 eggs)
Incubation	29–31 days
Fledging	28–31 days
Status	Common nesting species
BBS Trend	Increasing (trend = 1.8, 95% CI is 0.2, 3.2) [Iowa]

Patterns since BBA I



The American Kestrel is the most numerous and most widespread nesting falcon in Iowa and second only to Red-tailed Hawk in total number of blocks where it was documented. This smallest falcon was documented in 605 (76.5%) of BBA II blocks, compared to 517 (60%) of blocks during BBA I. For this adaptable species that requires only small patches of habitat, there was little difference between nesting evidence in habitat (46.6%) and grid (53.4%) blocks. The fairly high rate of confirmation (31.4%) can be particularly related to the visibility of family groups at farmsteads. This seemed especially true in the highly agricultural areas of northern Iowa where woodlots offered the only available nesting habitat. Data for the American Kestrel from the Illinois BBA showed similar results to Iowa. This small falcon was found statewide, documented in 59.1% of all Illinois blocks and confirmed nesting in 39.5% of blocks where it was found (Kleen et al. 2004). The BBS trend estimates for this species is upward for both Illinois and Iowa, and Iowa's population appears to be increasing at a rate of 1.8% annually from 2001 to 2011 (Sauer et al. 2012).

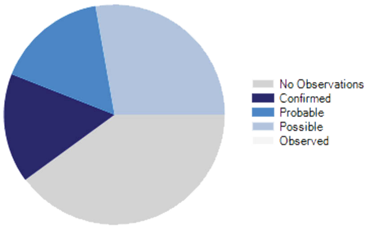
The distribution of American Kestrel changed little since the first atlas, and the number of blocks with confirmed nesting increased from 138 to 190, a 37% increase. The proportion of blocks with confirmed nesting was similar throughout the state, and high nest confirmation rates appeared most evident within counties that contain roadside nest box trails running through strings of grid blocks. Iowa DNR and its conservation partners erected at least 1,000 nest boxes along roadsides in 43 counties from 1983–1997. Of the 304 nest boxes monitored in 1997 on these trails, 214 (70%) were used by nesting American Kestrels, and 186 (87%) of these nests produced fledged young, with 4.1 young fledged per successful nest (Iowa DNR unpublished data). Smallwood and Bird (2002) noted that about 67% of wild kestrel nests are successful, while nest box hatching success in several states ranged from 62% to 89% and almost 90% of hatchlings fledged; a good indicator that nest boxes are quite successful at fledging young (Varland et al. 1991, Varland and Loughin 1993).

While kestrels in Missouri are known to often raise two broods of young (Toland 1983), Iowa's best evidence of double brooding is from a nest box trail in Boone County, where a banded female kestrel left behind her approximately 20-day-old young in one nest box, with her mate attending, while she incubated four eggs in a nest box nearly one-half mile away on 10 June 1998 (Iowa DNR unpublished data). According to Bird and Palmer (1988), a second brood is less likely in more northern latitudes, and Ontario is as far north as a second brood has been reported. The introduction of nest box programs in Iowa and other states and provinces allows American Kestrels to nest in formerly unoccupied habitats. This is particularly true when these unoccupied habitats contain good grassland foraging habitat and lack nest cavities (Smallwood and Bird 2002).

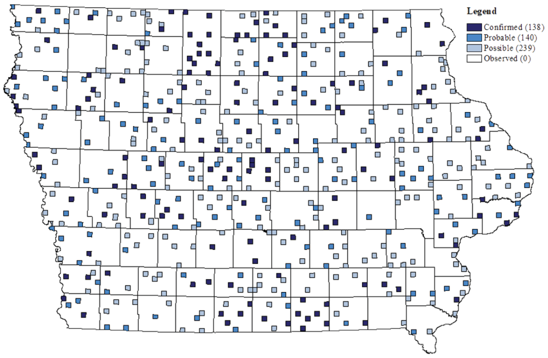
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	110	129	239
Probable	71	69	140
Confirmed	75	63	138
Conf & Prob	28.00%	33.10%	32.30%

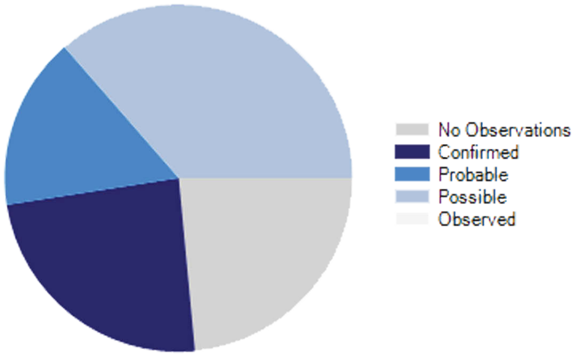
BBA I Results



BBA I



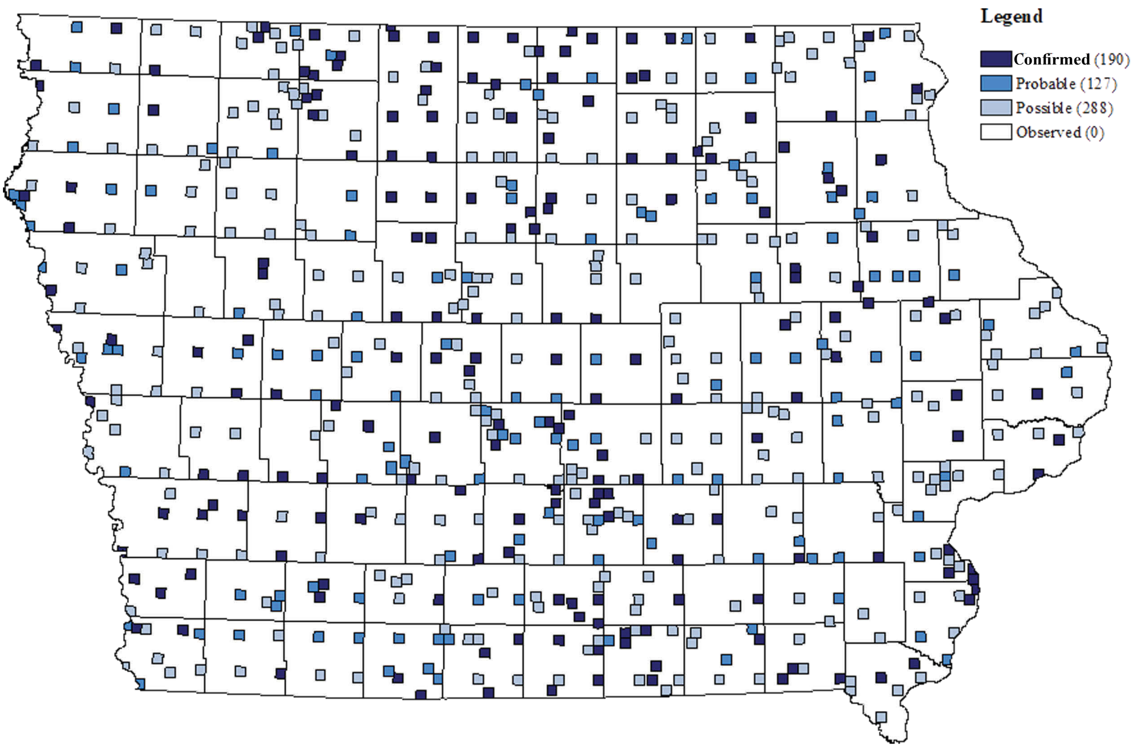
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	148	140	288
Probable	77	53	130
Confirmed	99	91	190
Conf & Prob	33.70%	36.10%	37.20%

BBA II



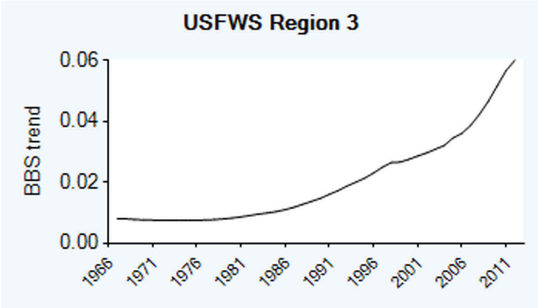
Sponsored by Prairie Rapids Audubon Society

© Doug Harr

Habitat	Areas that contain both tree groves and adjoining open areas of fields, grassland, and brushy vegetation
Breeding Dates	NA
Nest Type	Abandoned nests of crows or magpies
Clutch Size	5–6 eggs typically
Incubation	28–32 days
Fledging	25–30 days
Status	Historic nester
BBS Trend	Increasing (trend = 4.4, 95% CI is 2.2, 6.3) [Central US]

Patterns since BBA I

The Merlin, once known as Pigeon Hawk, is a medium-size falcon species that formerly nested in Iowa (Kent and Dinsmore 1996). There are two historic nest records for Iowa. According to Bailey (1918), "Professor Lynds Jones found a nest of the Pigeon Hawk in a hole in a linden tree, near Grinnell, April 28, in which were four eggs," while Jones only recorded the species as nesting in Poweshiek County (Jones 1889 in Kent and Dinsmore 1996). The second nest record (Linn County) is verified by a set of two Merlin eggs, placed at the Coe College Museum, that were "collected by Mr. George H. Berry in Wild-cat Grove, seven miles northeast of Marion, April 27, 1908" (Bailey 1918).



There were no Merlin records during the first atlas, and only one observation of a Merlin was reported during the second atlas project. The observation was of a prairie Merlin (*Falco columbarius richardsonii*) in Adair County on 5 July 2011. The closest nesting population of prairie Merlin is western Nebraska, and the closest nesting population of taiga Merlin (*Falco columbarius columbarius*) is Minneapolis, Minnesota (Svingen 2001). The most reliable wintering site in Iowa for both subspecies of Merlin is the Glendale Cemetery in Des Moines, where, since 1999, from one to seven Merlins have been witnessed (Cecil and Johnson 2000, Cecil 2004, Moore 2012). Urban Merlins especially nest in conifers in residential areas, parks, and cemeteries (Warkentin et al. 2005). It seems that the two main reasons for urban populations of this falcon are the high availability of safe nesting sites (particularly corvid nests in spruces) and high prey abundance (especially House Sparrows, *Passer domesticus*) (Sodhi et al. 1992).

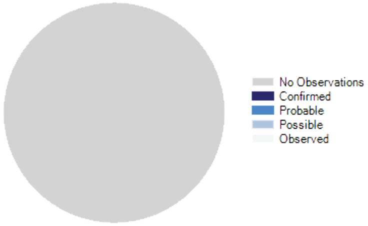
Merlin breeding populations have colonized an increasing number of urban centers within the last 30 years. It appears that growing urban populations happened at the same time this species was recovering from population lows experienced from the effects of the DDT era, the same time that many rural populations disappeared (Warkentin et al. 2005). The BBS data for Canada and regional and continental CBC data indicate stable or increasing populations from the 1960s through the early 2000s, with significant increases occurring in the 1990s (Kirk and Hyslop 1998, Hoffman and Smith 2003).With an increasing number of Merlin sightings in Iowa during migration and winter (Kent and Dinsmore 1996) and an established wintering site at Glendale Cemetery in Des Moines since 1999, there was speculation that the Merlin would one day again nest in Iowa (J. J. Dinsmore 2004).

In 2016, two taiga Merlin nests were confirmed in Iowa, the first documented nests in this state since 1908. First sighted in late-March 2016, a Merlin pair was reported to have taken over a crow's nest in a tall spruce tree near a cemetery in Iowa City (Dan McRoberts, pers. comm.). Five young fledged at that site in late June. Merlins took over a crow's nest at the top of a white pine tree at the second nest site, in Waterloo, where three young fledged by 12 July 2016 (Tom Schilke pers. comm.). Merlins have been reported in both Waterloo and Iowa City during nesting seasons from 2017–2020. Two nests have been confirmed in Waterloo in 2020, with three young near fledging at one site on 25 July 2020 (Tom Schilke pers. comm.).

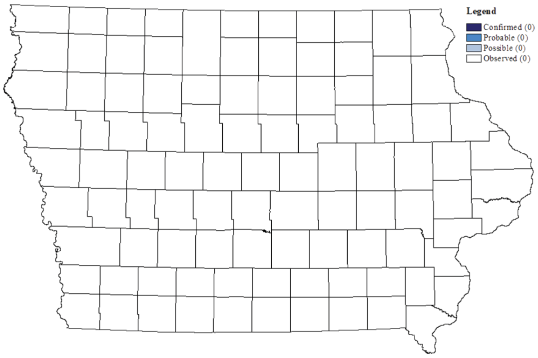
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	0	0	0
Probable	0	0	0
Confirmed	0	0	0
Conf & Prob	0.00%	0.00%	0.00%

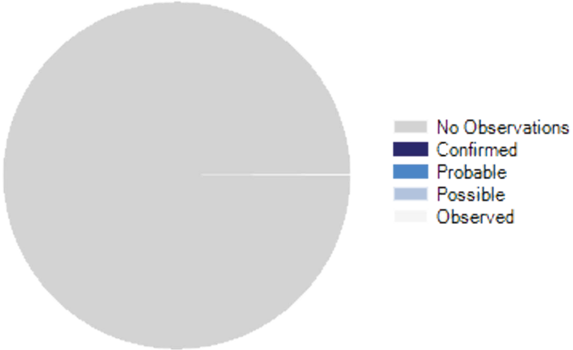
BBA I Results



BBA I



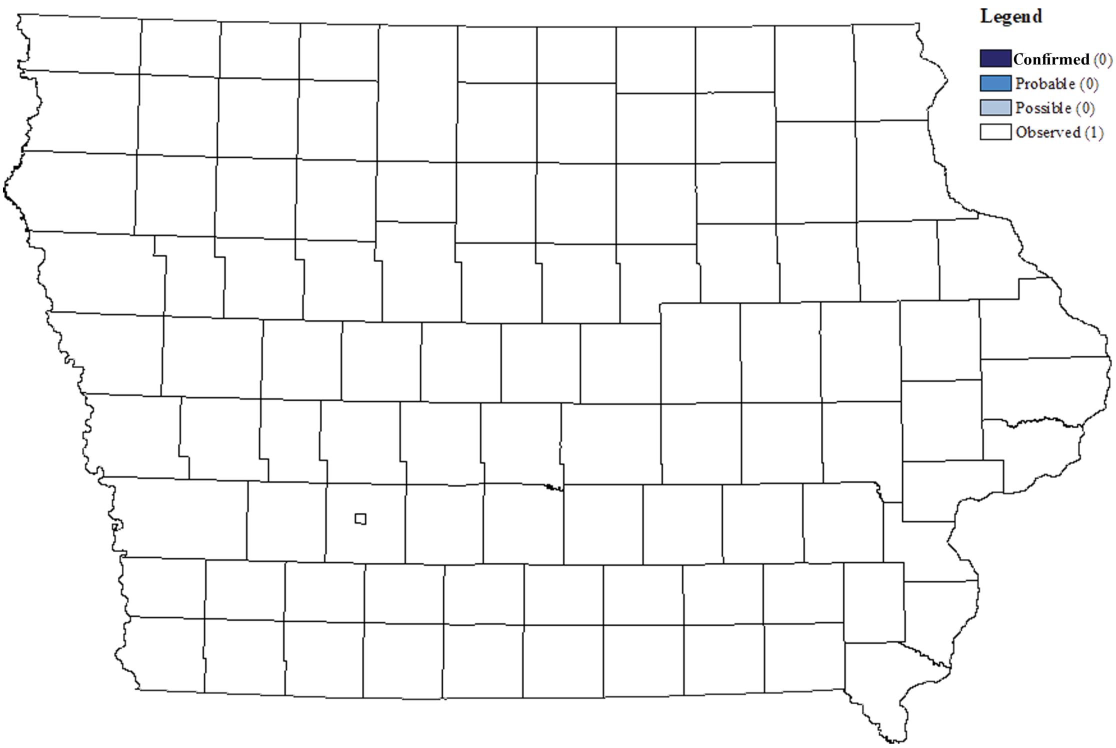
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	1	0	1
Possible	0	0	0
Probable	0	0	0
Confirmed	0	0	0
Conf & Prob	0.00%	0.00%	0.00%

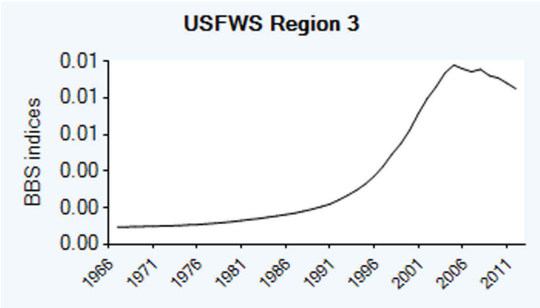
BBA II



© Adam Ciha

Habitat	Riparian cliffs, ledges and nest structures on tall buildings and under bridges of Mississippi River
Breeding Dates	20 May (CO)–9 Jul (PR)
Nest Type	Scrape in dirt or gravel of cliff ledge or in nest structure on building or under bridge
Clutch Size	3–5 eggs (Iowa mean = 4 eggs)
Incubation	29–32 days
Fledging	32–42 days
Status	Permanent resident that nests locally (reintroduced)
BBS Trend	No Trend Available

Patterns since BBA I



The Peregrine Falcon historically nested on cliff sites along the Mississippi River, as far south as Clinton County, and it also nested on the "palisades" along the Cedar River in southeastern Linn County and northeastern Johnson County (Bailey 1918). Other historic eyries included tree nests in Blackhawk and Polk counties. The last nesting report in bluffs along the Mississippi River was for 1967 (Roosa and Stravers 1989). No evidence of nesting occurred during BBA I, but Peregrine Falcon reintroduction efforts begun in 1989 resulted in successful nests in both Des Moines (Polk County) and Cedar Rapids (Linn County) in 1993. Between 1989 and 2003, a total of 167 falcons were released at various sites in Iowa, with most released from bluff sites along the Mississippi River. During BBA II, this species was detected in 12 (1.5%) blocks, with confirmed nesting in three of those blocks and probable nesting in one block. The Mississippi River bluffs of Allamakee County held two of the confirmed nesting records, and the third nest site was in Davenport (Scott County). The probable record was a pair of peregrines spotted near limestone bluffs of the Upper Iowa River in Winneshiek Co.

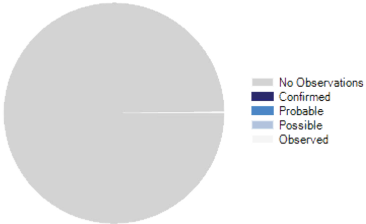
While three Peregrine Falcon nest sites are within atlas blocks, most nest sites are outside of blocks. For instance, during 2012 conservation agency staff and volunteers documented peregrine territories at 15 sites, with thirteen of those eyries successfully producing 34 fledglings (Pat Schlarbaum pers. comm.). Most of those territories are associated with the Mississippi River. Territories located away from the Mississippi River include two nest sites in Des Moines, one in Cedar Rapids, and one nest on a smokestack at Chillicothe (Wapello County). The adaptation of this species to nest in urban environments, as well as under bridges and in nest boxes at various locations, is an important reason for its successful widespread recovery (Cade et al. 1996, White et al. 2002). This adaptation to nest in new environments is also the reason that Iowa's current peregrine nesting distribution differs from historic distribution.

The Iowa Peregrine Falcon Recovery Team deserves most of the credit for the 2009 Iowa delisting of the Peregrine Falcon. Bob Anderson and his Raptor Resource Project team members, who were members of that falcon recovery team, deserve special credit for gathering the Mississippi River peregrine nesting data each year that allowed Iowa to delist this falcon. Even though Great Horned Owls were a principal predator on young peregrines during early years of reintroduction efforts (Cade et al. 1988, Barclay and Cade 1983), there is growing evidence (R. Anderson pers. comm.) that peregrines nesting on the Mississippi River today do not tolerate presence of owls and have learned how to aggressively reduce predation by this large owl. The goal of returning the Peregrine Falcon to its native bluff-land eyries seems achieved, and as human-related threats continue, it will require continued vigilance to maintain the current population of this noble species and the habitat it requires.

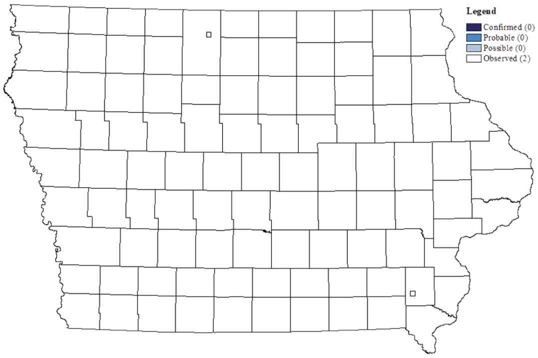
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	2	0	2
Possible	0	0	0
Probable	0	0	0
Confirmed	0	0	0
Conf & Prob	0.00%	0.00%	0.00%

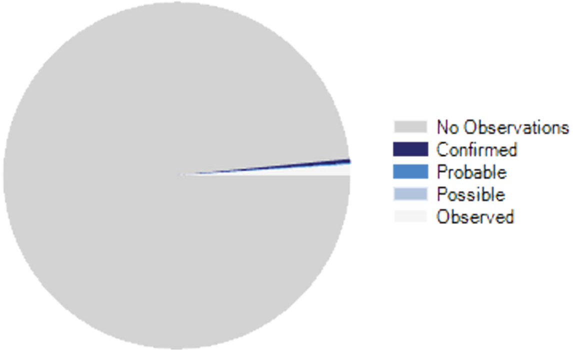
BBA I Results



BBA I



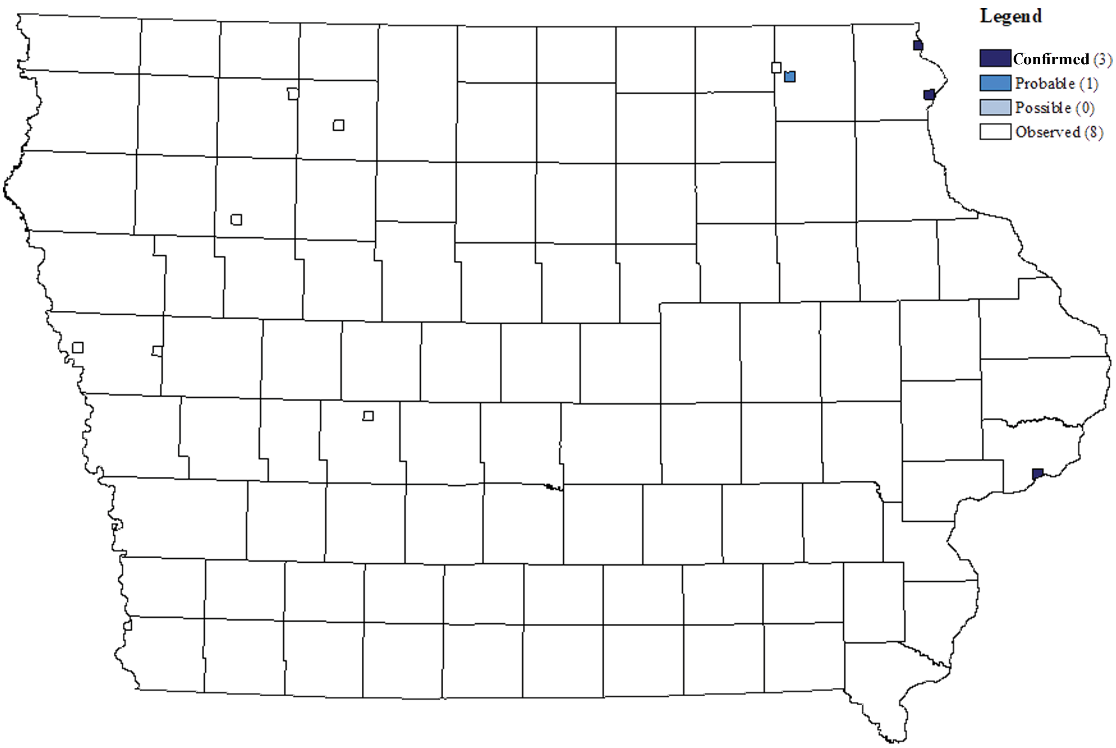
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	2	6	8
Possible	0	0	0
Probable	1	0	1
Confirmed	1	2	3
Conf & Prob	0.40%	0.50%	0.50%

BBA II



Sponsored by Garrison and Justus Frese

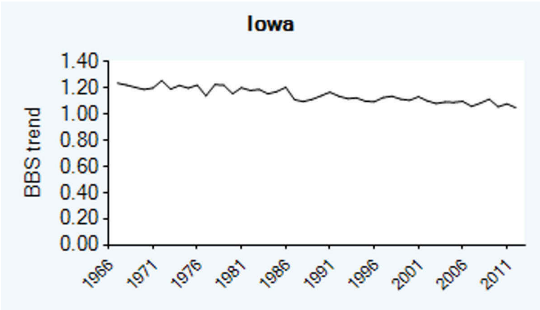
Great Crested Flycatcher *Myiarchus crinitus*

© Stanley Buman

Habitat	Most common in open deciduous or mixed woodlands and edges of clearings, including second-growth and selectively cut woodlands; may favor mesic or wet forests over dry forests
Breeding Dates	5 May (PR)–26 Aug (PR)
Nest Type	Secondary cavity (natural or excavated) that may be used in successive years; may use human-made cavities
Clutch Size	4–5 eggs
Incubation	13–15 days
Fledging	14–15 days
Status	Common summer resident
BBS Trend	Stable (trend = –0.2, 95% CI is –1.2, 0.8) [Iowa]

Patterns since BBA I

The Great Crested Flycatcher occurs statewide as a common summer resident, particularly along major river corridors in riparian forests. It tends to utilize moist, open woodlands and edges, less so closed canopy forest or very open savanna. The great crested is a secondary cavity nester and the only cavity-nesting flycatcher in eastern North America (Miller and Lanyon 2020). The presence of snags, therefore, is an attractive and crucial habitat feature, and it chiefly nests in cavities created by woodpeckers. Unlike more area sensitive species, this flycatcher apparently has benefited from the fragmentation of deciduous forest and an increase in woodland edges and woodlots (Miller and Lanyon 2020).



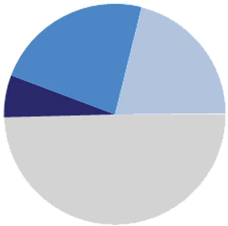
During BBA II, this flycatcher appeared to be most numerous in southern and south-central Iowa and in the Iowa lakes region of Clay and Dickinson counties, as well as along Iowa's major river system. The distribution of this species appeared similar between BBA I and BBA II, although it was detected in more blocks in the latter atlas (50.3% in BBA I versus 76.4% in BBA II). Confirmed nesting evidence was found more frequently in habitat blocks for both atlases, with (77.4%) in BBA I and (76.6%) in BBA II, while nest confirmations in grid blocks was (22.6%) in BBA I and (23.4%) in BBA II. This notable difference may be related to easier access to confirm nesting on public land. Another notable difference was the increased frequency of probable and confirmed breeding observations during BBA II (59.7%) than BBA I (29.3%), which may be related to increased effort to confirm nesting during BBA II. Continued maturation of Iowa forests and presumed greater abundance of natural cavities in older trees is another possible explanation for the greater number of probable and confirmed breeding records of this flycatcher during BBA II.

Kent and Dinsmore (1996) reported that this species was most common in eastern Iowa; however, this was not evident in records from BBA I or BBA II. Jackson et al. (1996) believed that this flycatcher was most abundant in northeastern, southeastern, and southern Iowa, as well as along wooded river valleys, and speculated that it might be more abundant than BBA I data suggested. Since the species is less vocal in later June, during the more crucial nesting period, it may have been overlooked by atlassers. Land-use practices and management that create and maintain snags and dead trees can increase nesting and foraging habitat for this species. Proliferation of martin houses, wood duck, bluebird, and other nesting boxes could also contribute to the possible increased abundance of the Great Crested Flycatcher.

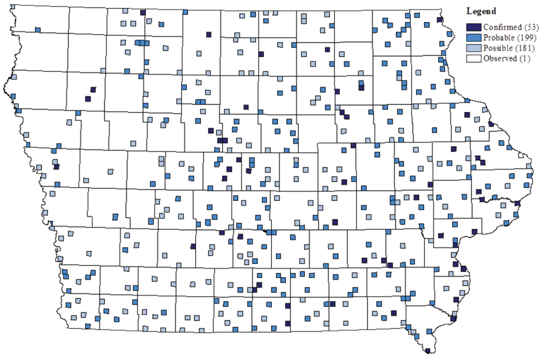
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	1	1
Possible	82	99	181
Probable	63	136	199
Confirmed	12	41	53
Conf & Prob	14.40%	44.40%	29.30%

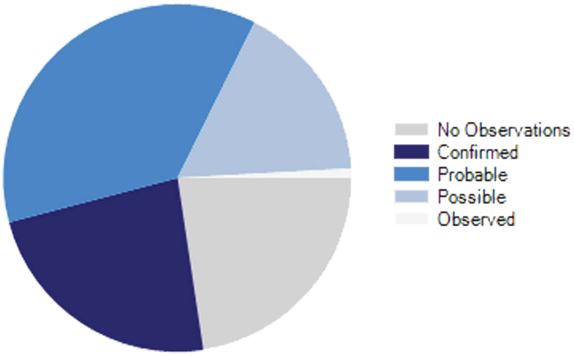
BBA I Results



BBA I



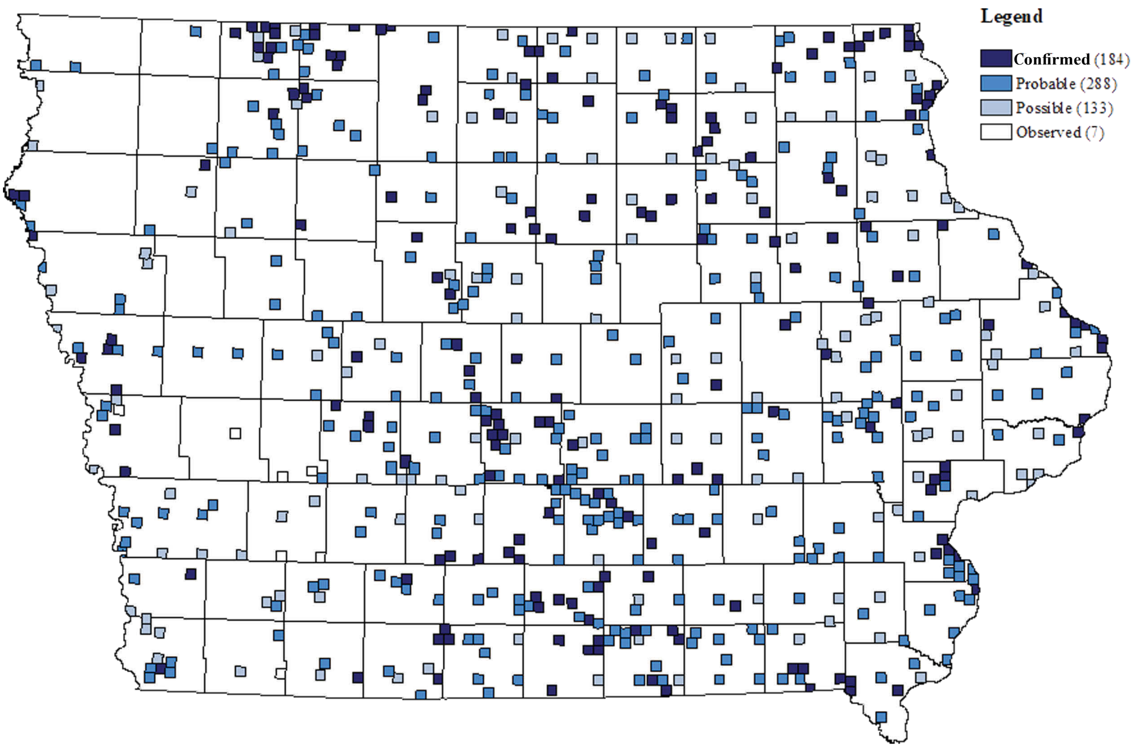
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	5	2	7
Possible	87	46	133
Probable	110	178	288
Confirmed	43	141	184
Conf & Prob	29.30%	79.90%	54.80%

BBA II



Sponsored by Charlie VanTassel

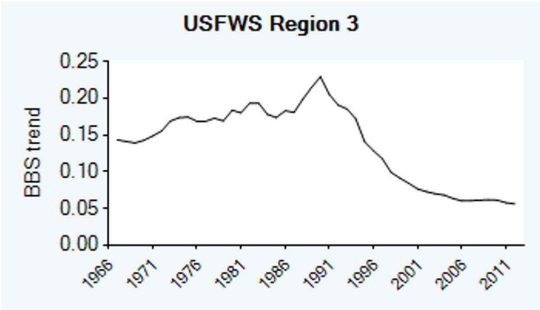
Western Kingbird *Tyrannus verticalis*

© Tyler Harms

Habitat	Open habitats such as grasslands, pastures, cultivated fields, urban areas, and savanna habitats
Breeding Dates	15 May (PR)–25 Aug (PR)
Nest Type	Open cup nest in tree, shrub or human structure comprised of stems of forbs, grasses, rootlets, and fine twigs; outer cup lined with fine material such as hair and feathers
Clutch Size	2–5 eggs
Incubation	12–19 days, mean = 14 days
Fledging	16 days avg.
Status	Regular summer resident in the Missouri River Valley; irregular central IA
BBS Trend	Increasing (trend = 0.5, 95% CI is 0.1, 0.9) [Central US]

Patterns since BBA I

A grassland species where sparse scattered trees like cottonwoods occur, Iowa is the extreme eastern edge of the Western Kingbird range. In neighboring Nebraska, open riparian woodland dominated by eastern cottonwood is the favored habitat. Where their ranges are sympatric, this species occupies similar habitat as Eastern Kingbird but it apportions habitat by nesting in taller, larger diameter trees (Jackson et al. 1996). Anderson (1907) and Roberts (1932) postulated that a range expansion eastward was occurring in Iowa and Minnesota, perhaps due to settlement and the increased availability of trees as nest sites. This range expansion appears to have stalled or reversed itself for now, and Western Kingbirds are once again regular breeders primarily in the Missouri River Valley with a small number of scattered records in central and northeastern Iowa. The BBS data from 1966 to 2009 indicate a slightly increasing population trend of 0.5%/year for the United States (Sauer et al. 2012).



Western Kingbird frequency of occurrence and distribution were similar between BBA I (5.5% of blocks) and BBA II (5.7%) except for a paucity of records in northwest Iowa along the Little Sioux River and the Iowa lakes region during BBA II, compared to BBA I. Two records (one each of probable and possible nesting) along the Wapsipinicon River in Chickasaw County during BBA II were notable. During BBA I there were 47 (5.5%) total records of Western Kingbird compared to 45 (5.7%) records during BBA II. There were 11 confirmed nesting records for each atlas. One notable difference in data was the frequency of probable records, with 20 (42.6%) during BBA I and only nine (20%) during BBA II. Comparing records from private and public land blocks, 38.4% of BBA I and 35.6% of BBA II records were in grid blocks and 61.7% of BBA I and 64.4% of BBA II records were in priority blocks. This species was found substantially more in public land blocks. Because the Western Kingbird is quite vocal and aggressive toward other birds, it is typically quite conspicuous to those who are looking for it. Its distribution is probably fairly well represented by Iowa BBA data.

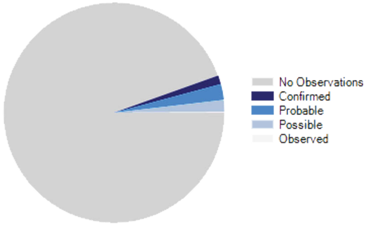
Continued loss of short to moderately tall grasslands to cultivation and tree encroachment, due to the suppression of fire and grazing, may be adversely affecting this species in Iowa. Continued removal of older cottonwood groves, especially in conjunction with cultivation of pastures in riparian areas also reduces potential habitat for Western Kingbirds. Management efforts that benefit this species include protection and restoration of riparian habitats, especially in western Iowa where it traditionally nests. Maintaining open riparian woodland, even small patches of it, to provide nesting habitat for Western Kingbirds should allow this spunky flycatcher to prosper.

By Rex R. Johnson

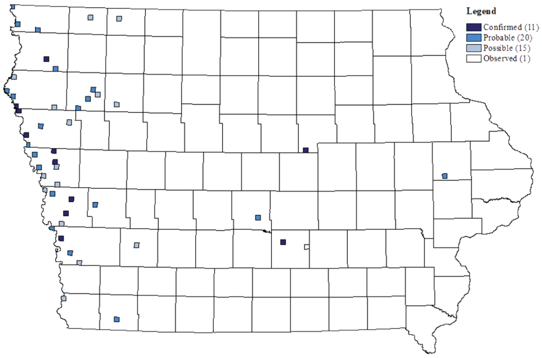
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	1	0	1
Possible	5	10	15
Probable	8	12	20
Confirmed	4	7	11
Conf & Prob	2.30%	4.80%	3.60%

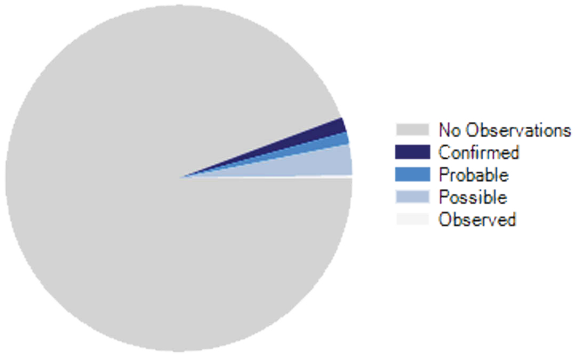
BBA I Results



BBA I



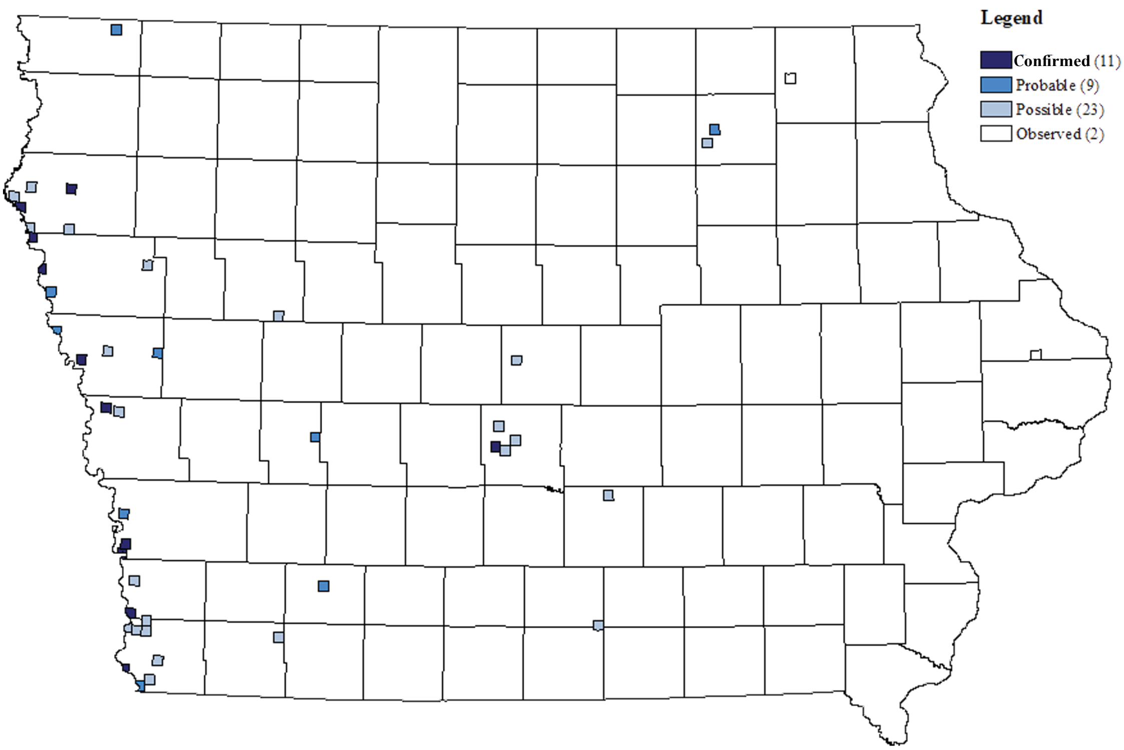
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	2	0	2
Possible	7	16	23
Probable	4	5	9
Confirmed	3	8	11
Conf & Prob	1.30%	3.30%	2.30%

BBA II

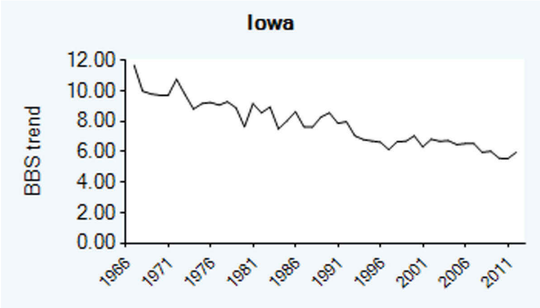


Sponsored by Jim Murdock

© Larry Dau

Habitat	Fields with scattered shrubs and trees, savanna, orchards, and especially along woodland edges in forested regions
Breeding Dates	4 May (PR)–4 Sep (CO)
Nest Type	Open cup comprised of small twigs, coarse roots, dry weed stems, and bark strips; interior neat and circular and lined with soft material
Clutch Size	2–5 eggs
Incubation	14–17 days
Fledging	16–17 days; young of smaller broods may mature faster
Status	Common summer resident
BBS Trend	Decreasing (trend = −1.5, 95% CI is −2.3, −0.8) [Iowa]

Patterns since BBA I



Along with the Red-headed Woodpecker (*Melanerpes erythrocephalus*), Baltimore Oriole (*Icterus gallbula*), and Blue Jay (*Cyanocitta cristata*), Eastern Kingbirds are classic species of oak savanna, a plant association that has been severely impacted in Iowa by settlement. Distribution in eastern North America in precolonial times may have been limited to swamps, marshes, edges of lakes and rivers, and open, disturbed environments (i.e., large forest blow-downs and forest fires). Today, this species has adapted to using virtually any open habitat with a few scattered trees (Jackson et al. 1996). The Eastern Kingbird nests in a much wider array of habitats than does the Western Kingbird. Zaletel and J. J. Dinsmore (1985) estimated that the statewide population had increased since the mid-1960s, with large increases in abundance in northeast and north-central Iowa and slight decreases elsewhere. Analyses of BBS data indicate that since 1966 the continental population declined on average 1.28%/year (Sauer et al. 2012). The most recent BBS trend estimates suggest that the Iowa population is slowly declining, and it currently is listed as a Species of Greatest Conservation Need.

Eastern Kingbirds return to Iowa in early May and typically begin nesting within 7–8 days of arrival, although some late arriving individuals may not begin pair formation until early June and may not begin nesting until 2–3 weeks later. From August to mid-September, Eastern Kingbirds form flocks that commonly sit on fences or overhead wires. Some of these premigration flocks may be quite large. Since the Eastern Kingbird is aggressive and vocal, it is one of the easiest species for a bird atlasser to locate.

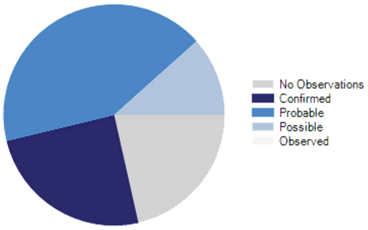
During BBA I, Eastern Kingbirds were encountered in nearly 80% of survey blocks. Distribution and abundance may have increased since the first atlas, because during BBA II this species was recorded in 788 (99.6%) of survey blocks and was a probable or confirmed breeder in more than 95% of all blocks in the state. Essentially, this kingbird probably nested in every BBA II block in this state. The most obvious difference between BBA I and BBA II was the percentage of blocks with probable (42.2%) or confirmed breeding (31.5%) during BBA I versus 23.8% and 71.4% during BBA II, respectively. The reason for this increased evidence of breeding is unclear, although effort significantly increased to confirm nesting during the second atlas and there were more experienced atlassers during the second atlas than during the first one. Young birds are dependent on their parents for 4–5 weeks post fledging, which allowed atlassers plenty of opportunities to record either recently fledged young or adults attending young.

Eastern Kingbirds are primarily insectivores, and their diet is comprised of about 86% insects during the breeding season (Murphy and Pyle 2020). In a state like Iowa, where applying insecticides is an integral part of producing crops in an industrial agricultural landscape, there is growing evidence that such practices are negatively impacting insectivore bird species. Long-term, ongoing continent-wide negative population trends for Eastern Kingbird are cause for concern, a condition shared with many other aerial insectivorous bird species (Murphy and Pyle 2020).

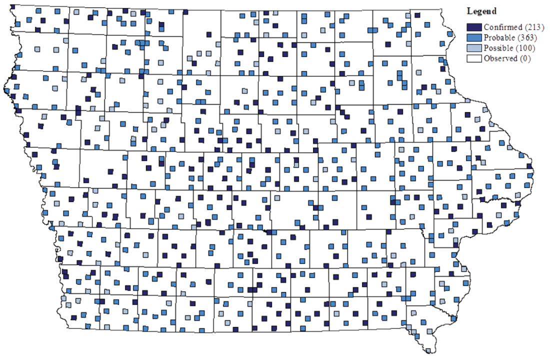
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	70	30	100
Probable	181	182	363
Confirmed	94	119	213
Conf & Prob	52.70%	75.40%	66.90%

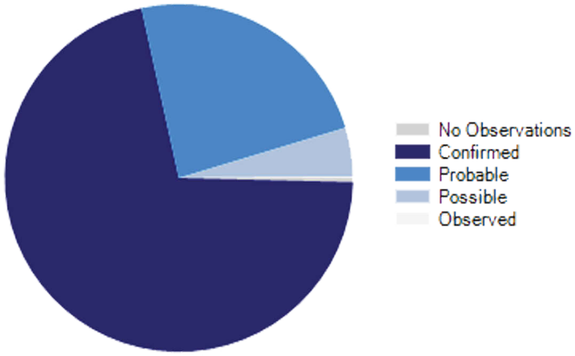
BBA I Results



BBA I



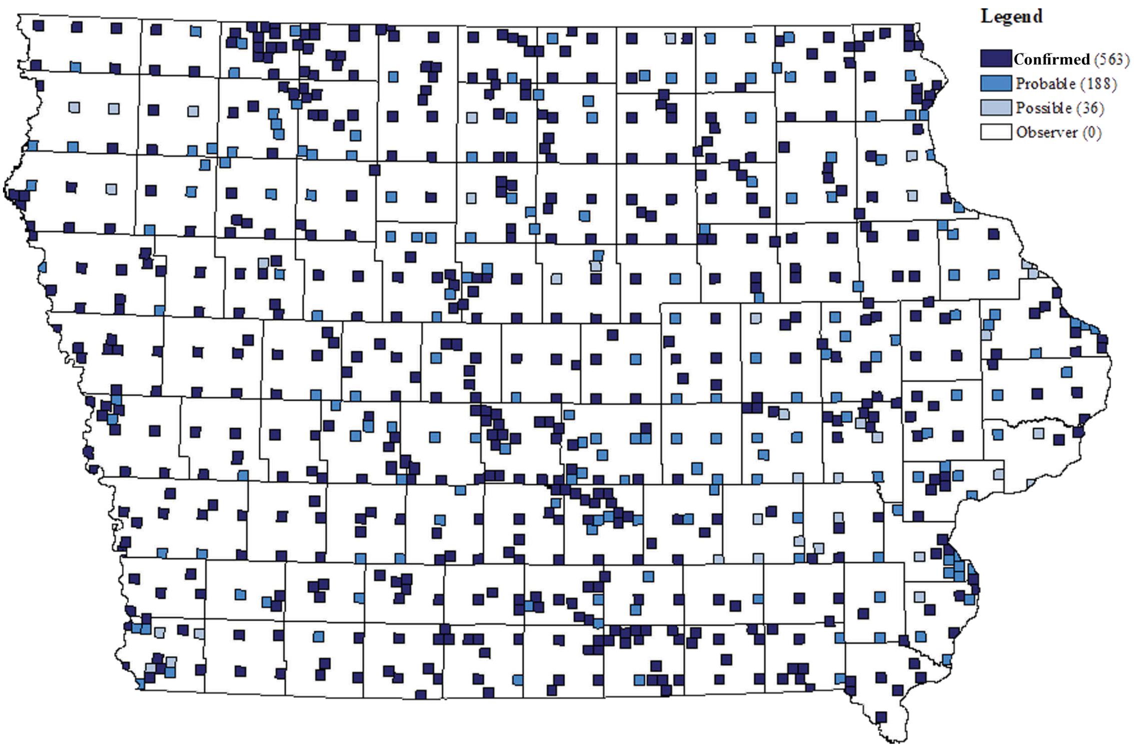
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	1	1
Possible	25	11	36
Probable	107	81	188
Confirmed	260	303	563
Conf & Prob	70.30%	96.20%	87.20%

BBA II



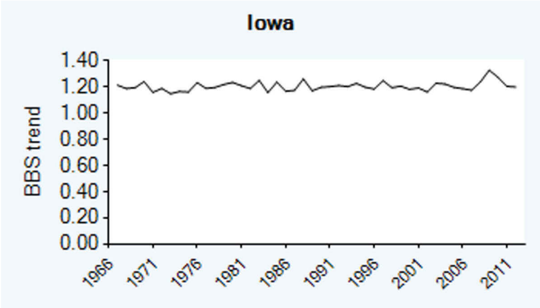
Sponsored by Ric Zarwell

© Linda Petersen

Habitat	Wooded areas of all types and sizes
Breeding Dates	15 May (PR)–4 Sep (CO)
Nest Type	Shallow cup in tree or sapling
Clutch Size	Usually 2–4 eggs, mean = 3
Incubation	12–13 days
Fledging	15–18 days
Status	Common and widespread
BBS Trend	Stable (trend = −0.1, 95% CI is −1.2, 0.9) [Iowa]

Patterns since BBA I

In Iowa, the Eastern Wood-Pewee is a deciduous forest generalist, occupying open mature forests and young or uneven age forest stands. It is typically found in more open habitats than the Least Flycatcher (*Empidonax minimus*) or Acadian Flycatcher (*E. virescens*) (Hespenheide 1971). Although occurring throughout the state, it may be most encountered adjacent to major rivers and wetlands (Murray and Stauffer 1995) in the forests of the driftless region of northeastern Iowa and in the woodland-grassland mosaic of southern Iowa. Mature mesic wetlands may be preferred, as in the driftless region where an average of 4.4 individuals were observed along BBS routes versus 0.8–1.9 elsewhere in the state (Kent and Dinsmore 1996).



Like results found for other flycatcher species, the number of records for this species increased between atlas periods (Jackson et al. 1996). Since Iowa's BBS trend indicates that this species is stable (Sauer et al. 2012), it is likely that the increased number of records resulted from increased atlassing effort during BBA II, although the number of nesting confirmations was significantly higher in BBA II. It is also possible that the increased number of encounters was due to the continued maturation of Iowa's forests and relatively low BBS sampling intensity.

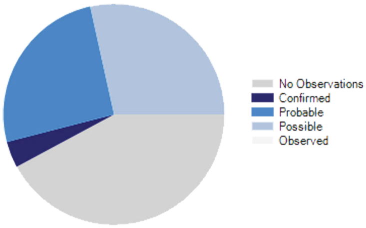
BBA II results suggest that variables affecting this species distribution may include forest community composition and structure, stand size, proximity to streams or wetlands, longitude, and terrain characteristics. In 28 Iowa plots, habitat suitability for Eastern Wood-Pewee increased rapidly with tree density from 0–100 trees/ha and then leveled off or declined (Best and Stauffer 1986). In eastern deciduous forests, this species was found in more open sites with low-density canopy cover than the sympatric Least and Acadian Flycatchers. This species appears to require forest openings and associated edges and is typically absent in areas of closed canopy (Hespenheide 1971).

Although populations are apparently stable in Iowa, range-wide the species has experienced a long-term decline. Management includes the maintenance of large blocks of mature forest combined with strategic small clear cuts and selective harvest of mature trees to create openings. Management for Ruffed Grouse (*Bonasa umbellus*), where they occur, and Eastern Wood-Pewee seems compatible.

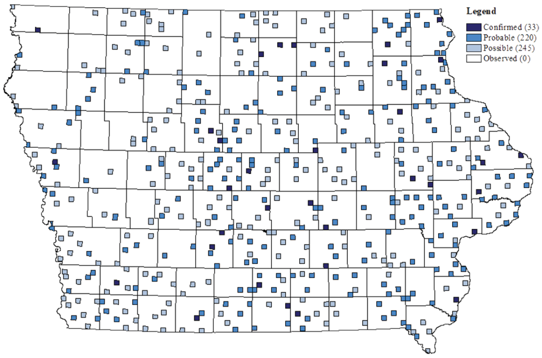
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	124	121	245
Probable	70	150	220
Confirmed	12	21	33
Conf & Prob	15.70%	42.90%	29.40%

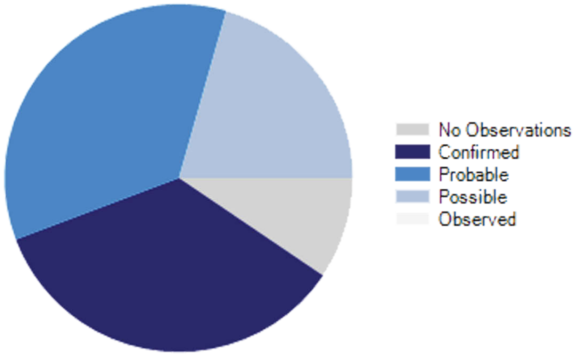
BBA I Results



BBA I



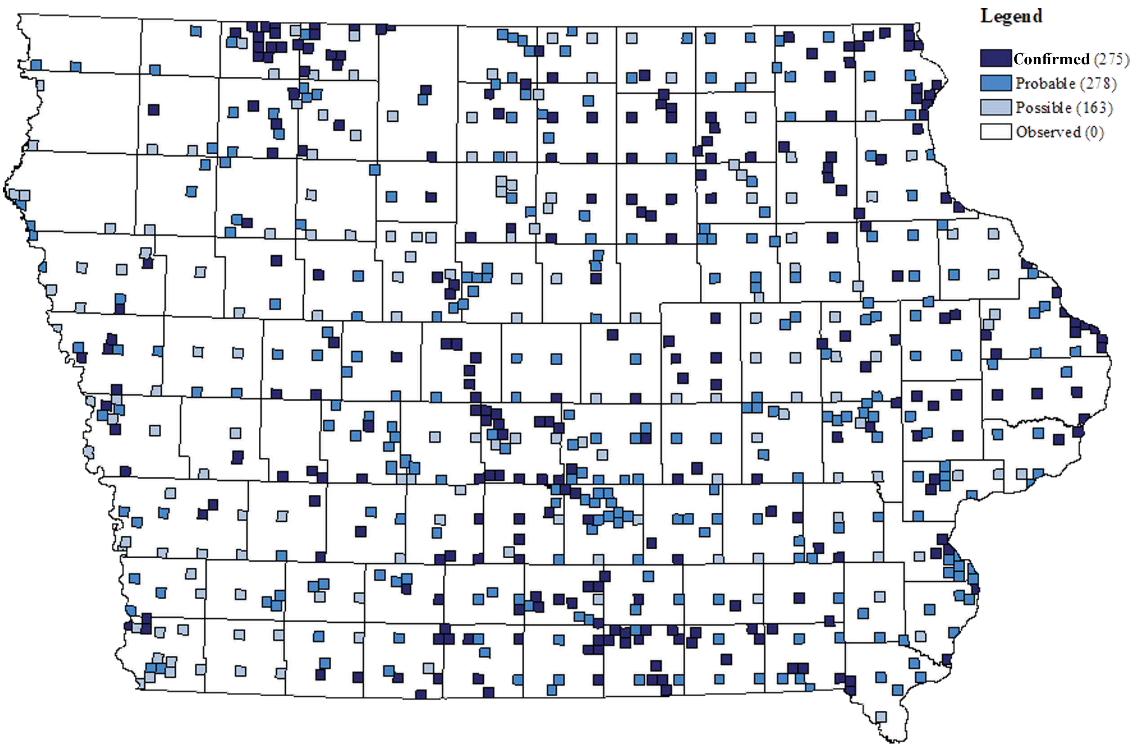
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	112	51	163
Probable	126	153	279
Confirmed	95	180	275
Conf & Prob	42.30%	83.50%	64.30%

BBA II



Sponsored by Michael Thomas

© Paul Roisen

Habitat Large tracts of mature deciduous forest in heavily wooded ravines

Breeding Dates 14 May (PR)–9 Aug (CO)

Nest Type Shallow cup comprised of bark, twigs, grass, and spider webs; streamers of plant material hang from the bottom; suspended hammock-like in a lower branch fork of a small tree

Clutch Size 1–4, usually 3

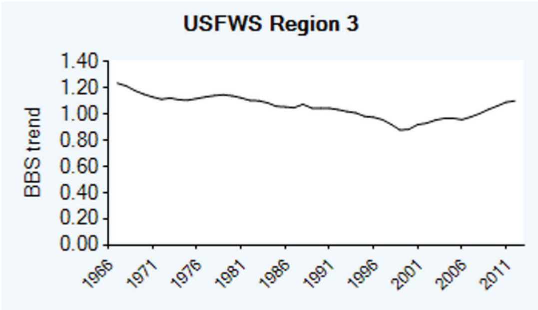
Incubation 13–15 days

Fledging 12–18 days

Status Uncommon breeder of mature forest, especially in the eastern part of the state and along major rivers

BBS Trend Stable (trend = 0.1, 95% CI is −0.6, 0.8) [Central US]

Patterns since BBA I



The Acadian Flycatcher is a species that is strongly associated with large, mature deciduous forests and is often affiliated with forested hillsides and deep ravines adjacent to larger rivers. Like results found for many other forest bird species, the number of Acadian Flycatcher records collected increased dramatically between atlas periods, with records from 61 (7.1%) BBA I blocks more than doubled to 152 (19.2%) BBA II blocks. While not enough records are gathered during Iowa's BBS to establish any trend (Sauer et al. 2012), data from the U.S. BBS show an overall stable trend. The number of nesting confirmations increased from ten (16.4%) BBA I blocks to 43 (28.3%) BBA II blocks. This higher number of nesting confirmations in the second atlas may be somewhat related to an increased effort by atlassers to confirm nesting. It is meaningful that 91% of all documented nest records were from public land blocks, where there was much more direct access and, apparently, more of the preferred Acadian Flycatcher habitat. As further evidence of blocks holding public forested property being more suitable habitat for Acadian Flycatcher nesting, 81% of all BBA II Acadian Flycatcher records came from habitat blocks. A similar trend was seen in BBA I, when 67% of the records came from priority blocks (Jackson et al. 1996). Another similarity between the two atlases is that there was a slightly higher proportion of possible records than probable. During BBA II, 39% of records were possible and about 32% were probable nesting. Similarly, during BBA I, 46% of records were possible and 33% were probable (Jackson et al. 1996).

Perhaps partially related to the increased maturity of Iowa forests since the first atlas, the distribution for Acadian Flycatcher is shifting slightly westward. Kent and Dinsmore (1996) describe this bird as a rare summer resident of heavily wooded river valleys of eastern and central Iowa. While that distribution description is still largely true, BBA II records indicate a likely range expansion of this species into extreme western Iowa, specifically into the increasingly forested area of the Loess Hills and into northwestern Iowa along the Little Sioux River. This deep forest flycatcher was found in 38 counties during BBA I (Jackson et al. 1996) and in 60 counties during BBA II.

Both male and female Acadian Flycatchers show significant nesting site fidelity, returning to the same breeding areas year after year (Whitehead and Taylor 2002). If this species experiences good nesting success in western Iowa, it seems likely that this species will continue to increase as the availability of its favored habitat increases in western Iowa. Because this species is considered to be area-sensitive (Freemark and Collins 1992), because it is negatively impacted by habitat fragmentation (Askins et al. 1990), and since its existence is threatened on both its wintering and breeding grounds, the Acadian Flycatcher has been assigned a relatively high-priority ranking (tied for fifteenth place among 110 Midwest Neotropical migrants) for management and monitoring (Thompson et al. 1993). Acadian Flycatcher is listed as a Species of Greatest Conservation Need in Iowa.

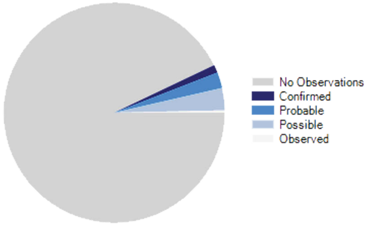
The most important management action to be taken for Acadian Flycatcher is the conservation of large mature forest habitats on both its breeding and wintering grounds. Ideally, these large forest tracts will have a patch size >10,000 ha and include as little human disturbance as possible (Thompson et al. 1996).

By Bruce L. Ehresman

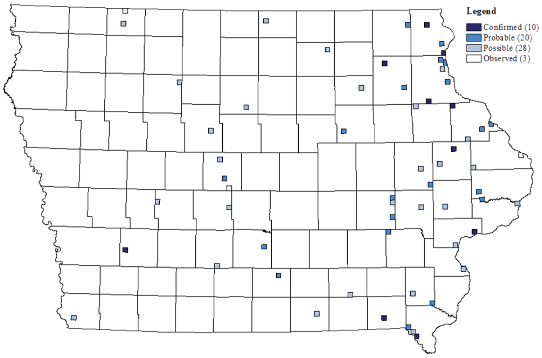
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	1	2	3
Possible	11	17	28
Probable	6	14	20
Confirmed	2	8	10
Conf & Prob	1.50%	5.50%	3.50%

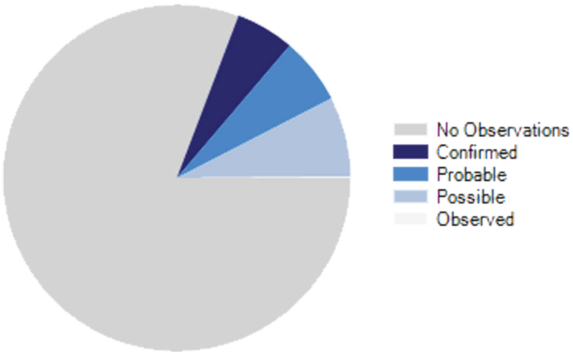
BBA I Results



BBA I



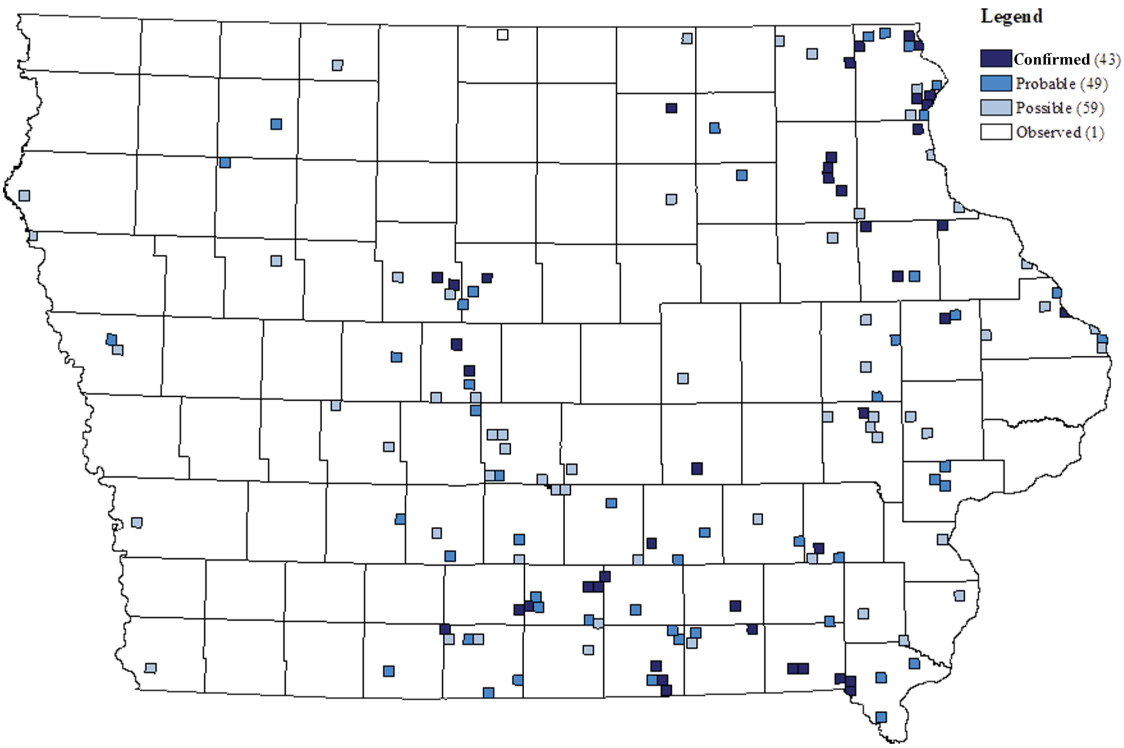
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	1	1
Possible	13	47	60
Probable	12	37	49
Confirmed	4	39	43
Conf & Prob	3.10%	19.00%	10.70%

BBA II



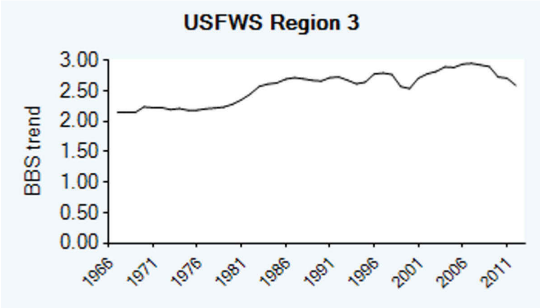
Sponsored by Paul Roisen

© Stephen J. Dinsmore

Habitat	Shrub-dominated wetlands or early succession moist thickets; shallow emergent wetlands with willow encroachment
Breeding Dates	8 Jul (PR)–16 Jul (CO)
Nest Type	Loose bowl of coarse grasses, often with grass streamers, constructed in shrub layer 2–2.6 ft above ground
Clutch Size	3–4 eggs
Incubation	~11 days
Fledging	~14 days
Status	Rare breeding species, common and widespread during migration
BBS Trend	Increasing (trend = 1.9, 95% CI is 1.0, 2.6) [Central US]

Patterns since BBA I

In other parts of their range, Alder Flycatchers occupy shrub dominated wetlands (Payne 1991) with an herbaceous understory, moist, brushy thickets and young stands of deciduous trees with high shrub stem densities and cover (Morgan and Freedman 1986). Iowa lies south of its normal breeding range, and the bogs of central Minnesota and Wisconsin are typically as far south as this species breeds.



The Alder Flycatcher was a new breeding species detected during BBA II. A single observed record in extreme north-central Iowa was the only evidence of its presence in BBA I (Jackson et al. 1996). During BBA II, Alder Flycatcher had two possible breeding records—in extreme northeastern Iowa (Allamakee County) and in central Iowa (Hamilton County)—and one confirmed breeding record near Des Moines in Dallas County (S. J. Dinsmore 2009). There apparently were observed records statewide, albeit at low density. The observed records are assumed to be migrants moving through the state.

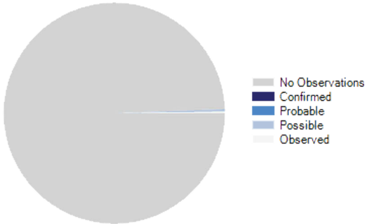
Even in Wisconsin and Minnesota, where Alder Flycatcher is found on some BBS routes, there are too few records to determine any population trend. The general trend of increased flycatcher records during BBA II, and the detection of Alder Flycatcher, specifically, could be attributable to a variety of factors. These include range-wide population increases, a shift in species' ranges, increased observer ability, sensitivity or awareness during BBA II, changes in habitat characteristics including forage availability, moderately short-term changes in weather patterns, or long-term climate change. Kent and Dinsmore (1996) did not report Alder Flycatcher breeding in Iowa but noted late spring singing and speculated that July observations could be early fall migrants. The near identical appearance of Alder Flycatcher to the Willow Flycatcher (*Empidonax traillii*), and similarity of its vocalizations to Willow Flycatcher vocalizations, may have masked Alder Flycatcher in BBA I and other previous surveys. Conversely, at least some observations of Alder Flycatcher during BBA II could have been Willow Flycatcher, which breed at low densities across the state.

A territorial male Alder flycatcher was documented at a shrubby wetland site on two separate surveys in June 2019, during a bird point count survey on the Jennett Heritage Area in Story County (Bruce Ehresman pers. obs.). Perhaps more Alder Flycatchers are nesting in Iowa than are known. Considering that Willow and Alder flycatchers cannot be visually distinguished from one another and the fact that these species can be found in quite similar habitat, more effort will be required before the breeding status of Alder Flycatcher in Iowa is determined.

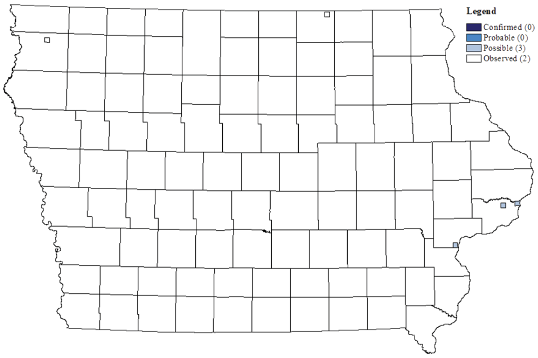
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	1	1	2
Possible	0	3	3
Probable	0	0	0
Confirmed	0	0	0
Conf & Prob	0.00%	0.00%	0.00%

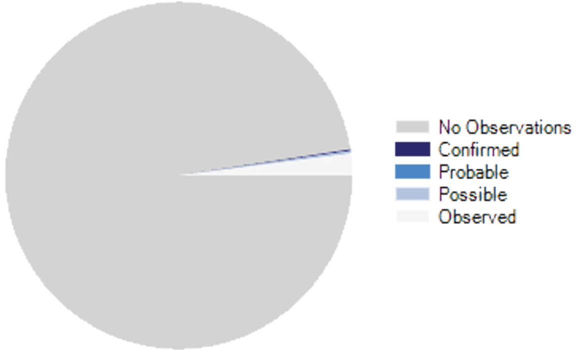
BBA I Results



BBA I



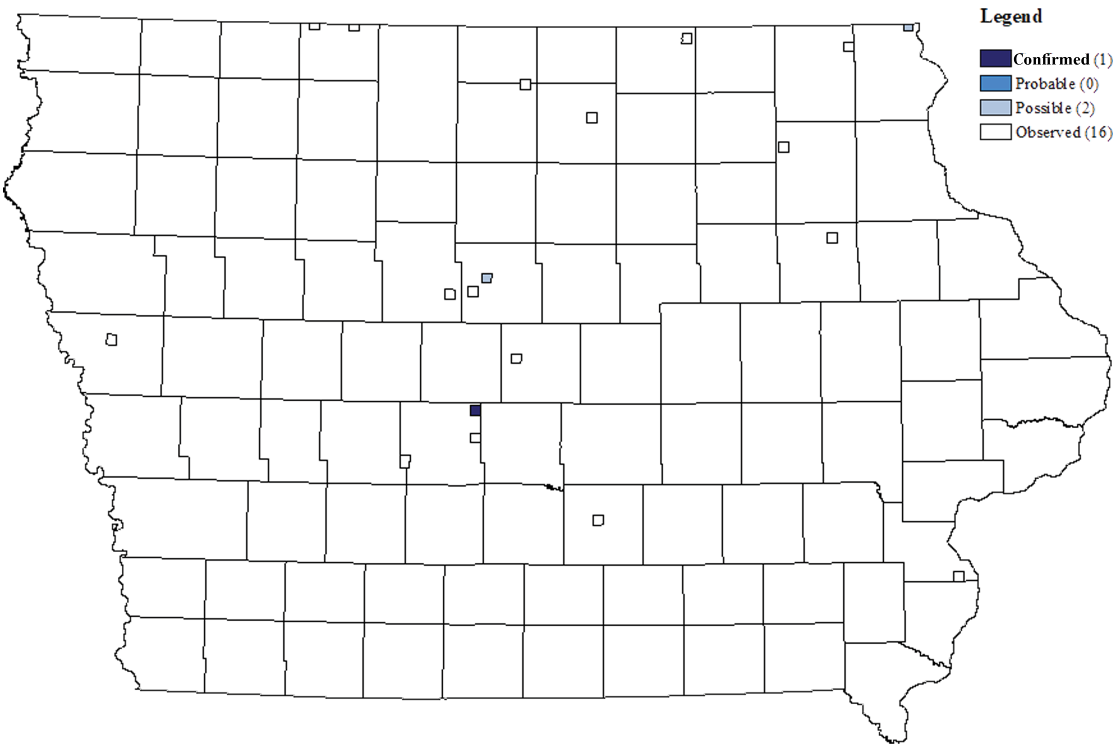
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	5	11	16
Possible	0	2	2
Probable	0	0	0
Confirmed	0	1	1
Conf & Prob	0.00%	0.30%	0.10%

BBA II

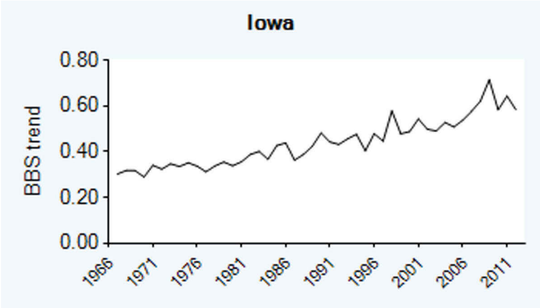


Sponsored by John Rutenbeck

© Mark Brown

Habitat	Variety of shrubby and usually wet habitats especially in willows and dogwoods next to marshes, streams, and ponds
Breeding Dates	19 May (PR)–12 Aug (PR)
Nest Type	Compact cup nest comprised of grass, bark, twigs, and spider webs lined with hair, down, fine grass, lichens, and cottony material and placed in an upright fork of a shrub
Clutch Size	3–4 eggs
Incubation	13–14 days
Fledging	13–15 days
Status	Regular statewide nester
BBS Trend	Increasing (trend = 2.2, 95% CI is 0.7, 3.7) [Iowa]

Patterns since BBA I



While the Willow Flycatcher is best known for inhabiting willow thickets and other moist areas lined with shrubs or small trees, it also is found in shrubby upland areas, like hedgerows, dogwood thickets, and brushy roadsides (Graber et al. 1974, Peterjohn and Rice 1991). Similar to results found for other flycatcher species, the number of Willow Flycatcher records collected increased dramatically between atlas periods. While there were records from 174 (20%) BBA I blocks, that number more than doubled to 402 (50.8%) BBA II blocks. This increase may reflect Iowa's BBS trend, which indicates that this species is increasing at an average annual increase of 2.2% (Sauer et al. 2012). The number of nesting confirmations increased from 11 (6.3%) BBA I blocks to 115 (28.6%) BBA II blocks. This dramatic increase in the number of nesting confirmations in the second atlas is almost certainly related to an increased effort to document nests. Since about 82% of all documented nest records were detected in public land blocks, direct access to public land probably allowed more opportunity to confirm nesting for this species. During the first atlas, it was pointed out that the preferred shrubby habitat for this species was five times greater in priority blocks (with public land) than standard blocks that are primarily private land (Jackson et al. 1996). As evidence of public land blocks holding more suitable nesting habitat for Willow flycatcher than private land blocks, 68% of all BBA II Willow Flycatcher records came from habitat blocks, and 66% of the BBA I records came from priority blocks (Jackson et al. 1996). Another similarity between the two atlases is that there were more possible records than probable. During BBA II, 44% of records were possible and about 27% were probable nesting. During BBA I, 60% of records were possible and 33% were probable (Jackson et al. 1996).

While the Iowa distribution for Willow Flycatcher remains statewide, BBA II data indicate this species occurred more readily in many more southern Iowa counties than it was recorded in during BBA I. Jackson et al. (1996) reported this flycatcher in 78 counties during BBA I, and it was recorded in 91 counties during BBA II. Like the first atlas, this bird was not found in multiple western counties. In the eastern three-fourths of the state, the only two counties in which it was not found during BBA II are Henry and Wapello. The dramatic increase in records from south-central Iowa may be related to much more effort expended atlassing southern Iowa, and it also may be related to an increase in Willow Flycatcher numbers in that portion of the state, where there exists a higher proportion of early successional habitat.

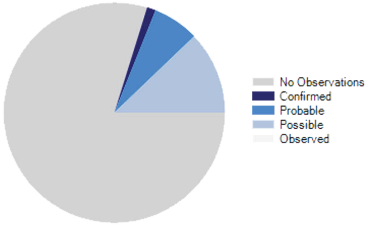
Habitat loss and degradation (including overgrazing by livestock) are the major causes for the decline of this species (Sedgwick 2000), which increases mammal predation, the major cause of seasonal nest losses for Willow Flycatchers (Sedgwick and Iko 1999). According to McCabe (1991), the Willow Flycatcher has the largest north-south and east-west range of any of the tyrant flycatchers. This large range is helpful for maintaining a potentially stable population. It also helps that this species is not especially sensitive to the size of habitat patches that it inhabits. In Iowa, perhaps the most important management action to be taken for Willow Flycatcher is maintaining an abundance of early successional habitat, particularly willow thickets near water.

By Bruce L. Ehresman

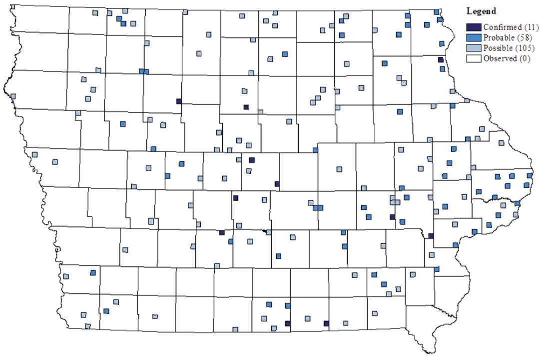
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	32	73	105
Probable	22	36	58
Confirmed	5	6	11
Conf & Prob	5.20%	10.50%	8.00%

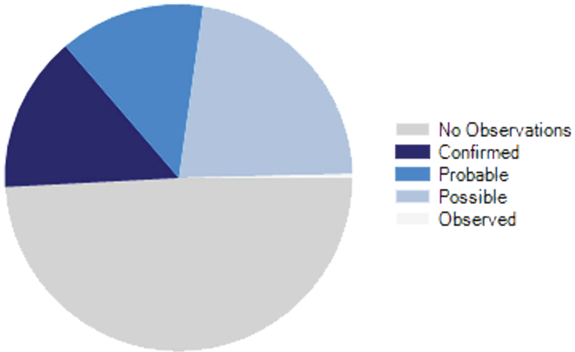
BBA I Results



BBA I



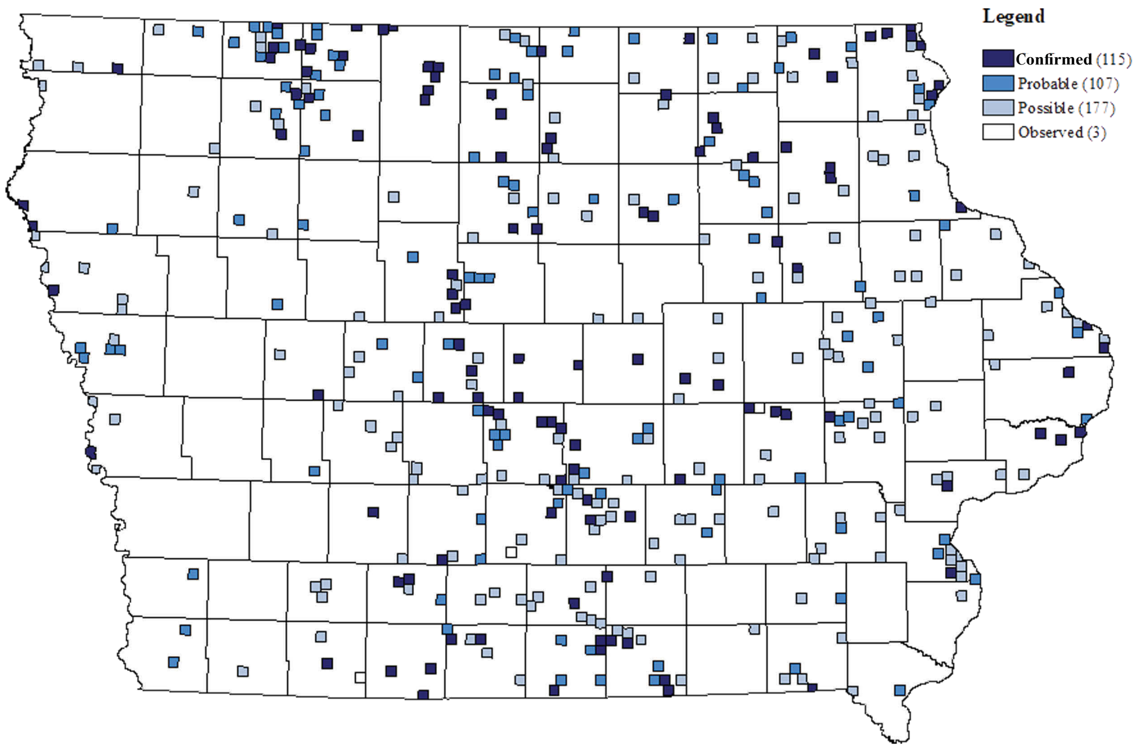
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	1	2	3
Possible	76	101	177
Probable	30	77	107
Confirmed	21	94	115
Conf & Prob	9.80%	42.90%	25.80%

BBA II



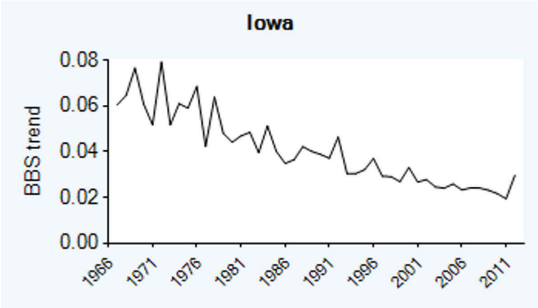
Sponsored by Jan Null

© Larry Dau

Habitat	Variety of woodland habitats, especially in open deciduous woodlands and also shrubby savanna habitats
Breeding Dates	24 May (PR)–8 Aug (PR)
Nest Type	Small compact cup nest comprised of woven grasses, bark, stems, and spider webs lined with hair, down, and fine materials and placed in the crotch of a small tree or saddled on a limb of a large branch
Clutch Size	usually 4
Incubation	13–15 days
Fledging	12–17 days
Status	Regular; occasional nester in northern Iowa
BBS Trend	Stable (trend = −2.4, 95% CI is −6.1, 0.7) [Iowa]

Patterns since BBA I

In Iowa, the Least Flycatcher is a bird of mid-successional and mature deciduous woodlands. It is typically found in more densely vegetated habitats than Eastern Wood-Pewee and in less densely vegetated forests than Acadian Flycatcher (Hespenheide 1971), and it prefers drier woodlands than other *Empidonax* flycatchers (Walkinshaw 1966). Similar to results found for other flycatcher species, the number of Least Flycatcher records collected significantly increased between atlas periods. Excluding observed records, there were records from 36 (4.0%) BBA I blocks and 77 (9.7%) BBA II blocks. Since Iowa's BBS trend indicates that this species is stable (Sauer et al. 2012), it is likely that the increased number of records resulted from increased atlassing effort during BBA II. The number of nesting confirmations was similar, with two (4.8%) in BBA I blocks and three (2.4%) in BBA II blocks. All three confirmations were of adults attending young. Since 74% of all BBA I records (Jackson et al. 1996) and 77% of all BBA II records were detected in public land blocks, this strongly suggests that public land blocks hold more suitable nesting habitat for Least Flycatcher than private land blocks. During BBA II, about 45% of records were possible and about 14% were probable nesting. During BBA I, 60% of records were possible and 29% were probable (Jackson et al. 1996).



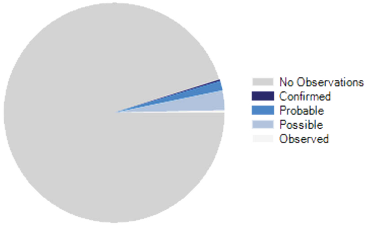
The Iowa distribution for Least Flycatcher was similar for both atlases, although distribution during the second atlas better reflected the historic distribution of this species. According to Kent and Dinsmore (1996), most summer records have been in northeastern and central Iowa, and DuMont (1933) recorded nesting in Polk County. During BBA II, numerous records were procured in north-central Iowa, and there were confirmed nesting records in Emmet, Wright, and Allamakee counties. There also were more possible and probable nest records from southeastern Iowa and central Iowa during the second atlas. This woodland flycatcher was in 32 counties during the first atlas (Jackson et al. 1996), and it was found in more than 50 counties during the second atlas.
According to Tarof and Briskie (2008), the Least Flycatcher is sensitive to the patch size of the habitat that it inhabits, and it appears sensitive to logging, environmental pollution, local disturbances, and deer density. In Iowa, perhaps the most important management action to be taken for this flycatcher is maintaining large contiguous forest tracts with minimal forest disturbances. If large forest openings are created, they should be clustered together instead of making large openings throughout the forest (DellaSala and Rabe 1987). It is especially important to maintain an abundance of mid-successional deciduous forests for Least Flycatcher nesting habitat (Holmes and Sherry 2001). In northwestern Pennsylvania, the abundance of Least Flycatchers significantly dropped in areas of the forest where the understory was over-browsed by excessive numbers of white-tailed deer (DeCalesta 1994), and this same phenomenon was documented in other areas of northeastern United States by Smith et al. (1993). It was found that controlling white-tailed deer populations by regulating densities of 4–8 deer/km^2 will minimize the damage to understory vegetation structure (DeCalesta 1994).

During migration, Rodewald and Matthews (2005) suggest conserving upland forest patches to serve as stopover habitat for Least Flycatchers and other migratory songbirds. Even though highly fragmented upland forests may have dramatically decreased breeding bird species' diversity, these areas appear to offer valuable temporary stopover locations (Tarof and Briskie 2008).

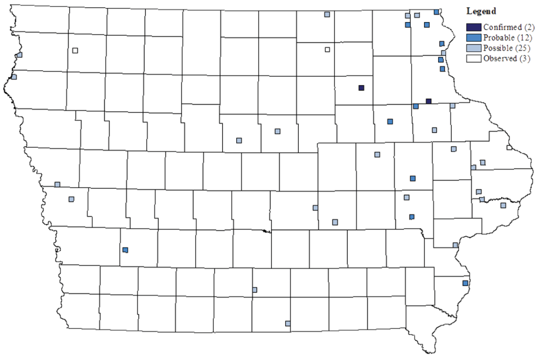
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	1	2	3
Possible	4	21	25
Probable	4	8	12
Confirmed	1	1	2
Conf & Prob	1.00%	2.30%	1.60%

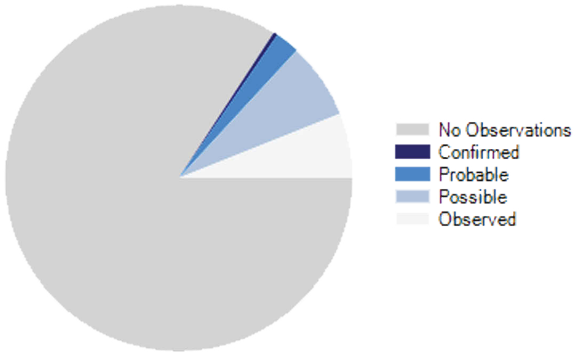
BBA I Results



BBA I



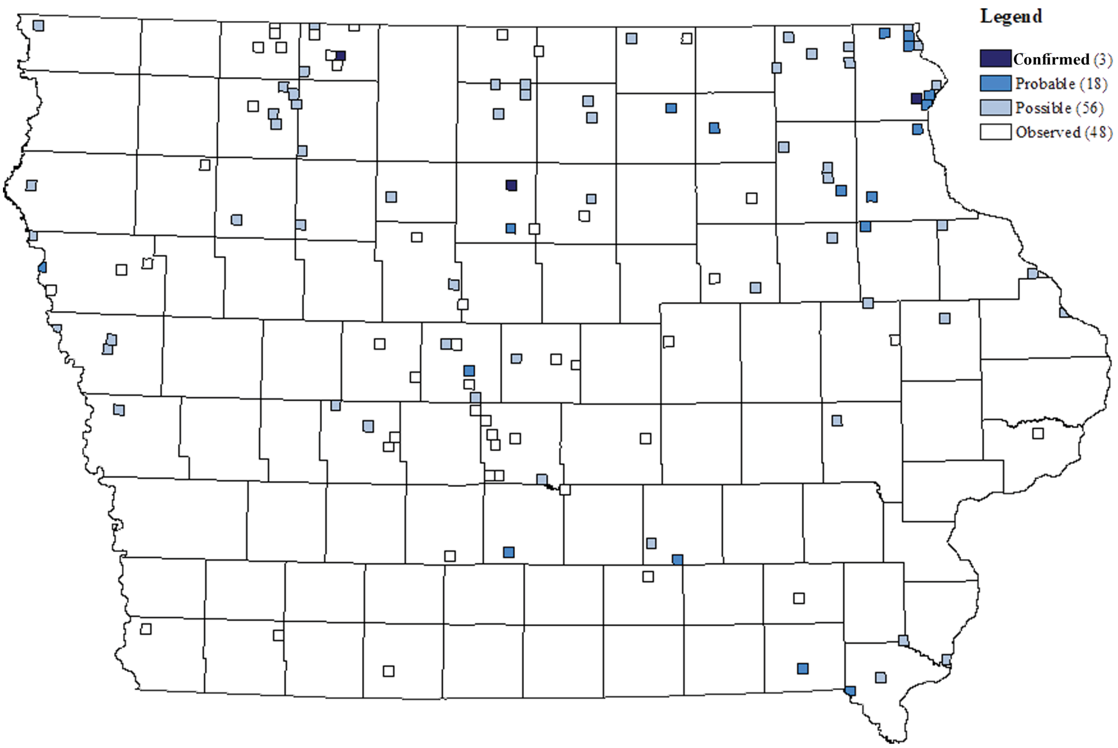
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	11	37	48
Possible	13	43	56
Probable	4	14	18
Confirmed	0	3	3
Conf & Prob	0.80%	4.30%	2.40%

BBA II



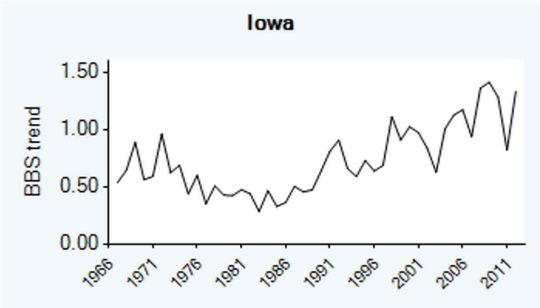
Sponsored by Ann Johnson

© Paul Roisen

Habitat	Woodland and edge habitat near water, often occupying bridges, culverts, buildings, and rock outcrops
Breeding Dates	6 Apr (CO)–18 Aug (PR)
Nest Type	Bowl constructed of mud with diagnostic green moss and lined with fine grass and hair
Clutch Size	4 eggs
Incubation	Typically two broods per year; incubation averages 16 days with second clutch initiated 7–10 days after first brood fledges
Fledging	15–18 days
Status	Common statewide summer resident
BBS Trend	Stable (trend = 0.8, 95% CI is −0.9, 2.5) [Iowa]

Patterns since BBA I

The Eastern Phoebe is a species that normally is found near water with some adjacent woody vegetation (Klaas 1970). Extensive woodlands may make sites more attractive than woodlands of limited extent, but this species is probably more limited by the number of sites near water than woodland availability (Hill and Gates 1988). This species readily adapts to nesting on human structures such as bridges, culverts, or walls of buildings, where anything protrudes and creates a platform to support nests. Nests covered by green moss in these locations are diagnostic of the presence of breeding Eastern Phoebe. This species typically nests twice per season and then may spread out throughout adjacent woodlands.



Anderson (1907) and DuMont (1933) reported that Eastern Phoebe was a common breeding species throughout the state, but by the late 1900s J. J. Dinsmore et al. (1984) reported that it was common in northeast Iowa but rare elsewhere in the state. Zaletel and J. J. Dinsmore (1985) reported that BBS observations had declined statewide from 1968–1980. Kent and Dinsmore (1996) reported that this species was an uncommon breeding species in Iowa. The reasons for these differences are unclear. Deteriorating riparian corridor condition in the early and mid-1900s could account for an historic decline in the species, but it is likely that by the mid-1900s culvert and bridge construction would have led to a population increase. Changes in abundance may be more obscure such as some facet of agricultural practices or technology.

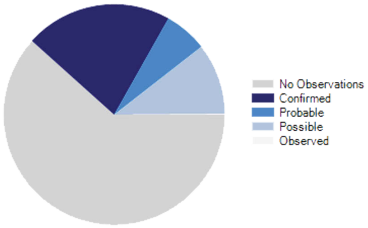
Like other flycatchers, Eastern Phoebes were significantly more abundant during BBA II than BBA I. The reasons for this increased abundance is unclear but may include including population increases, a shift in species' ranges, increased observer ability, sensitivity or awareness during BBA II, changes in habitat characteristics including forage availability, moderately short-term changes in weather patterns, or long-term climate change. During BBA I, this species was a possible, probable, or confirmed breeder in 38.2% of blocks, and was a confirmed breeder in 56.1% of blocks. During BBA II frequency of occurrence increased to 84.1% of blocks and confirmed breeders in 80.5%. The increase in encounters, particularly confirmed breeders, between BBA I and BBA II was striking. The species occurred statewide during both atlassing projects, but during BBA I the frequency of encounters was lower in the northwest Iowa loess plains. This apparent gap in distribution was less evident during BBA II with numerous records along major rivers and in the Iowa lakes region in Dickenson and Clay counties.

Eastern Phoebe breeding distribution, both regionally and locally, is restricted by its unique nest site requirements. The importance of the BBS data in determining population trends, the surveys of which are linked to roads, and the species' strong association with roads because of available bridges and culverts, indicates that research attention needs to be given to the validity of published BBS trends.

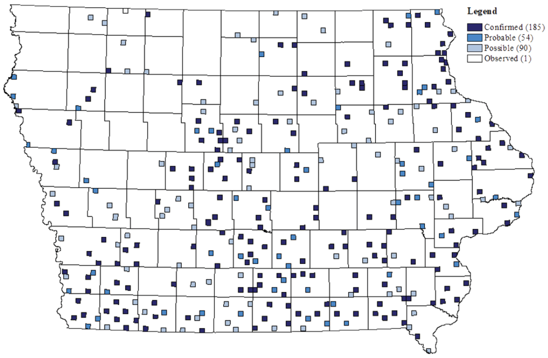
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	1	1
Possible	33	57	90
Probable	20	34	54
Confirmed	77	108	185
Conf & Prob	18.60%	35.60%	27.80%

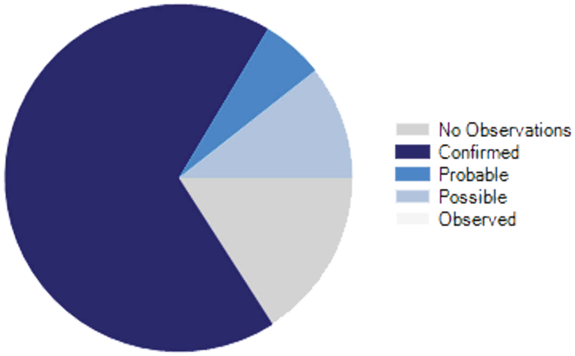
BBA I Results



BBA I



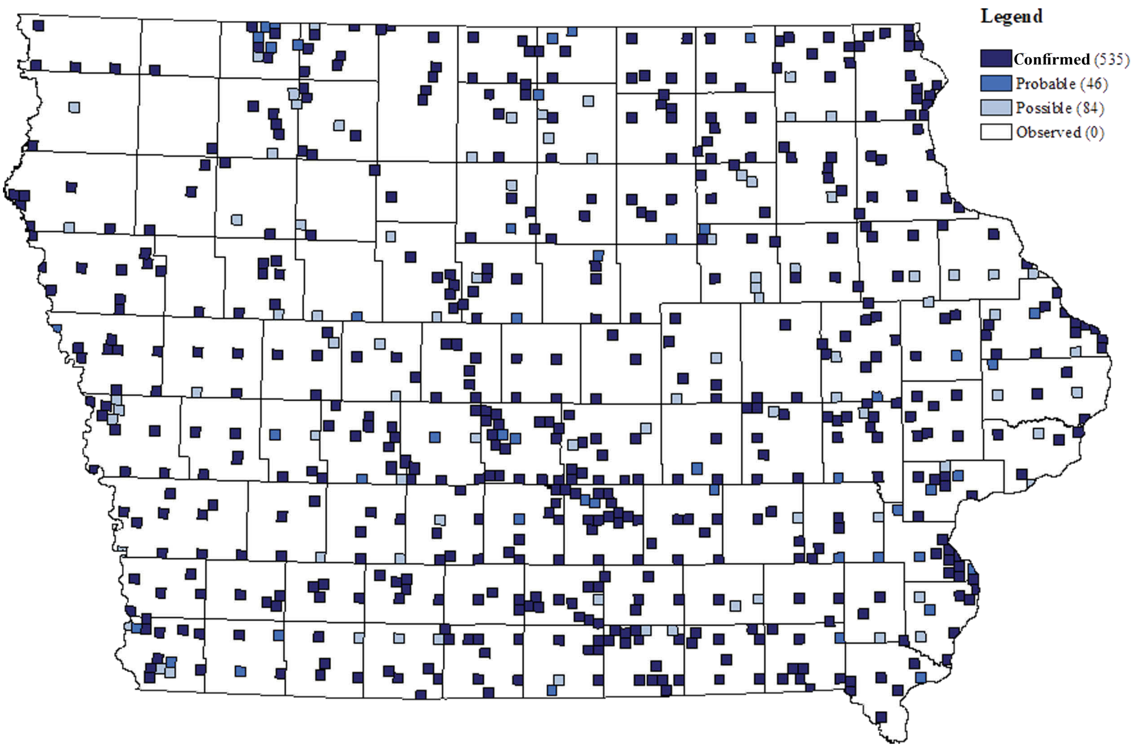
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	51	33	84
Probable	22	24	46
Confirmed	226	309	535
Conf & Prob	47.50%	83.50%	67.50%

BBA II

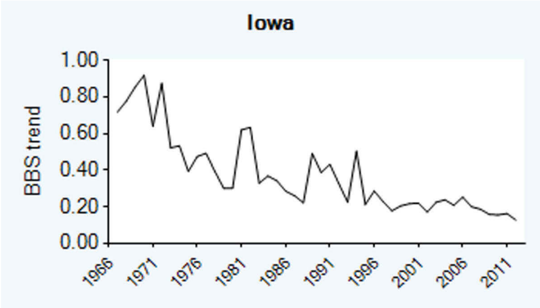


© Reid Allen

Habitat	Medium height grasslands with shrubs, including shrubby pastures, old fields, prairie with shrubs, oak savanna, and orchards
Breeding Dates	24 May (PR)–8 Aug (CO)
Nest Type	Large bulky cup of twigs, herbaceous stems, and bark strips, woven together and lined with finer grasses
Clutch Size	5–6 eggs
Incubation	16–17 days
Fledging	17–20 days
Status	Uncommon breeding species, mostly in SW quarter of state
BBS Trend	Decreasing (trend = −2.5, 95% CI is −5.0, -0.4) [Iowa]

Patterns since BBA I

The Loggerhead Shrike is a species of grassland-shrub habitat and is particularly associated with shrubby pastures, where it prefers to nest in hawthorn, red cedar, or plum trees 4–8 feet off the ground (DeGeus 1990, Yosef 1996). This is a Species of Greatest Conservation Need in Iowa, and Iowa BBS data indicate this shrike is declining at the average annual rate of 2.5% (Sauer et al. 2012). Atlas data reflect this declining trend, and while this species was detected in 185 (21.5%) of BBA I blocks, documentation indicated a 68% decrease to only 59 (7.5%) blocks during the second atlas. During BBA I, it occurred in 51.9% of grid blocks and 48.1% of priority blocks, and during BBA II it was detected in 45.8% of grid blocks and 54.2% habitat blocks, indicating a shift toward using more public land during nesting season.



During the first atlas, this shrike was confirmed nesting in 59 (31.9%) blocks, significantly decreasing to only 14 (23.7%) blocks during the second atlas. Confirmed nesting occurred equally in habitat blocks and grid blocks during BBA II and almost equally in grid and priority blocks during BBA I. Probable nesting comprised 14.6% of BBA I records and 23.7% of BBA II records, while possible records made up 50.8% of records for both atlases. For probable nesting, the main code used was pair observed in suitable nesting habitat, and the main code used for confirmed nesting category was recently fledged young, followed closely by attending young. Similar to Iowa BBA I data, Illinois BBA data indicated that the Loggerhead Shrike was documented in 20.8% of its blocks and confirmed nesting occurred in 52% of the blocks in which it was found (Kleen et al. 2004).

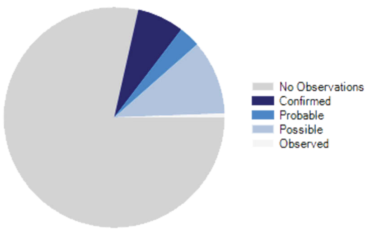
Iowa distribution for Loggerhead Shrike significantly changed since the first atlas was conducted. While this species was confirmed nesting in Lyon County and possibly nested in Osceola County during BBA I, there were no shrike records for that extreme northwestern corner of the state during BBA II. A record of recently fledged young in a pasture in Clay County was the northernmost confirmed nesting record during the second atlas. There also were many fewer records in north-central Iowa, as well as fewer records in the eastern half of the state. Southwestern Iowa continues to hold the most records for this species, and it appears a population also is holding its own in the Loess Hills grasslands in the Sioux City area, both north and south. Loggerhead Shrike is known to re-occupy its territories in succeeding years, and DeGeus (1990) documented 57% re-occupancy in southwestern Iowa, while Kridelbaugh (1983) found a 54% re-occupancy rate in Missouri. DeGeus (1990) also pointed out that while this shrike is attracted to linear habitats, like shrubby roadsides and hedge-rows, there is a lower nest success associated with such linear habitats because they attract predators and serve as predator travel corridors. Shrikes, both nesting adults and fledglings, utilizing roadside habitat also are frequently killed by automobiles (Luukkonen 1987).

To provide suitable habitat for Loggerhead Shrikes, it is recommended to use grassland management practices that leave a few scattered shrubs or trees present for nesting, while also ensuring these practices maintain an adequate prey base for this carnivorous bird (Sample and Mossman 1997). Such practices are implemented in Kellerton Grasslands BCA, and while doing bird point counts in this BCA on 2 July 2015, 14 Loggerhead Shrikes were observed (Ehresman pers. obs.).

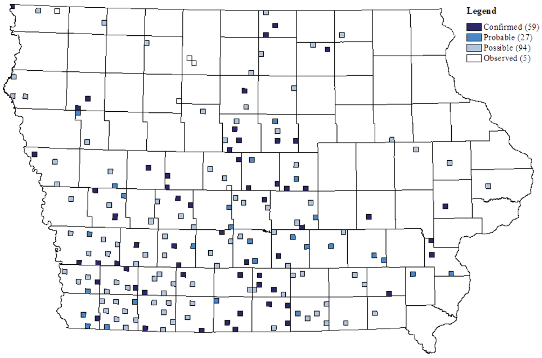
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	3	2	5
Possible	47	47	94
Probable	18	9	27
Confirmed	28	31	59
Conf & Prob	8.80%	10.00%	10.00%

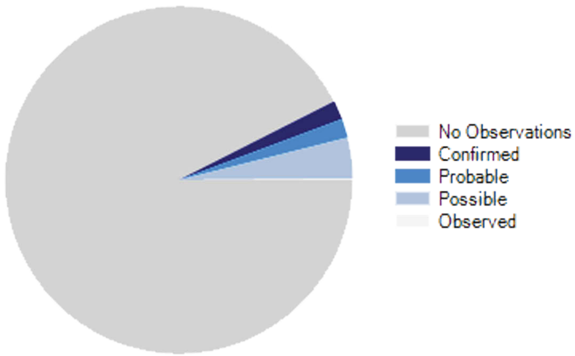
BBA I Results



BBA I



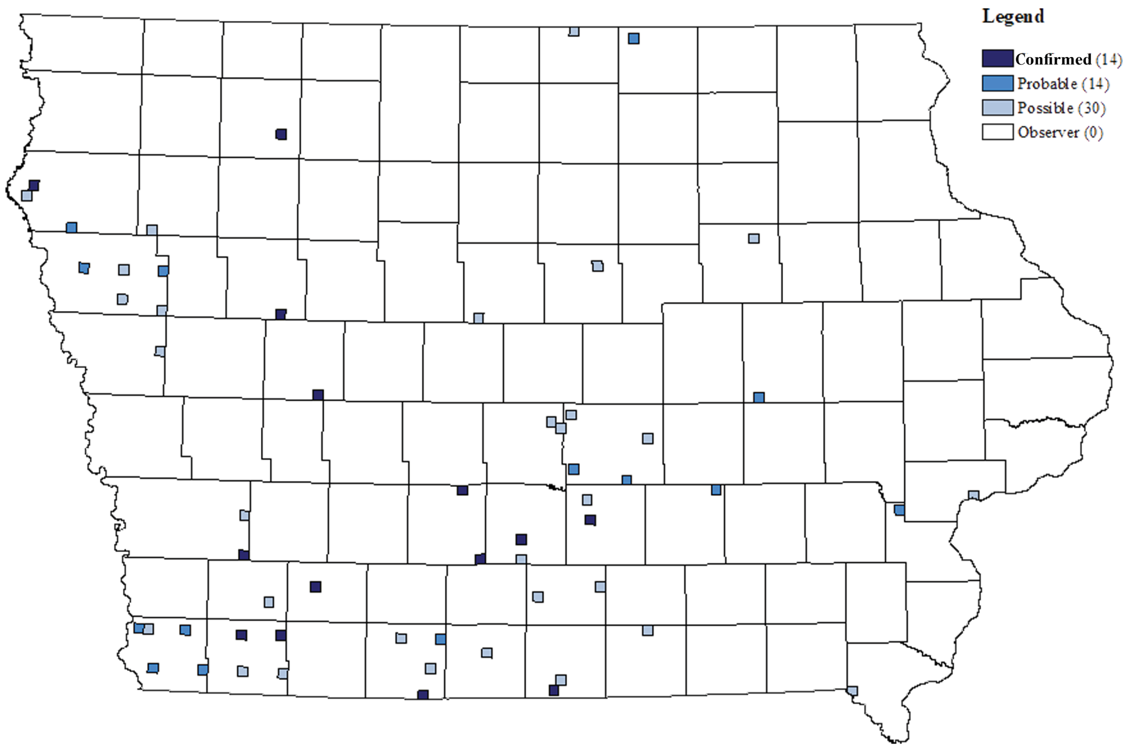
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	1	0	1
Possible	12	18	30
Probable	7	7	14
Confirmed	7	7	14
Conf & Prob	2.70%	3.50%	3.30%

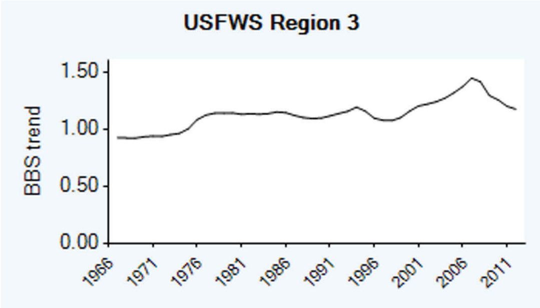
BBA II



© Reid Allen

Habitat	Dense deciduous shrubs and low trees in woodland edges and overgrown pastures
Breeding Dates	22 May (PR)–7 Aug (PR)
Nest Type	Nest is suspended from a forked twig one to eight feet above the ground and constructed of grasses, twigs, leaves, plant fibers, and caterpillar and spider silk
Clutch Size	3–5 eggs, usually 4
Incubation	13–15 days
Fledging	9–11 days
Status	Rare breeding species, found mostly in southeastern Iowa
BBS Trend	Increasing (trend = 0.6, 95% CI is 0.2, 1.0) [Central US]

Patterns since BBA I



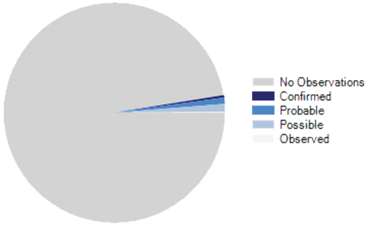
The White-eyed Vireo is a rare Iowa breeder, where it is located near the northern and western edge of its normal range (Kent and Dinsmore 1996). There was little difference in the data collected for this species during the two atlas projects, and as has been noted in the past, Iowa continues to have far too few BBS records to indicate any trend for this species (Sauer et al. 2012). The White-eyed Vireo was documented in 22 (2.6%) of BBA I blocks, while it occurred in 42 (5.3%) blocks during the second atlas. The vast majority (85.7%) of records came from habitat blocks, where public land offered the most appropriate habitat for this species. It was confirmed nesting in four (9.5%) southern Iowa blocks, two blocks in Decatur County and one block each in Wapello and Lucas counties. One notable difference in atlas data is that, during the first atlas, this vireo was confirmed nesting in three northern counties: Allamakee, Black Hawk, and Ida. Probable nesting reports made up one-third of all records, with agitated behavior making up most of the records. All reports (54.8%) of possible nesting were of less than seven singing males. This is as expected, since this secretive bird rarely is seen as it sings from shrubby cover. Because this species is more common south of Iowa, it is not surprising to know that it was found much more prevalently in atlases of both Missouri and Illinois, especially in the more forested southern areas of those states. Missouri found White-eyed Vireos in 474 (39.3%) of its atlas blocks (Jacobs and Wilson 1997), and it was found in 308 (24%) of Illinois blocks (Kleen et al. 2004). Like what was observed in Iowa, for the blocks in which this species was found in Illinois, 88.3% of the blocks were priority blocks (Kleen et al. 2004).

Iowa distribution for the White-eyed Vireo was similar during both atlas projects, and the distribution is a good match to that which was portrayed by Kent and Dinsmore (1996), as well as that described by Hopp et al. (1995). Southeastern Iowa appears to represent the heart of the range for this species in Iowa, and it is extremely rare or absent in the northwestern portion of the state (Jackson et al. 1996). This vireo was in 17 counties during the first atlas and in 23 counties during the second atlas. As evidenced by records from blocks in Ringgold and Fremont counties, this species likely nests in all counties in the southern tier if suitable habitat exists. The availability of the dense shrub/scrub vegetation that the White-eyed Vireo requires seems to greatly restrict where it can nest, and because this habitat has little economic value (on privately owned land) it is rarely protected (Hopp et al. 1995). On the other hand, the early successional habitat created with the implementation of Iowa's public forest management plans will likely continue to provide habitat for this secretive vireo of the woodland edge.

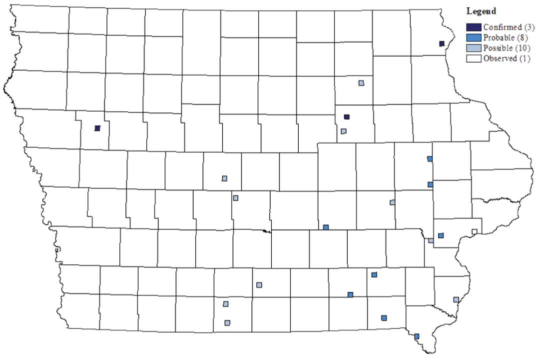
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	1	1
Possible	1	9	10
Probable	3	5	8
Confirmed	1	2	3
Conf & Prob	0.80%	1.80%	1.30%

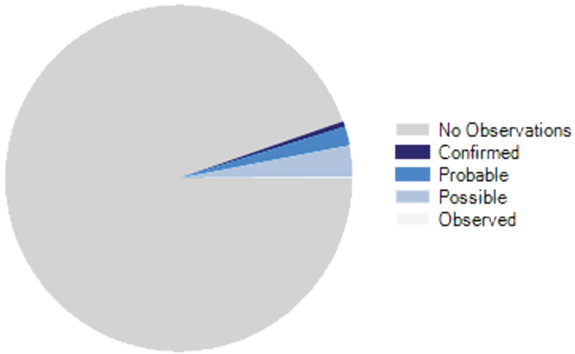
BBA I Results



BBA I



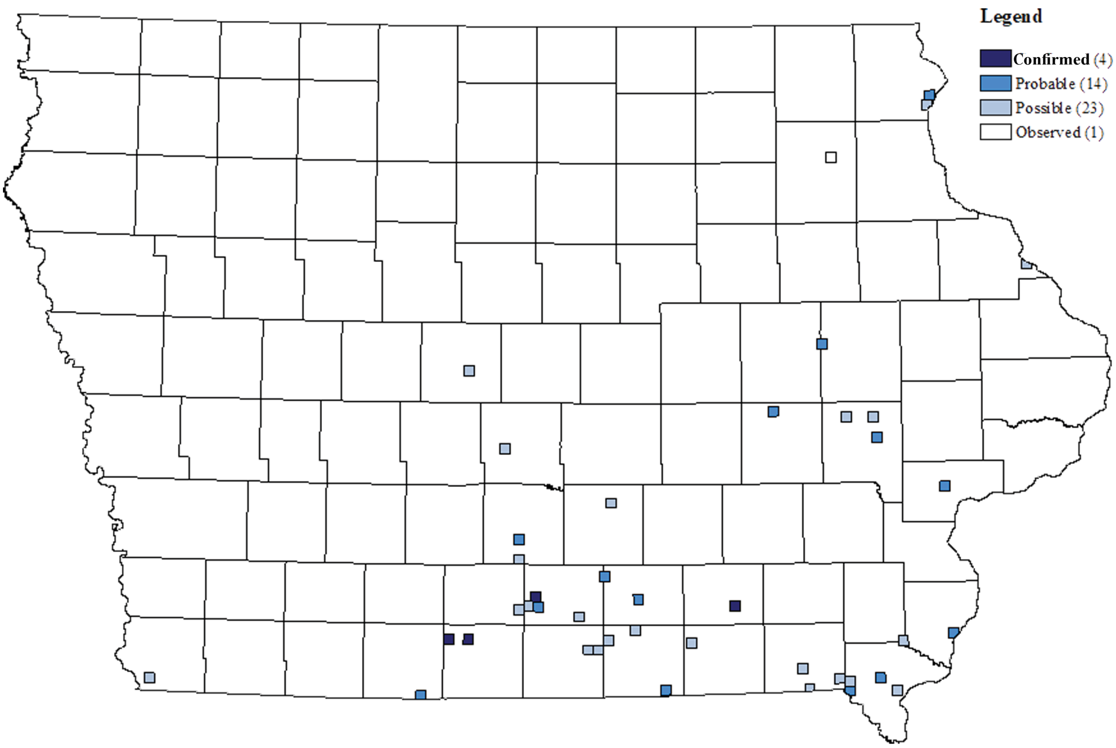
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	1	0	1
Possible	2	21	23
Probable	3	11	14
Confirmed	0	4	4
Conf & Prob	0.60%	3.80%	2.10%

BBA II

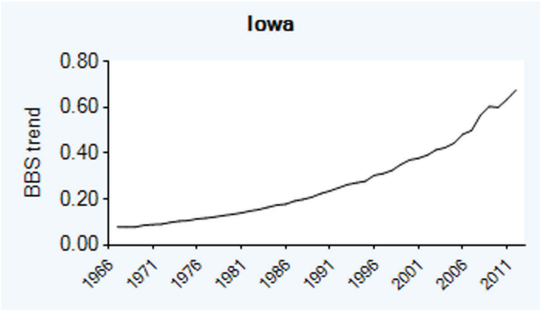


Sponsored by Aaron, Jaclyn & Sawyer Brees

© Mark Brown

Habitat	Dense, low, shrubby vegetation (especially gray dogwood thickets) characteristic of early successional stages in grassland
Breeding Dates	16 May (PR)–26 Aug (PR)
Nest Type	Somewhat pendulous nest is suspended from a forked twig and constructed of plant fibers, grasses, and leaves and lined with finer plant materials and sometimes hair
Clutch Size	3–4 eggs
Incubation	14 days
Fledging	10–12 days
Status	Regular and locally uncommon nesting species
BBS Trend	Increasing (trend = 5.2, 95% CI is 2.2, 8.3) [Iowa]

Patterns since BBA I



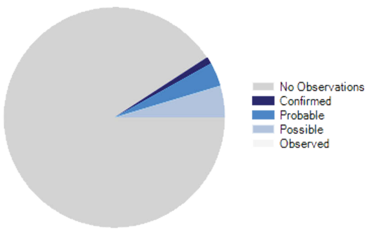
In Iowa, the Bell's Vireo is a species particularly found in shrubby grassland and shrubby roadsides adjacent to old CRP fields, and it seems especially fond of dogwood thickets. The number of Bell's Vireo records collected increased dramatically between atlas periods, with records from 79 (9.2%) BBA I blocks increasing to 244 (30.8%) BBA II blocks. Iowa BBS data support this observed change in records, showing an average annual increase of 5.2% for Bell's Vireo in the last decade (Sauer et al. 2012). While there were more nesting confirmations (32) made during BBA II than during BBA I (9), the percentage of confirmations 11.4% (BBA I) vs. 13.1% (BBA II) was quite similar between the two atlases, perhaps indicating how difficult it is to find nests of this shy vireo that is proficient at hiding its nest. During the second atlas, 70% of all records came from habitat blocks, indicating that the shrubby habitat this species requires occurs much more readily on public lands than on those privately owned. This differs somewhat from the first atlas when 58% of records came from blocks containing public areas. Perhaps this difference is related somewhat to the approximately 930,000 acres of hayfield and grassland conversion to row crops experienced on private land in Iowa since 2000 (Todd Bogenschutz pers. comm.).

Historically, when the majority of Iowa was still covered by prairie, the Bell's Vireo was reported by Anderson (1907) to occur throughout the state and was considered common to abundant. Jackson et al. (1996) described its distribution as uniform statewide, except for the top two tiers of counties and in west-central Iowa away from the Loess Hills. While the overall distribution of Bell's Vireo was not dramatically different between the first and second atlases, there was a substantial change in total number of records located in southern Iowa and along Iowa's western border (up to Sioux County). There also was an increase seen in records from northeastern Iowa. When a map layer is overlaid these atlas records showing where most of Iowa's remaining grasslands occur, it becomes readily apparent that this species occurs where appropriate habitat exists. Further, the Iowa BBA II distribution compares very well with the distribution indicated by Kus et al. (2010). Habitat loss and degradation, along with cowbird brood parasitism, appear to be the main factors that cause decline in Bell's Vireo populations (Kus et al. 2010). The future of this species in Iowa will be largely determined by the amount of early successional grassland habitat that remains. Bell's Vireo will benefit from an emphasis to include native shrubs (especially gray dogwood) as an important component of both savanna and prairie restoration.

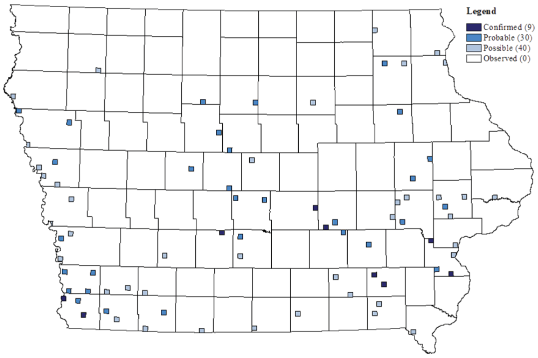
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	16	24	40
Probable	12	18	30
Confirmed	4	5	9
Conf & Prob	3.10%	5.80%	4.50%

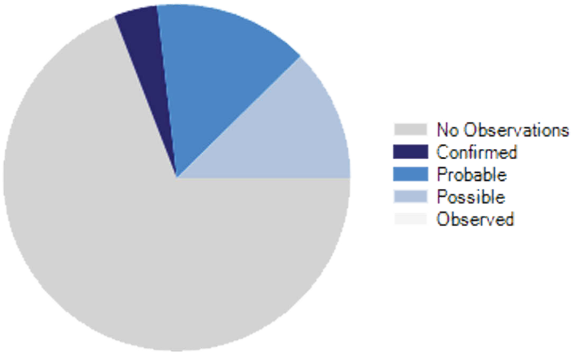
BBA I Results



BBA I



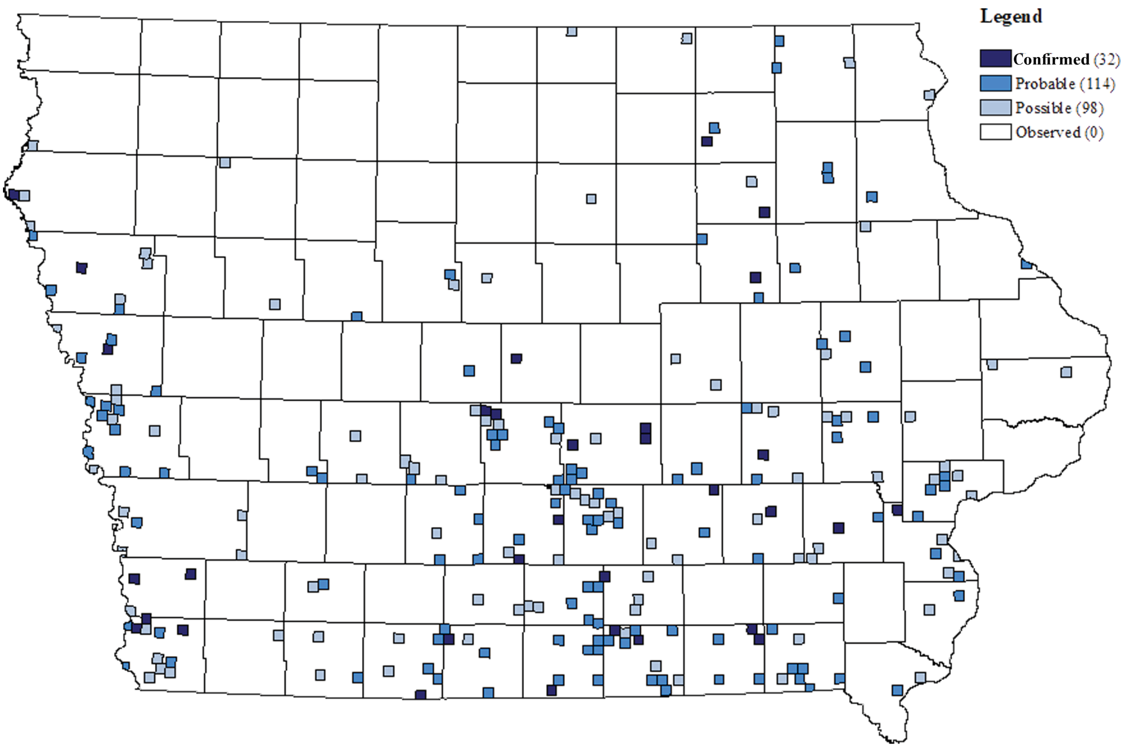
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	33	65	98
Probable	34	80	114
Confirmed	7	25	32
Conf & Prob	7.90%	26.30%	17.00%

BBA II



Sponsored by Prairie Rapids Audubon Society

© James Durbin

Habitat Edge habitats of both bottom land and upland deciduous and mixed deciduous-coniferous forests

Breeding Dates 6 May (PR)–21 Aug (PR)

Nest Type Somewhat pendulous rounded cup nest, suspended from a forked branch and constructed of grape vine bark, grasses, and other plant fibers bound with spider webs

Clutch Size 3–5 eggs, usually 4

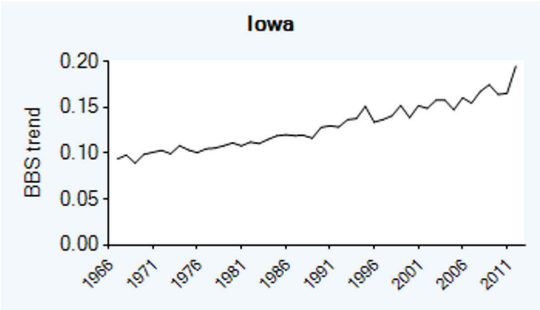
Incubation about 13 days

Fledging about 13 days

Status Regular and locally common nesting species

BBS Trend Stable (trend = 2.1, 95% CI is −0.5, 4.7) [Iowa]

Patterns since BBA I



The Yellow-throated Vireo is especially found in deciduous forests bordering Iowa's rivers and streams, where it suspends its nest from a forked branch high in the subcanopy. Like several other vireo species, the number of Yellow-throated Vireo records collected increased dramatically between atlas periods, with records from 241 (28%) BBA I blocks more than doubled to 499 (63.1%) BBA II blocks. Interestingly, Iowa BBS data do not completely support this observed increase in number of records, showing that Yellow-throated Vireo population has been stable during the last decade (Sauer et al. 2012). Data from the U.S. BBS show a significant range wide population increase of 1.1% per year from 1966 to 1994, however, and Rodewald and James (2011) suggest that this increase may be somewhat related to the maturation of woodlands in some areas of the eastern United States. While the number of nesting confirmations increased from 21 (8.7%) BBA I blocks to 67 (13.4%) BBA II blocks, the overall percentage of nesting confirmations did not significantly change between the atlas periods. This low confirmation rate is probably related to the fact that this species typically nests somewhat high in the subcanopy and the nest is difficult to locate. The percentage of records (40.1%) documented at the possible level was like the percentage of records (45.9%) recorded at the probable category. As was noted in the first atlas (Jackson et al. 1996), the coarser voice of Yellow-throated Vireo is distinctive from that of the Red-eyed Vireo, and it appears that most possible and probable records were comprised of singing or territorial males. During both atlases, most records came from blocks containing public land (71% during BBA I and 64.5% during BBA II). This is probably an indication of more appropriate habitat for this species on public land, and it also may reflect less intense coverage of private land blocks.

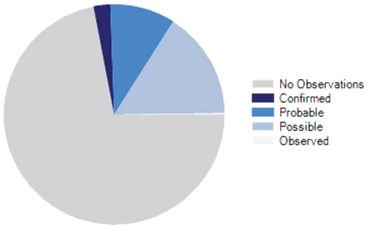
The distribution for Yellow-throated Vireo appears similar for both atlases, and this species is found statewide wherever suitable woodland habitat is located. Like the first atlas, there are fewer records from the western third of Iowa, where less woodland habitat exists. The northwestern corner of the state has the fewest records, and this distribution reflects that shown by Rodewald and James (2011). This woodland vireo was in 84 counties during the first atlas (Jackson et al. 1996), and it was found in 96 counties during the second atlas. Even though records were not found in O'Brien and Ida counties during either atlas, this species most likely nests in every county of the state.

Regarding effects of forest management on this species, extensive clear-cutting can adversely affect the Yellow-throated Vireo, while forest management practices that create smaller openings within forest stands may benefit the species by creating its preferred habitat (Rodewald and James 2011). While this species typically is associated with forest edge, it may prefer to nest in larger blocks of forest habitat or in areas with an overall high percentage of regional forest cover. In southern Wisconsin forests, breeding territories of this vireo included more large trees (37–52 cm), more white oaks (*Quercus alba*), and fewer medium shrubs (1.0–3.0 m) than forest territories that were randomly selected (Ambuel and Temple 1983). Given the fact that (for the most part) Iowa forests are maturing, it appears that the immediate future of this vireo is secure.

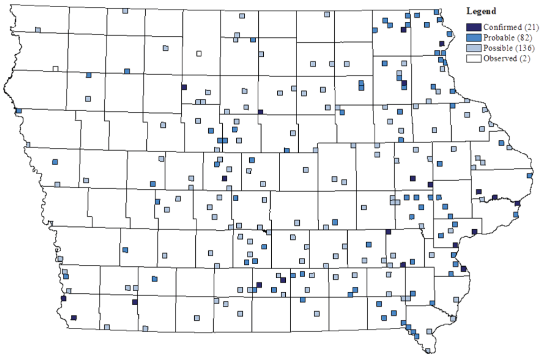
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	1	1	2
Possible	47	89	136
Probable	18	64	82
Confirmed	2	19	21
Conf & Prob	3.80%	20.80%	12.00%

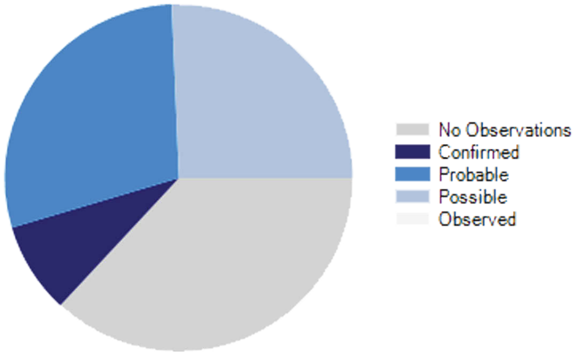
BBA I Results



BBA I



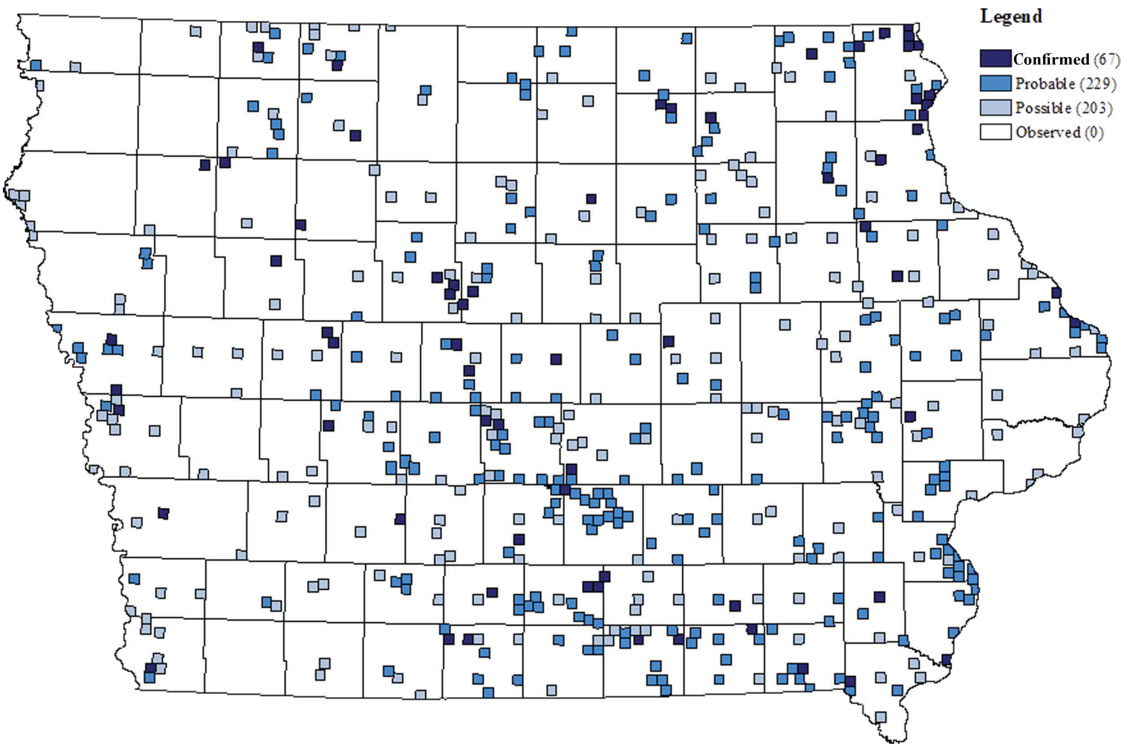
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	104	99	203
Probable	62	167	229
Confirmed	11	57	68
Conf & Prob	14.00%	56.10%	34.50%

BBA II



Sponsored by Stuart Sparkman

© Reid Allen

Habitat Variety of mature open deciduous woodlands, especially riparian areas dominated by cottonwoods

Breeding Dates 23 Apr (PR)–31 Aug (PR)

Nest Type Somewhat pendulous rounded cup nest, suspended from a forked branch and constructed of grape vine bark, grasses, and other plant fibers bound with spider webs

Clutch Size usually 4 eggs, range = 3–5 eggs

Incubation ~12 days, range 10–16 days

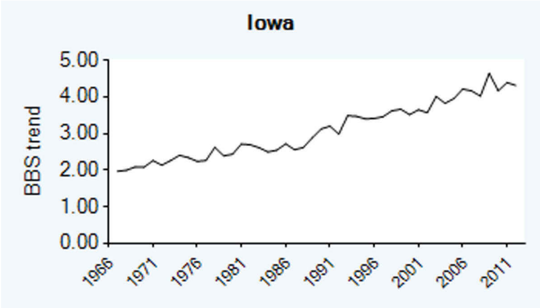
Fledging ~ 14 days, range 10–19 days

Status Regular and locally common nesting species

BBS Trend Increasing (trend = 1.8, 95% CI is 0.7, 3.0) [Iowa]

Patterns since BBA I

The drab gray-green colored Warbling Vireo is not as easily seen as it is heard, and its repetitious song of jumbled notes and phrases allowed atlassers to document this vireo in more blocks than any other vireo in the state. Like several other vireo species, the number of Warbling Vireo records collected increased significantly between atlas periods. The 443 (51.5%) BBA I block records increased to 698 (88.2%) BBA II block records. This increase is supported by Iowa BBS data that show an average annual increase of 1.8% for Warbling Vireo during the last decade (Sauer et al. 2012). While the number of nesting confirmations increased from 36 (8.1%) BBA I blocks to 100 (14.3%) BBA II blocks, the overall percentage of nesting confirmations did not significantly change between the atlas periods. This low confirmation rate is probably related to the fact that this species typically nests somewhat high in the canopy, and the nest is difficult to locate. The percentage of records (32.7%) documented at the possible level was much lower than the percentage of records (53%) recorded at the probable category. The higher percentage of records documented at the probable nesting category is likely related to the fact that this species is very vocal for much of the day, and it was easily relocated on subsequent trips to blocks. Consequently, this bird with attitude was often recorded as agitated or territorial, as it defended its territory.



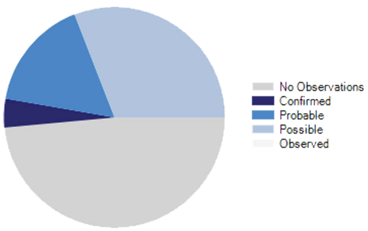
During both atlases, most records came from blocks containing public land (61% during BBA I and 55.3% during BBA II). This may be an indication of more appropriate habitat for this species on public land, and it also may reflect less intense coverage of private land blocks. The fact that three times as many nestings were confirmed in habitat blocks than grid blocks may be because atlassers had better access to confirm nests on public land than on private land. With the widest distribution of any vireo in North America (Gardali and Ballard 2000), the Warbling Vireo is likewise distributed throughout the state of Iowa. Since this vireo nests in a variety of woodland habitats and because of its ability to nest in narrow strips of riparian woodland, the habitat it requires exists throughout the state. With atlas records documented in all counties except Grundy, this species almost certainly nests in every county of the state. During the first atlas, this species was documented in all counties except Grundy and Floyd (Jackson et al. 1996). This vireo is most absent in areas of the state where the primary land-cover is row crops, like extreme northwestern Iowa and Grundy County.

The future of the Warbling Vireo, in Iowa, appears bright. Even though many other species are negatively affected by forest fragmentation, this vireo may benefit from the additional edge habitat that this practice creates (Gardali and Ballard 2000). The ability to raise two broods each year (Tewksbury et al. 1998) also gives this species an advantage to increase its population numbers. While the wintering area for this species is smaller than its breeding area, which suggests a substantial concentration on its wintering ground (Barlow 1980), the Warbling Vireo is able to use a wide variety of Latin America winter habitats (Gardali and Ballard 2000), thereby increasing its chances of survival.

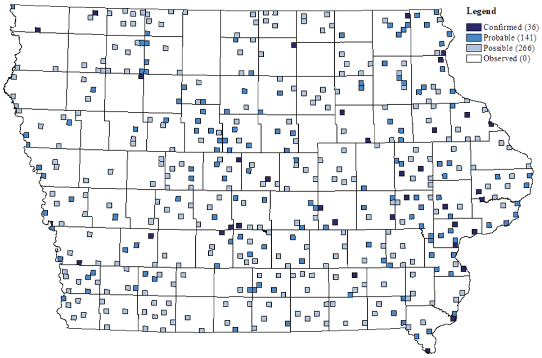
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	120	146	266
Probable	41	100	141
Confirmed	10	26	36
Conf & Prob	9.80%	31.60%	20.60%

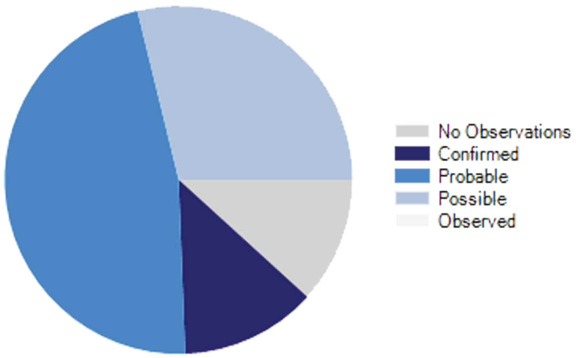
BBA I Results



BBA I



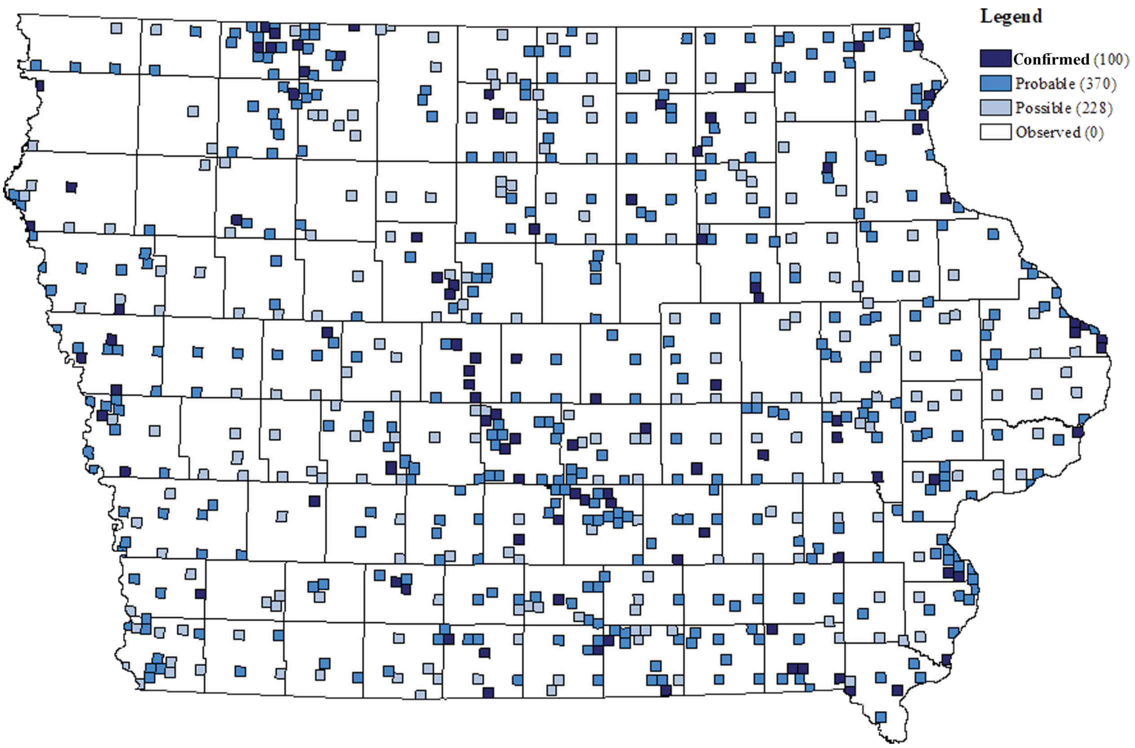
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	142	87	229
Probable	147	223	370
Confirmed	24	76	100
Conf & Prob	32.80%	74.90%	54.60%

BBA II

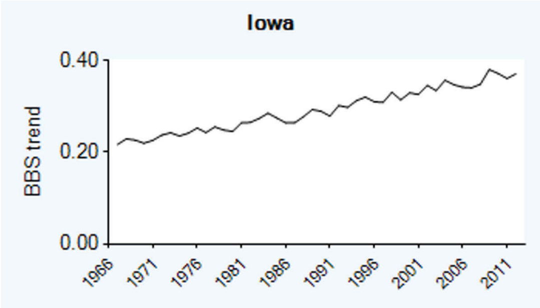


In Memory of Corey Ferguson (Kirsten Winter)

Habitat	Breeds especially in interior of deciduous and mixed deciduous-coniferous forest.
Breeding Dates	14 May (PR)–4 Sep (CO)
Nest Type	Basket-like nest, suspended by its rim from a forked branch and constructed of grape vine bark, grasses, and other plant fibers bound with spider webs
Clutch Size	3–4 eggs, typically
Incubation	11–14 days
Fledging	10–12 days
Status	Statewide common nesting species
BBS Trend	Increasing (trend = 2.0, 95% CI is 0.3, 3.8) [Iowa]

Patterns since BBA I

The Red-eyed Vireo is the second most reported vireo in Iowa, as it was during the first atlas (Jackson et al. 1996). Like several other vireo species, the number of Red-eyed Vireo records collected increased dramatically between atlas periods, with records from 276 (32.1%) BBA I blocks more than doubling to 580 (73.3%) BBA II blocks. Iowa BBS data support this observed increase in number of records, showing that the Red-eyed Vireo population has increased an average of 2% each year during the last decade (Sauer et al. 2012). Further, the number of nesting confirmations increased from 22 (8%) BBA I blocks to 116 (20%) BBA II blocks, which perhaps reflected an increased effort to confirm nesting during the second atlas period. Like the first atlas, where 74% of the Red-eyed Vireo reports came from blocks that contained public areas, the majority (61.7%) of reports came from habitat blocks during the second atlas. This result is most likely related to the fact that most public areas in the state contain some woodland habitat, and open access to public land makes it easier to find this species. This easy access to public woodlands might also explain why nearly four times as many confirmed nesting records were found in blocks with public land than blocks comprised completely of privately owned land. Red-eyed Vireos are easily detected because they are very persistent singers. By voice, the only other species with which it is likely to be confused is the Yellow-throated Vireo, which often is found in similar habitat.



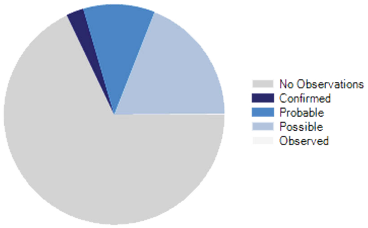
The distribution for Red-eyed Vireo appears similar for both atlases, and this species is found statewide wherever suitable woodland habitat is located. This vireo is much more common in eastern and southern Iowa, where most of the woodland habitat exists. It also was more prevalent during the second atlas (than the first) in the Loess Hills of far western Iowa, which has become much more forested in the last two decades. While the Red-eyed Vireo was not found in 13 counties during the first atlas (Jackson et al. 1996), it was documented in all except two counties (Ida and O'Brien) during the second atlas. During both atlases, the fewest records were found in northwestern Iowa, where the dominant landscape is agricultural.

Red-eyed Vireo nesting densities increase in larger forests, and it is sensitive to large clear-cuts, forest fragmentation, and cowbird parasitism (Cimprich et al. 2000). It is reported to be tolerant of small canopy openings, small (1–2 ha) group selection, small (2–10 ha) clear-cuts, tree thinning, and single-tree harvest (Crawford et al. 1981), which are some of the predominant forestry practices found in Iowa. Since this vireo is more likely to forage in the lower forest canopy and in understory shrubs (Donahue 1987) than in the treetops, managing Iowa forests to include these important habitat layers will also benefit this species.

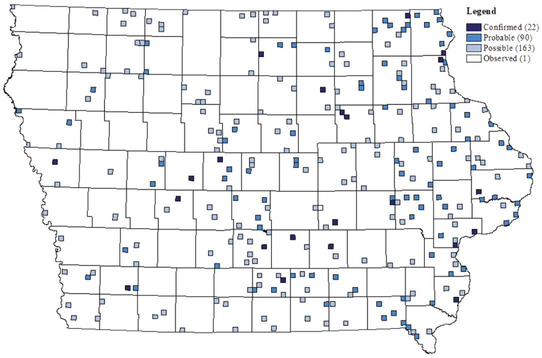
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	1	1
Possible	53	110	163
Probable	18	72	90
Confirmed	2	20	22
Conf & Prob	3.80%	23.10%	13.00%

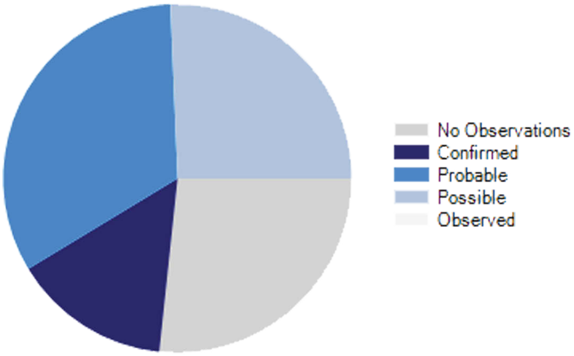
BBA I Results



BBA I



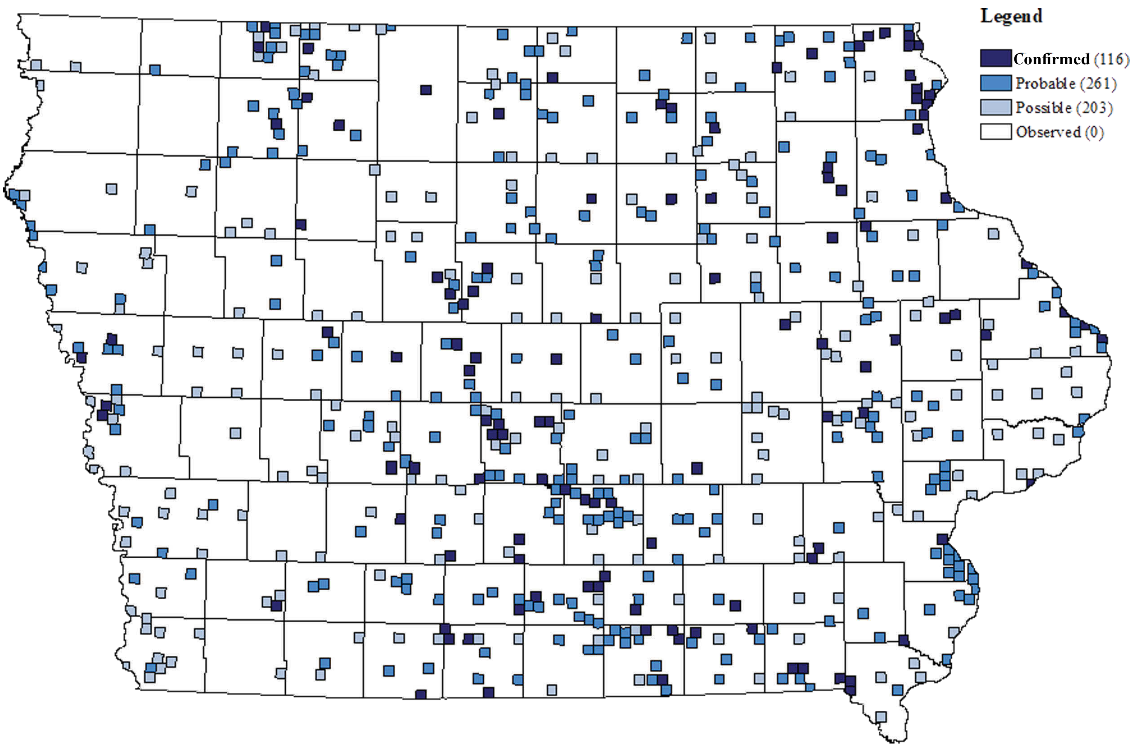
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	124	80	204
Probable	79	182	261
Confirmed	20	96	116
Conf & Prob	19.00%	69.70%	43.80%

BBA II



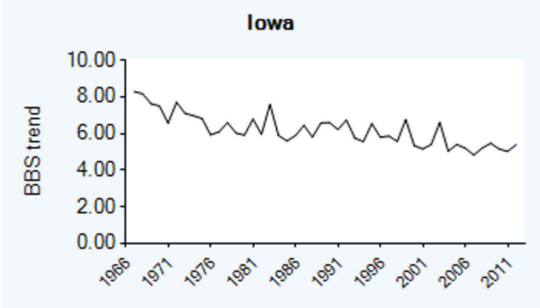
Sponsored by Iris Moon Reiter-Marolf

© Linda Petersen

Habitat	Oak savanna, open woodlands and woodland edge, small woodlots, and wooded residential areas
Breeding Dates	2 Apr (PR)–31 Aug (CO)
Nest Type	Bulky compact cup of twigs, bark strips, grass/weed stems, or other debris with thin lining of rootlets or similar material
Clutch Size	5 eggs (range 4–6)
Incubation	16–18 days
Fledging	17–21 days
Status	Common permanent resident
BBS Trend	Decreasing (trend = −1.2, 95% CI is −1.9, −0.4) [Iowa]

Patterns since BBA I

In Iowa, the Blue Jay is a common dweller of oak savannas and woodlands, both rural and urban. It is quite fond of bird feeders and is usually more abundant near forest edges than in deep forest (Smith et al. 2013). Iowa BBS data indicate that Blue Jay is declining at the average annual rate of 1.2% (Sauer et al. 2012), while Iowa BBA data indicate this species remains widespread and common. This jay was documented in 662 (76.9%) of BBA I blocks, with detection increasing to 775 (98%) blocks during the second atlas. During BBA I Blue Jays were found equally well in private land blocks and public land blocks, with only 2% more found in public land blocks during BBA II.



During BBA I, this jay was confirmed nesting in 36% of blocks, increasing to 47.2% of records during BBA II. In the confirmed nesting category, 58.8% of records came from priority blocks during BBA I and 66.1% during BBA II. The higher confirmation rate on public land blocks may have been related to the fact that atlassers had better access to confirm nesting on public property than they did on private property. Probable records comprised 43% of BBA I records and 35.4% for those of BBA II, while possible records made up just 17% of BBA I records and 21% of BBA II records. Overall, the data collected during both atlases were quite similar in pretty much every category. Recently fledged young was the code most used for nesting documentation during both atlases. This also was the main code used for nesting documentation during the Illinois BBA (Kleen et al. 2004). Blue Jays become much less vocal and much more secretive while nesting and locating noisy fledglings was much easier than finding the nest site.

Similar to what was observed in Iowa, BBA results from Illinois (1986–1991) indicated the Blue Jay was one of the most frequently reported and widespread species, and it was documented in 88.3% and confirmed nesting in 56.1% of Illinois blocks (Kleen et al. 2004). Missouri's atlas (1986–1992) results indicated this species to be found statewide, as well, with records from 98.4% of all blocks and confirmed nesting in 43.9% of those blocks (Jacobs and Wilson 1997).

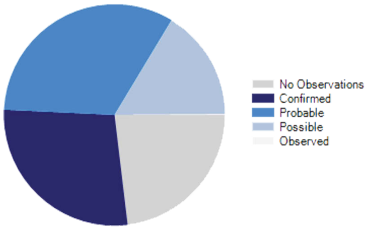
Iowa distribution for the Blue Jay was similar for both atlases, and it was detected in every county of the state during both atlases. This species almost certainly nests in every county of Iowa, with nesting documented in all but ten counties during the first atlas (Jackson et al. 1996) and nesting confirmed in all but three counties during the second atlas. Counties with fewest records, during both atlases, were in the northwestern quarter of the state, which has the least amount of wooded habitat that this jay prefers.

While Blue Jay is often blamed for the consumption of other birds' eggs and young, traces of bird eggs and nestlings were found in only six of 530 stomachs; while mostly acorns, along with beechnuts, chestnuts, hickory nuts, and hazelnuts constituted 43% of the yearly diet and 67% of fall and winter diet (Beal 1922). The Blue Jay is known in the Midwest as a valuable planter of oak woodlands, since it often stores acorns in the ground and then fails to retrieve them. One study documented six Blue Jays each caching 3,000–5,000 acorns during one fall (C. S. Adkisson pers. comm. in Smith et al. 2013).

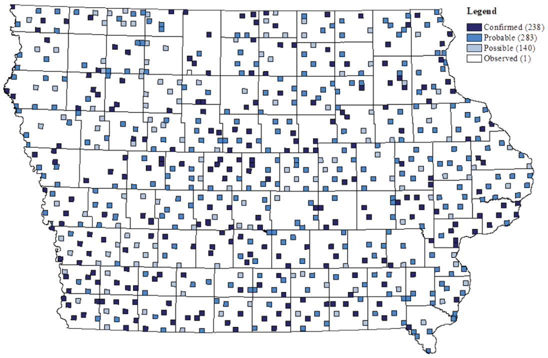
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	1	0	1
Possible	88	52	140
Probable	141	142	283
Confirmed	98	140	238
Conf & Prob	45.80%	70.70%	60.50%

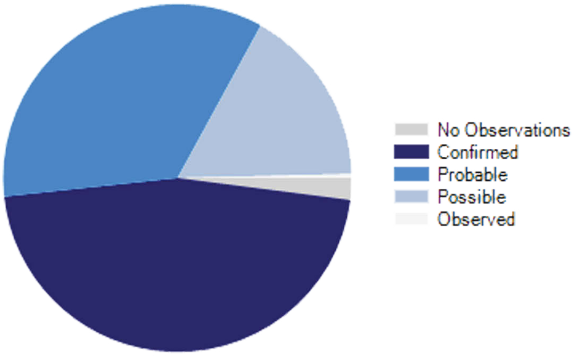
BBA I Results



BBA I



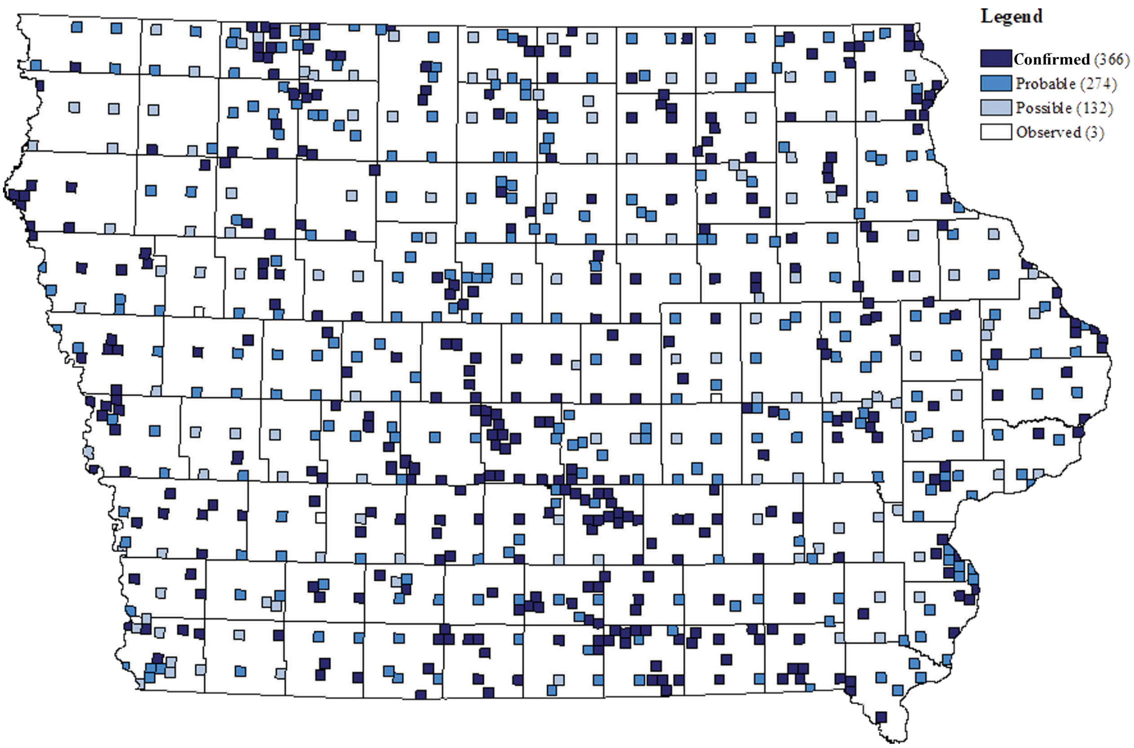
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	3	0	3
Possible	105	27	132
Probable	148	127	275
Confirmed	124	242	366
Conf & Prob	52.10%	92.50%	74.40%

BBA II



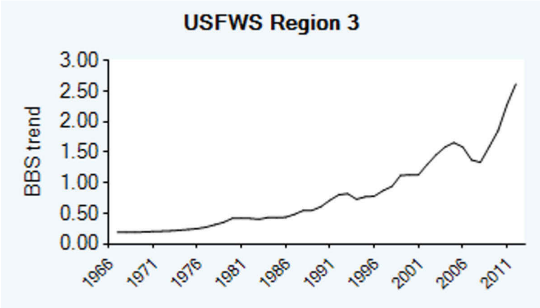
Sponsored by Kay Pudil

© Doug Harr

Habitat	Thickets near riparian areas; especially associated with grasslands and shrubby, wooded draws
Breeding Dates	NA
Nest Type	Large domed structure (75 cm high and 50 cm wide) of sticks, with mud cup and lining of rootlets, grass, and hair
Clutch Size	4–9 eggs (typically 6–7 eggs)
Incubation	~18 days
Fledging	24–30 days
Status	Rare breeder in Plymouth County
BBS Trend	Decreasing (trend = −0.7, 95% CI is −1.3, −0.2) [Central US]

Patterns since BBA I

While the Black-billed Magpie is known for a being a bird of western North America, it has in recent years made its presence known as a year-round resident of Broken Kettle Grassland BCA in Plymouth County. This species was documented in just two atlas blocks, both in Plymouth County within the Broken Kettle Grasslands BCA. One record was attending young and the other an occupied nest. Scott Moats, Director of Stewardship for TNC of Iowa, pointed out several used magpie nests in plum thickets that lined the valleys of Broken Kettle Grasslands during a visit on 17 February 2011, with at least five magpies seen in one valley on that day (Ehresman pers. obs.). One stick nest (built with twigs from a plum thicket) was about three feet tall and two feet wide. The nest appeared to have been added to for more than one year, with a second nest built atop the first one.



Throughout its North American range, BBS data indicate the status of the Black-billed Magpie is relatively stable, with a nonsignificant average annual decline of 0.6%, between 1966 and 2011 (Sauer et al. 2012). There is no BBS trend for Iowa.

From 1820 to 1923, there were nine published reports of Black-billed Magpies in Iowa (J. J. Dinsmore et al. 1984); most in northwestern Iowa. A large invasion of magpies occurred in fall 1921, with reports in 16 counties recorded by Stoner (1922) and Stephens (1930); reports mostly from northwestern counties and ranging as far east as Floyd and Linn counties. Another large magpie invasion occurred in fall/winter 1934 (DuMont 1935), with birds reported in 20 counties, mostly western, but also including Polk, Floyd, and Allamakee counties. Following another smaller invasion in December of 1936, a pair of magpies remained in Bremer County to nest in 1937 and 1938 (Dix 1937, 1938). From 1960–1995, eight more magpie records were confirmed, mostly from western Iowa (Kent and Dinsmore 1996). In 1997, Bill Huser reported magpies nesting in Plymouth County (Kent 1997), the first Iowa nesting record in 59 years. This same area is where magpies nested during Iowa's second BBA. The nearest nest to Iowa was confirmed in South Dakota's BBA along the Missouri River (Peterson 1995), about 50 miles west of the Iowa nesting site.

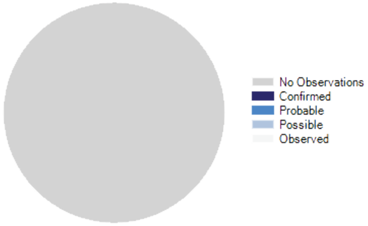
Iowa's nesting magpies appear to be isolated from other populations. It is unknown to what extent genetic interchange occurs with other magpie populations or whether Iowa's population currently suffers from a lack of genetic diversity. While it is unknown what factor climate change may play in the future of Iowa's nesting magpies, field research and laboratory observations suggest that heat stress is more limiting to Black-billed Magpies than is cold, to which they are physiologically adapted (Hayworth and Weathers 1984, Trost 1999).

Black-billed Magpies appear to have a symbiotic relationship with bison and other large ungulates, including cattle, and these birds are often seen gleaning ticks and other external parasites from these large mammals (Ryser 1985). When humans caused the near extirpation of bison herds in the late 1800s, this magpie disappeared from many parts of its former North American range (Houston 1977). Bison have been reintroduced by TNC to a portion of the Broken Kettle Grasslands BCA, and it is hoped that the presence of bison will be a positive influence on magpie survival at this site.

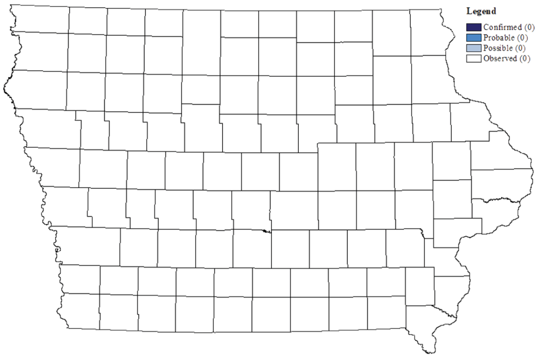
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	0	0	0
Probable	0	0	0
Confirmed	0	0	0
Conf & Prob	0.00%	0.00%	0.00%

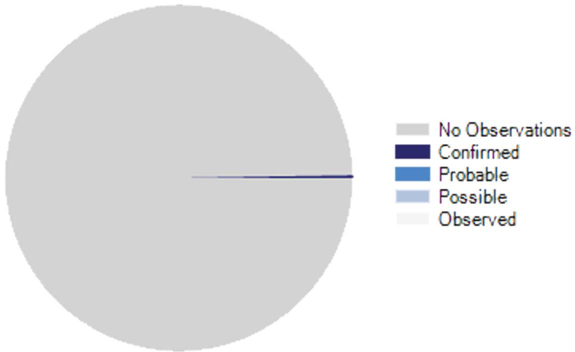
BBA I Results



BBA I



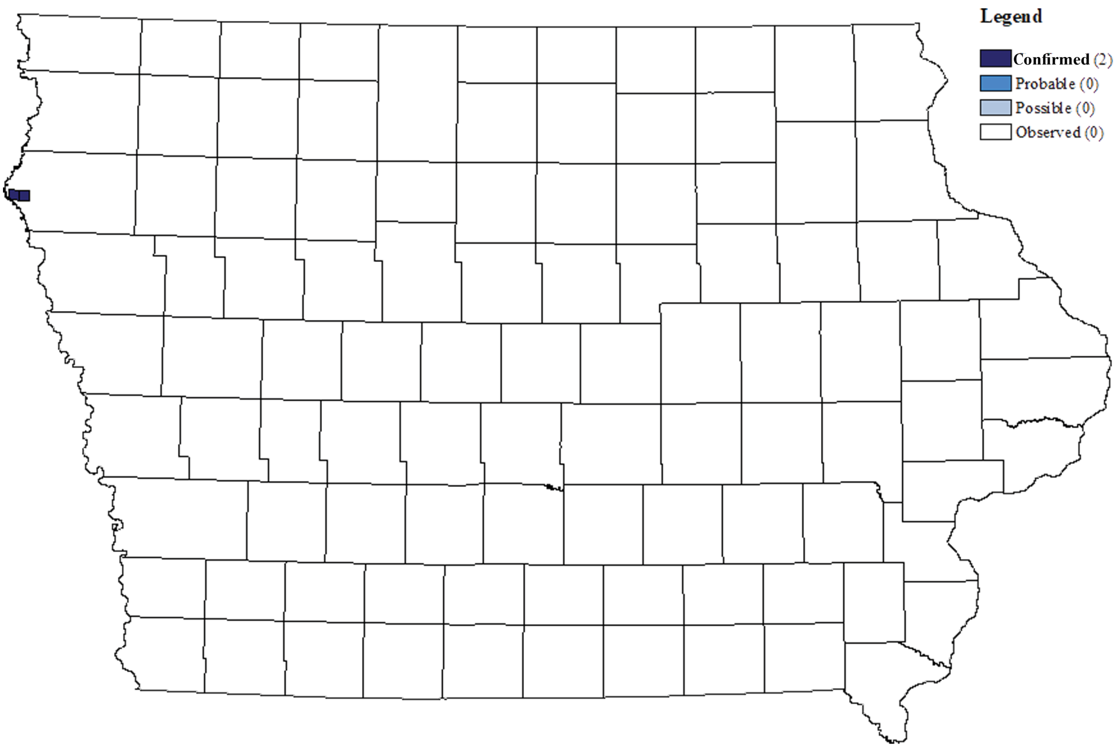
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	0	0	0
Probable	0	0	0
Confirmed	0	2	2
Conf & Prob	0.00%	0.50%	0.20%

BBA II



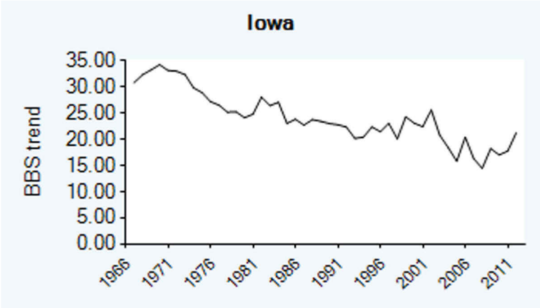
Sponsored by Paul Roisen

© Adam Ciha

Habitat	Wide range of wooded habitats, including savanna, open woodlands, forests, woodlots, farm groves, and wooded residential areas
Breeding Dates	6 Mar (CO)–31 Aug (CO)
Nest Type	Large cup of sticks, twigs, and bark lined with bark, moss, grass, feathers, hair, and other soft materials
Clutch Size	5 eggs (range 3–7)
Incubation	16–18 days
Fledging	28–35 days
Status	Common permanent resident
BBS Trend	Decreasing (trend = −1.5, 95% CI is −2.2, −0.8) [Iowa]

Patterns since BBA I

The American Crow is one of the better known and most widespread birds of North America (Verbeek and Caffrey 2002). Like the Blue Jay, Iowa BBS data indicate that this species is declining at an average annual rate of 1.5% (Sauer et al. 2012). Iowa BBA data indicate this species remains widespread and common. For example, the crow was detected in 636 (73.9%) of BBA I blocks, increasing to 769 (97.2%) blocks during BBA II. The crow was found in only 2% more public land blocks than it was in private land blocks during both atlases. During the first atlas, this species was confirmed nesting in 245 (38.5%) blocks, and nesting documentation doubled to 503 (65.4%) BBA II blocks. Public land blocks yielded 60.4% of confirmed nest records during BBA I and 56.6% during BBA II. Probable records comprised 30.8% of BBA I records and 19.6% for those of BBA II, while possible nesting records made up 30.5% of BBA I blocks and only 14.2% of BBA II blocks.



The largest difference in the data collected (between the atlases) was the much higher number and percentage of confirmed nests during BBA II, which probably was due to more concentrated effort to confirm nesting. Recently fledged young was the code most used for nesting documentation during BBA II. This also was the main code used for nesting documentation during the Illinois BBA (Kleen et al. 2004). American Crows become much less vocal and much more secretive while nesting and locating noisy fledglings was much easier than finding the actual nest site. The BBA results from Illinois (1986–1991) were similar to what was observed in Iowa, and the American Crow was documented in 86.2% and confirmed nesting in 40.3% of Illinois blocks (Kleen et al. 2004). Missouri's atlas (1986–1992) results indicated this species occurred statewide, as well, with records from 88.5% of all blocks and confirmed nesting in 29.1% of those blocks (Jacobs and Wilson 1997). The lower nesting confirmation rates from these two neighboring states compared well to Iowa's BBA I data.

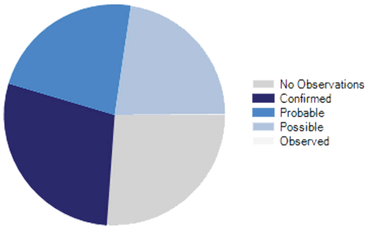
Iowa distribution for the American Crow was similar for both atlases, and this species was detected in every county of the state during both atlases. This species undoubtedly nests in every county of Iowa, with nesting documented in all but thirteen counties during the first atlas (Jackson et al. 1996) and nesting confirmed in all but four counties during the second atlas. While BBS data indicated a few decades ago that American Crow was more frequently reported in northern than southern counties (J. J. Dinsmore et al. 1984), data collected from both atlases indicate this species is evenly distributed throughout the state.

American Crows are often portrayed as major consumers of other birds' eggs and young, although analysis of stomach contents of 778 adult crows showed that diet consisted of 28% animal and 72% plant matter, with the vast majority of animal matter being insects (Kalmbach 1939). Because of the increased size of winter roost sites in Iowa urban areas (like Keokuk, Ames, and Des Moines) in recent decades, there is a public misperception that crow numbers have been substantially growing. While the reality may be that Iowa's crow population is slightly decreasing, this highly intelligent corvid species is well adapted to changing times and changing environments and its overall future in Iowa seems secure.

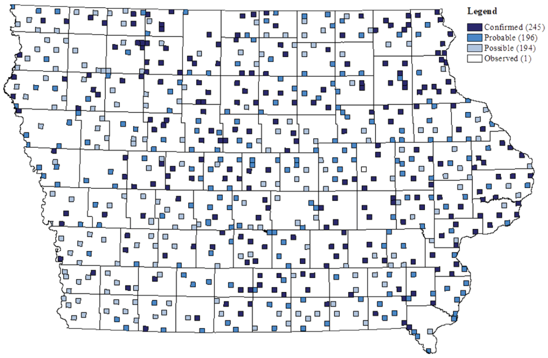
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	1	0	1
Possible	111	83	194
Probable	102	94	196
Confirmed	97	148	245
Conf & Prob	38.10%	60.70%	51.20%

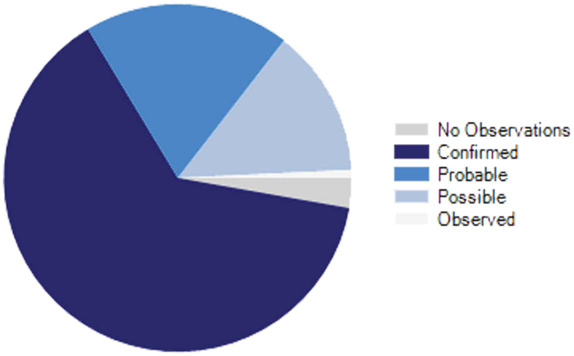
BBA I Results



BBA I



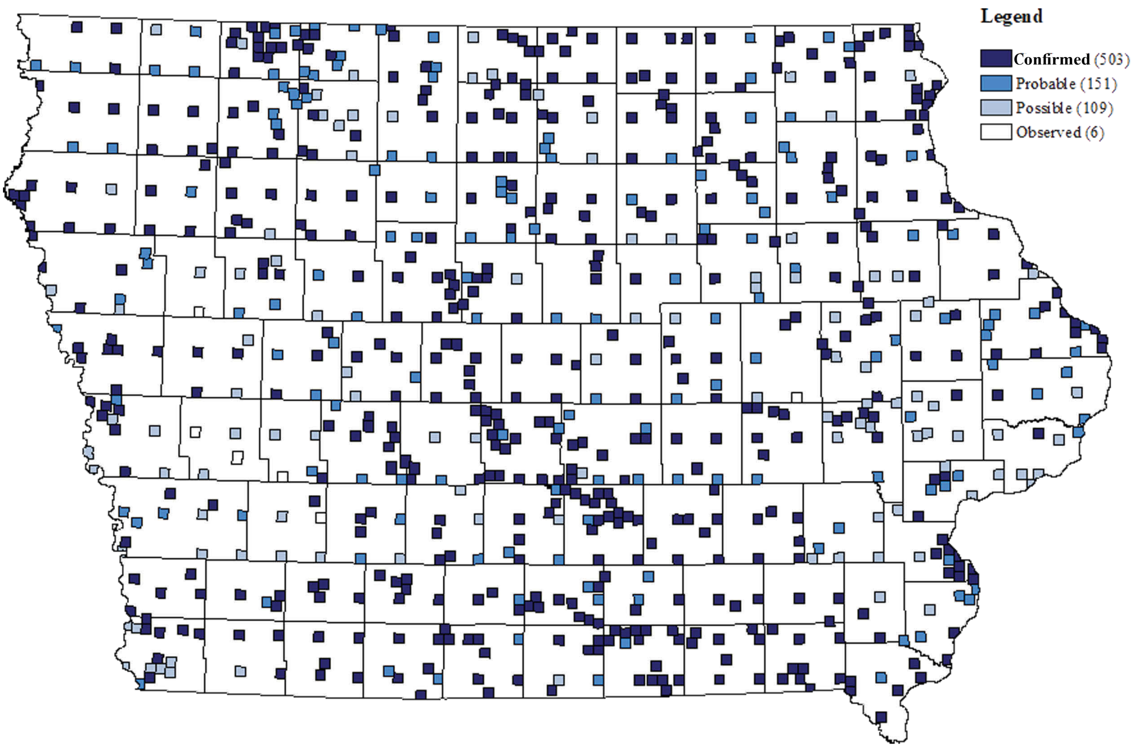
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	5	1	6
Possible	70	40	110
Probable	81	70	151
Confirmed	218	285	503
Conf & Prob	57.30%	89.00%	76.00%

BBA II

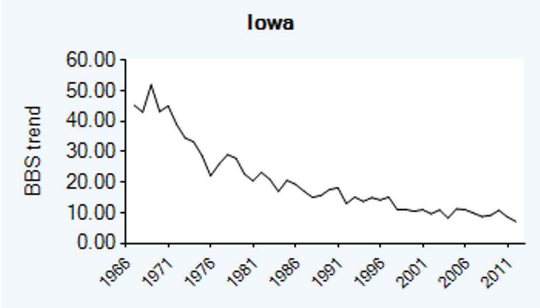


Horned Lark *Eremophila alpestris*

© Billy Reiter-Marolf

Habitat	Open, usually barren habitats, including pastures, tilled fields, airports, golf courses, and roadsides
Breeding Dates	2 Mar (PR)–26 Aug (CO)
Nest Type	Nest built in a shallow depression on the ground, rimmed with pebbles, dirt clods, and corn stalks and lined with grass, roots, and sometimes hair
Clutch Size	4 eggs (range 3–5)
Incubation	11–12 days
Fledging	9–12 days
Status	Common permanent resident
BBS Trend	Decreasing (trend = −3.6, 95% CI is −5.0, −2.6) [Iowa]

Patterns since BBA I



The Horned Lark is Iowa's earliest nesting songbird with courtship flights witnessed by mid-February and substantial nesting evidence documented by early March. Unfortunately, because most of its available nesting habitat is row crop agriculture land that is usually tilled very early in the year, there is a very narrow time window in which this species can nest successfully. Iowa BBS data indicate this lark is declining at the average annual rate of 3.6% (Sauer et al. 2012), and Horned Lark has recently been listed as an Iowa Species of Greatest Conservation Need. This lark was detected in 445 (51.7%) of BBA I blocks, and documentation increased to 548 (69.3%) blocks during BBA II. It was found equally well in private land blocks as it was public land blocks, with a slight increase in detection in private land blocks during BBA II. During BBA I, it occurred in 48.5% of grid blocks and 51.5% of priority blocks. During BBA II, it was detected in 54.2% of grid blocks and 45.8% habitat blocks.

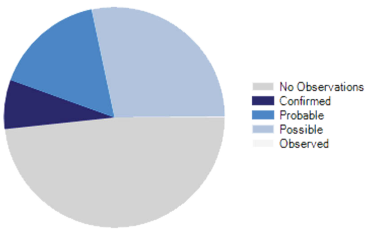
During BBA I, this species was confirmed nesting in 62 (13.9%) of blocks, while it was confirmed to nest in 80 (14.6%) of blocks during BBA II. Confirmed nesting occurred almost equally often in grid blocks as priority blocks during BBA I, while about 59% of confirmed nesting occurred in grid blocks during BBA II. Probable nesting comprised 31.2% of BBA I records and 40.1% of BBA II records, with the main code being pair observed in suitable nesting habitat. About 55% of all BBA I records were recorded as possible and 45% of BBA II records were listed as possible. The "tinkling" song of the male was often heard coming from the middle of a soybean field, and the vast majority of times this occurred (whether in a grid block or habitat block), the bird was observed singing on privately owned land (Ehresman pers. obs.). Illinois BBA data indicated that the Horned Lark was documented in 72.1% of its blocks and confirmed nesting in 43.7% blocks (Kleen et al. 2004). While the percentage of blocks in which this lark was detected was quite similar to Iowa's data, the percentage of blocks with nesting confirmation was nearly three times greater than Iowa's confirmation rate. Recently fledged young was the most frequently used code in Illinois, as well. Horned Larks can raise two broods each nesting season, and the latest confirmed nesting (recently fledged young) occurred on 26 August.

Iowa distribution for the Horned Lark was similar for both atlases. This species was detected in every county except Ida during BBA I (Jackson et al. 1996) and in every county except Ida and Jefferson during the second atlas. While this lark was detected in 103 more blocks during the second atlas than during the first, the overall distribution seems the same for both time periods. A major cause of mortality for this species is agricultural operations (Beason 1995). Nests destroyed by agricultural equipment was documented to cause a low fledging rate in Illinois (Beason and Franks 1974). Another potential problem for Horned Lark is that the short grassland habitat that this bird prefers is not usually found on public land, since tall-grass prairie is the grassland type most managed for. If grassland habitat is burned in fall (rather than spring), however, this action can produce excellent nesting habitat for this early spring nester.

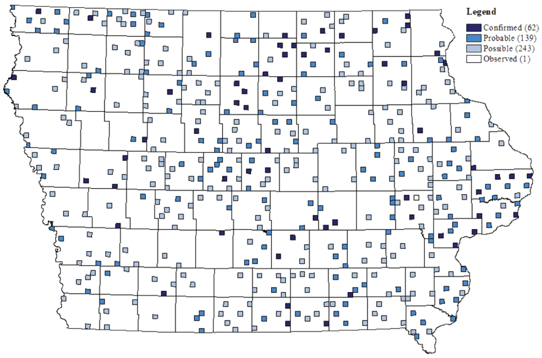
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	1	1
Possible	119	124	243
Probable	67	72	139
Confirmed	30	32	62
Conf & Prob	18.60%	26.10%	23.30%

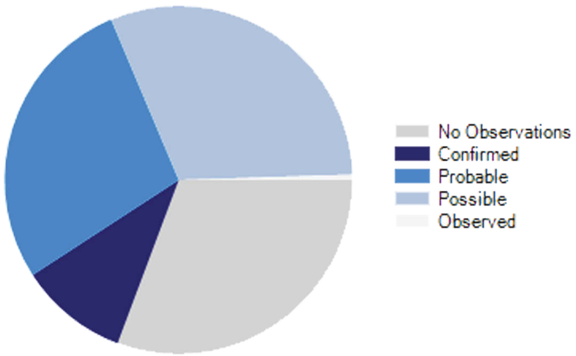
BBA I Results



BBA I



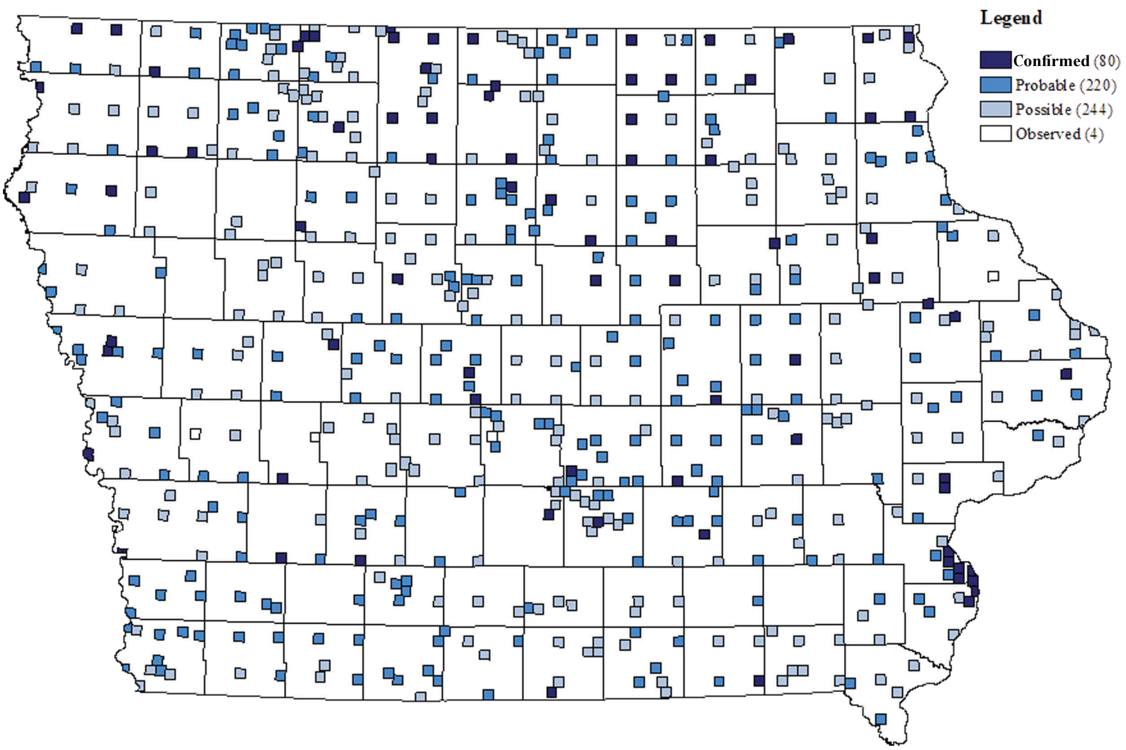
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	3	1	4
Possible	123	121	244
Probable	124	96	220
Confirmed	47	33	80
Conf & Prob	32.80%	32.30%	34.80%

BBA II



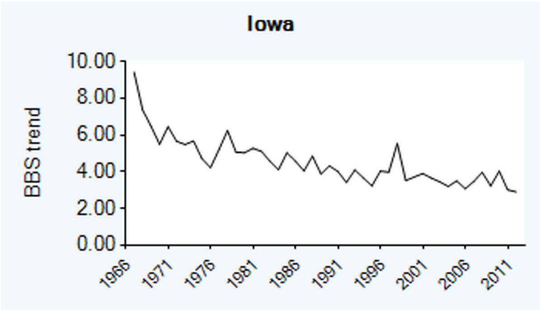
Sponsored by Diane Buman

© Stephen J. Dinsmore

Habitat	Stream banks and other vertical banks of dirt, sand, or gravel near running water
Breeding Dates	5 May (CO)–24 Aug (CO)
Nest Type	Excavated burrow in a bank, cliff, or pile of sand; nest lined with grasses, feathers, and other plant material
Clutch Size	2–6 eggs (typically 5 eggs)
Incubation	13–15 days
Fledging	18–21 days
Status	Common statewide breeding bird
BBS Trend	Stable (trend = −1.5, 95% CI is −5.6, 1.3) [Iowa]

Patterns since BBA I

Bank Swallows nests throughout the state in cavities they excavate in cut banks of every major river and stream, in loess bluffs, and in large piles of quarried sand or gravel near water. During this second atlas, this swallow was detected in 395 (49.9%) blocks, while it was found in 227 (26.4%) of the blocks during the first atlas (Jackson et al. 1996). Like most other swallows and similar to the first atlas results, this species was detected primarily in habitat (65.8%) blocks and secondarily in grid (34.2%) blocks. Like the Northern Rough-winged Swallow, this swallow was confirmed to nest in 38.7% of all blocks. During Iowa's first atlas, Bank Swallow was confirmed nesting in 45.8% of the blocks in which it was found. Once a nesting colony of this species is located, confirming nesting is usually relatively easy. The three confirmed nesting codes most used were attending young, occupied nest, and recently fledged young. The BBA results from Iowa's neighboring states were similar, and Bank Swallow was confirmed nesting in 45.3% of Missouri's blocks (Jacobs and Wilson 1997) and 58.3% of Illinois blocks (Kleen et al. 2004).



The overall distribution of Bank Swallow was similar for both atlases. Much like what was seen for Northern Rough-winged Swallow, however, there was a higher detection rate for this species in northern and western Iowa during the second atlas. This was especially true around the Iowa Great Lakes area and in blocks associated with wetlands on many wildlife management areas in the Des Moines Lobe Region. Large colonies, numbering in the hundreds, also were detected nesting in vertical walls of loess soil in the Loess Hills of western Iowa. Bank Swallow nesting evidence was not found in 13 counties, while it went undetected in 18 counties during the first atlas. Furthermore, Bank Swallow nesting evidence was found in 168 (43%) more blocks during BBA II than in BBA I, even though Iowa BBS data, from 2001–2011, indicate this swallow's overall population trend is stable (Sauer et al. 2012). An increase in detection may have resulted from more uniform coverage of all blocks in the second atlas than the first and the fact that 74 more blocks were visited during BBA II. Distribution tended to be spotty during both atlases, tied especially to river and stream corridors and apparently related to the specialized nesting habitat required by this species.

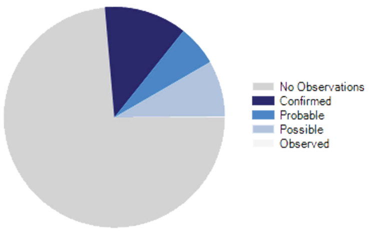
The size and longevity of Bank Swallow colony nesting sites depend greatly on erosion to maintain or create suitable nesting habitat, although the ephemeral nature of the nesting banks results in relatively low levels of nest-site fidelity (Garrison 1999). As was noted by Jackson et al. (1996), since this species relies primarily on natural phenomenon to create its nesting habitat, its future in Iowa appears secure.

By Bruce L. Ehresman

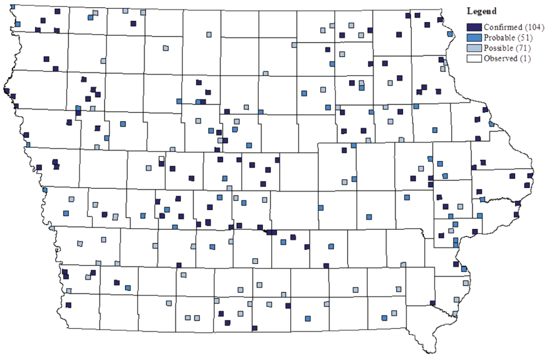
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	1	1
Possible	34	37	71
Probable	15	36	51
Confirmed	43	61	104
Conf & Prob	11.10%	24.30%	18.00%

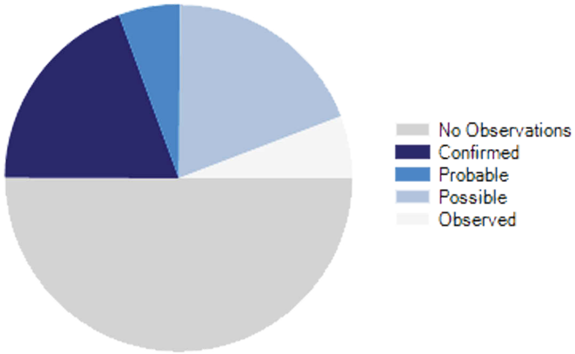
BBA I Results



BBA I



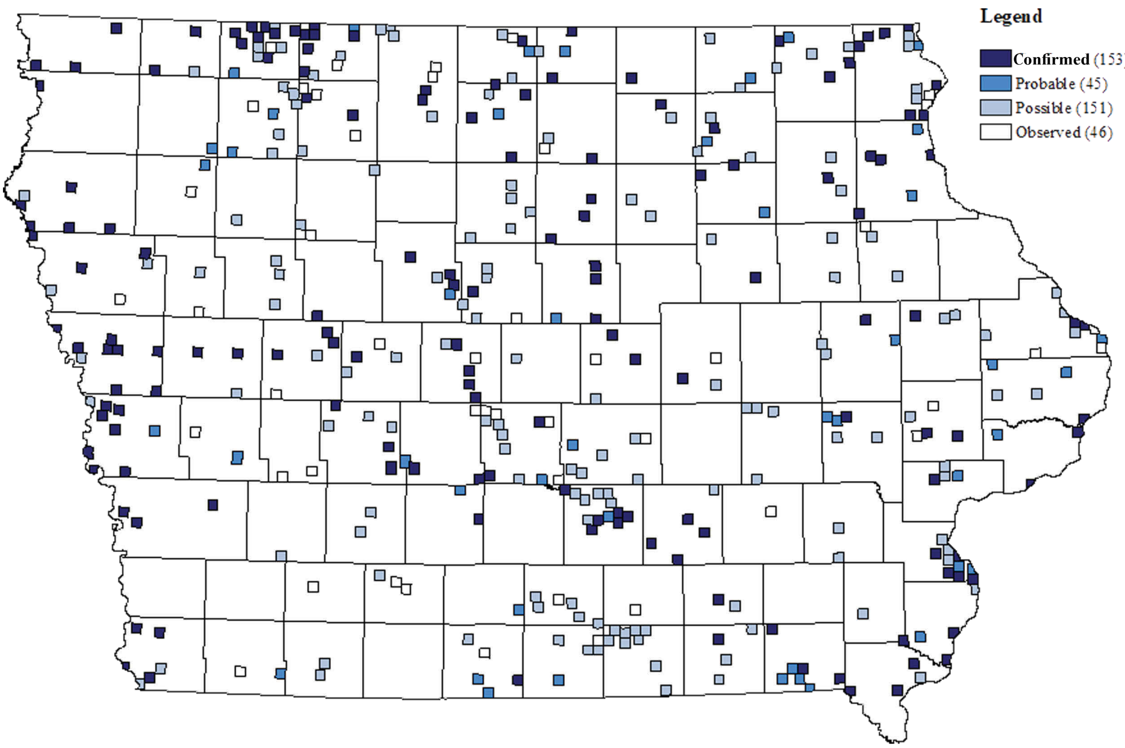
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	18	28	46
Possible	45	106	151
Probable	15	30	45
Confirmed	57	96	153
Conf & Prob	13.80%	31.60%	23.00%

BBA II

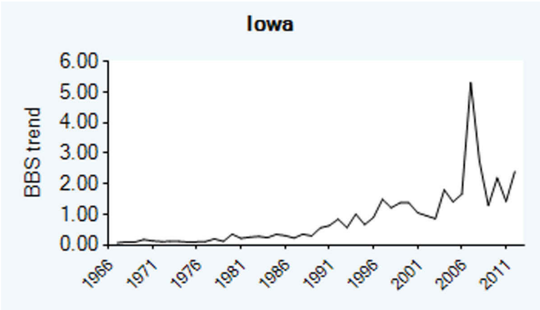


Tree Swallow *Tachycineta bicolor*

© Tyler Harms

Habitat	Open fields, marshes, and other wetland areas with dead snags and trees with woodpecker holes or nest boxes
Breeding Dates	8 Apr (PR)–12 Aug (CO)
Nest Type	Nest constructed in tree cavity or nest box of grass and lined with feathers
Clutch Size	3–6 eggs (typically 5 eggs)
Incubation	13–16 days
Fledging	16–24 days (typically 18–22 days)
Status	Common statewide breeding bird
BBS Trend	Increasing (trend = 7.3, 95% CI is 4.6, 11.1) [Iowa]

Patterns since BBA I



The Tree Swallow is a common statewide nester, and it is found near lakes, rivers, marshes, and ponds wherever suitable tree nest cavities or nest boxes exist. During Iowa's second atlas, this swallow was detected in 693 (87.6%) blocks, a substantial increase from the 324 (37.6%) blocks in which it was found during the first atlas. Perhaps this increase in detection is related to a significant population increase, since Iowa BBS data indicate an average annual increase of 7.3%, from 2001–2011 (Sauer et al. 2012). The Tree Swallow was detected primarily in habitat (56%) blocks and secondarily in grid (44%) blocks, and it also was especially found in priority (67%) blocks during the first atlas. Iowa has a growing tradition of nest box establishment for many bird species, and it appears that the Tree Swallow has particularly benefitted from the growing number of Eastern Bluebird nest box trails. This swallow readily nests in bluebird nest boxes, and it was easily found at nest boxes and in trees at the edge of wetlands and was confirmed to nest in 67.4% of all Iowa blocks with records. Probable nest records made up about 14% of all records, while about 16% of the records were possible nesting. Like Iowa, Illinois BBA data reflected a high confirmed nesting rate, and Tree Swallows were confirmed nesting in about 54% of Illinois blocks from which records were obtained (Kleen et al. 2004).

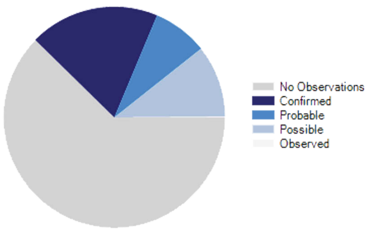
While the overall distribution of Tree Swallow was similar for both atlases, there was a higher detection rate for this species in southern Iowa during the second atlas. This species was found in 369 more blocks during BBA II than in BBA I. One difference in results between the two atlases may be related to the fact that habitat blocks were especially clumped near southern Iowa reservoirs, where this species was found in nearly every block. These large reservoirs offer an abundance of potential nesting sites, with many dead trees standing in the water. A higher rate of detection may also have resulted from the occurrence of more uniform coverage of all blocks in the second atlas than during the first atlas, as well as the fact that 74 more blocks were visited during BBA II.

Lack of dead snags may affect Tree Swallow abundance directly or it may influence the presence of various woodpeckers needed to create the nesting cavities to be subsequently used by Tree Swallows (Winkler et al. 2011). Fortunately, Tree Swallows have adapted their nest site preferences to include human-made structures (Jackson et al. 1996, Winkler et al. 2011), which enables Tree Swallows to occupy nest boxes placed around treeless marshes, farm ponds, and other such areas where they otherwise could not nest.

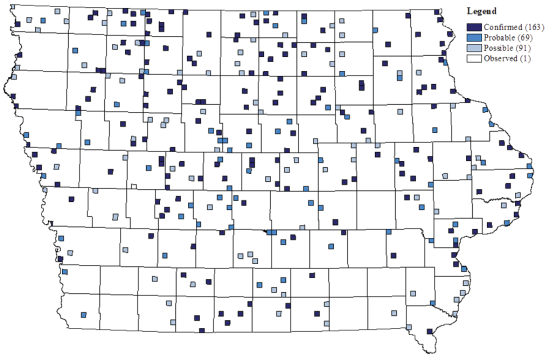
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	1	0	1
Possible	40	51	91
Probable	17	52	69
Confirmed	48	115	163
Conf & Prob	12.50%	41.90%	26.90%

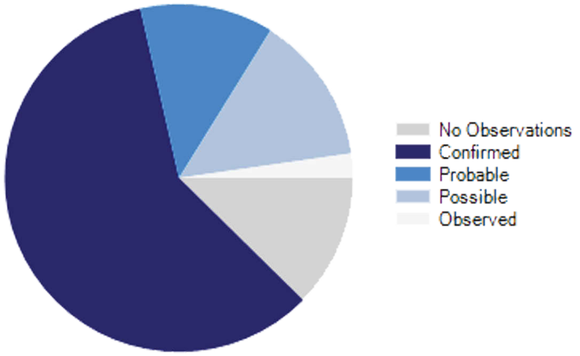
BBA I Results



BBA I



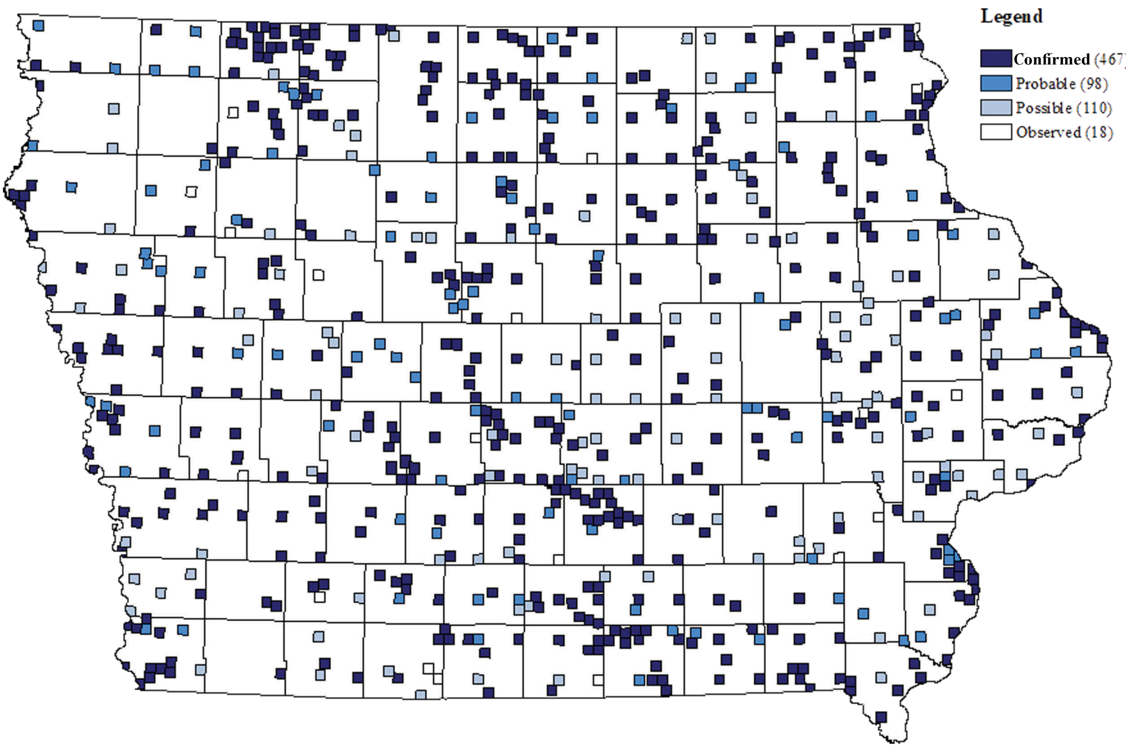
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	15	3	18
Possible	69	41	110
Probable	49	49	98
Confirmed	172	295	467
Conf & Prob	42.30%	86.20%	65.60%

BBA II

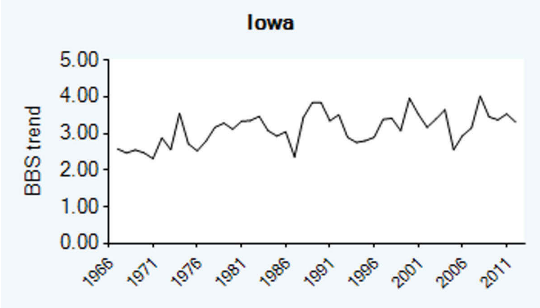


In Honor of Carol and David Vleck
(Paul Skrade)

© Doug Harr

Habitat	River banks and other cut banks (especially in Loess Hills) near water
Breeding Dates	30 Apr (PR)–18 Aug (CO)
Nest Type	Excavated cavity in a bank, cliff, or crevice lined with grass and other plant material
Clutch Size	4–8 eggs (typically 5 or 6 eggs)
Incubation	15–17 days (avg. 16 days)
Fledging	17–21 days
Status	Common statewide breeding bird
BBS Trend	Increasing (trend = 1.8, 95% CI is 0.1, 3.8) [Iowa]

Patterns since BBA I



The Northern Rough-winged Swallow nests throughout the state wherever a cut bank or the bank of a river, stream, or even a drainage ditch provides an adequate nesting site. During this second atlas, this swallow was detected in 604 (76.4%) blocks, while it was found in 419 (48.7%) blocks in the first atlas. Iowa BBS data from 2001–2011, indicate this species has increased at an average annual rate of 1.8% (Sauer et al. 2012). Like most other swallows, this species was detected primarily in habitat (57.6%) blocks and secondarily in grid (42.4%) blocks. These data compare well to the first atlas, when 58% of the records were from priority blocks (Jackson et al. 1996). Unlike Barn Swallows and Cliff Swallows, whose mud nests are easily seen, this cavity-nesting swallow was confirmed to nest in only 39.7% of BBA II blocks and 35.1% of BBA I blocks, where it was found. The three confirmed nesting codes most used were occupied nest, attending young, and recently fledged young. The BBA results from other neighboring states were similar, and this swallow was confirmed nesting in 33.7% of Missouri's blocks (Jacobs and Wilson 1997) and 46.1% of Illinois blocks (Kleen et al. 2004).

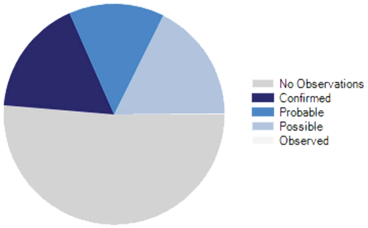
While the overall distribution of Northern Rough-winged Swallow was similar for both atlases, there was a higher detection rate for this species in northwestern Iowa during the second atlas, particularly around the Iowa Great Lakes area of the Des Moines Lobe Region. This species was also easily detected nesting in vertical walls of loess in the Loess Hills of western Iowa, where it was often found nesting in association with large Bank Swallow colonies. Another difference between the two atlases was that no detections were made in Page County during the second atlas, while there were detections made in five Page County blocks during BBA I. This swallow also was not found in O'Brien and Keokuk counties. Similarly, this swallow was not detected in four counties during the first atlas (Jackson et al. 1996). Overall, Northern Rough-winged Swallow was found in 185 (31%) more blocks during BBA II than in BBA I. The increase in detection may have resulted from more uniform coverage of all blocks in the second atlas than the first, an increase in Iowa's population (Sauer et al. 2012), and because 74 more blocks were visited during the second atlas.

For their nesting sites, it appears that rough-winged swallows are especially dependent on burrows dug by other species, and perhaps especially Bank Swallows and Belted Kingfishers (De Jong 1996). On several occasions, while doing atlas work, this species was observed nesting beneath bridges in crevices between planks or in holes in concrete walls, and one pair was found nesting in a galvanized pipe protruding from the wall (Ehresman pers. obs.). According to De Jong (1996), the lack of available nest sites may be the most limiting factor for the nesting success of this species. One likely important cause of nest loss is flooding of the nest burrow by high spring water (Dingle 1942), and this may be a growing concern if Iowa's spring rainfall continues to increase, as it has in recent years.

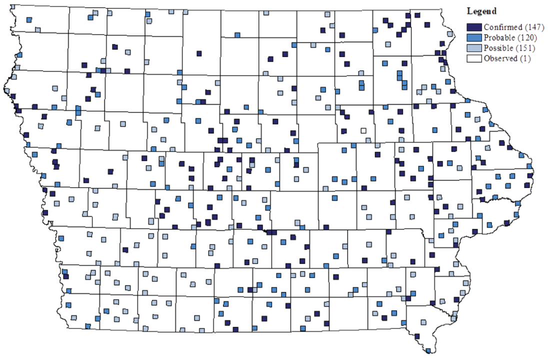
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	1	0	1
Possible	79	72	151
Probable	47	73	120
Confirmed	46	101	147
Conf & Prob	17.80%	43.60%	31.00%

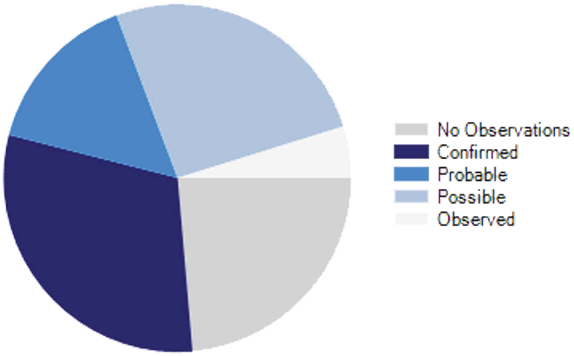
BBA I Results



BBA I



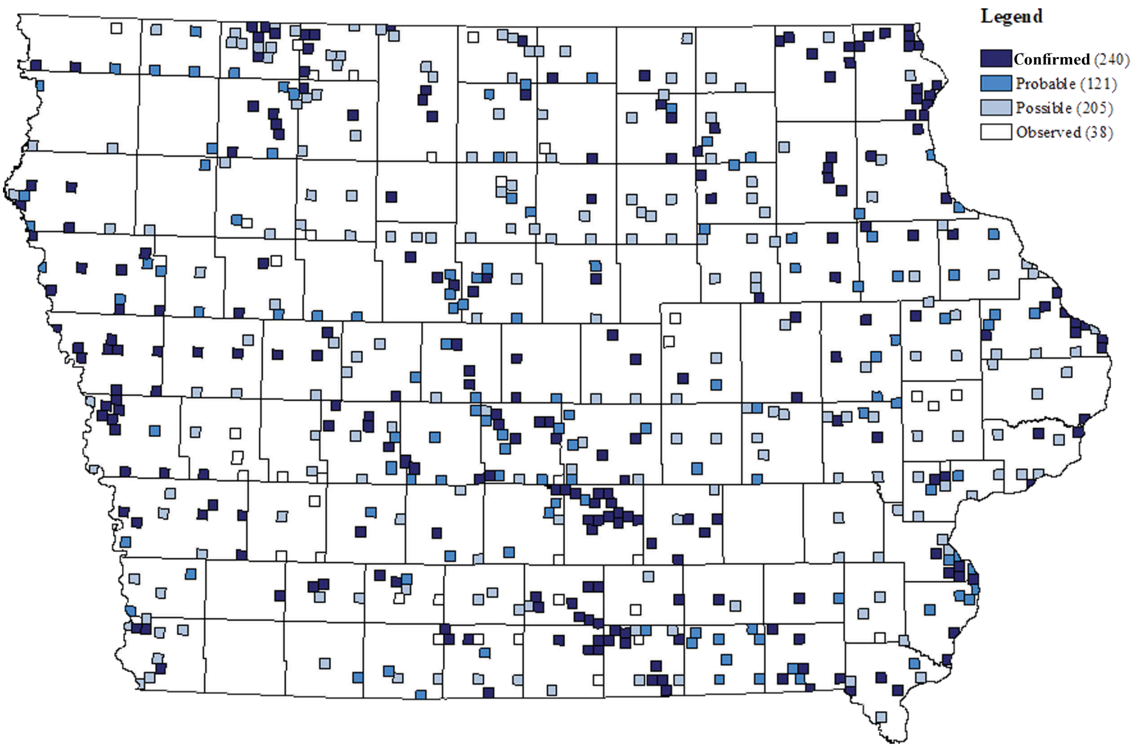
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	27	11	38
Possible	103	102	205
Probable	43	78	121
Confirmed	83	157	240
Conf & Prob	24.10%	58.90%	41.90%

BBA II

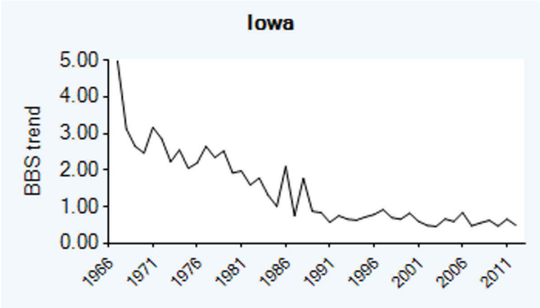


In Honor of Kirsten Winter (Carol Winter)

© Tom Schilke

Habitat	Wooded riparian areas with dead snags and woodpecker holes and human-made nest structures
Breeding Dates	1 Apr (CO)–17 Aug (CO)
Nest Type	Nest constructed in tree cavity or nest house of twigs, coarse grass, leaves, and mud
Clutch Size	3–6 eggs (typically 5 eggs)
Incubation	15–18 days
Fledging	27–36 days
Status	Uncommon statewide and locally common breeding bird
BBS Trend	Decreasing (trend = −4.1, 95% CI is −6.4, −2.3) [Iowa]

Patterns since BBA I



The Purple Martin is found statewide, and it is particularly seen in close association with human-made nest structures in yards near rivers, streams, lakes, and ponds. During this atlas, martins were detected in 310 (39.2%) blocks, which is an increase from the 265 (30.8%) block records from the first atlas. While the number of records in blocks increased from the first to the second atlas, the BBS data for Iowa indicate this species is declining at an average annual rate of 4.1%, from 2001–2011 (Sauer et al. 2012). Perhaps more Purple Martin records were documented during the second atlas because more effort was focused on areas where this bird might be found. This species prefers to occupy riparian habitats, where much of Iowa's public land exists, and it was found primarily in habitat (67.4%) blocks and secondarily in grid (32.6%) blocks, like results of the first atlas. The Purple Martin exhibits a growing tradition to nest in human-made nest structures, which are often quite visible from roads and streets. For this reason, it was especially easy to confirm nesting, and the martin was confirmed to nest in 230 (74.2%) blocks with records. During the first atlas, this species was confirmed nesting in 151 (57%) of the blocks with records. Illinois BBA data showed similar results, with confirmed nesting documented in 441 (67.6%) of the blocks with records (Kleen et al. 2004). Missouri BBA data for this species also showed a high percentage of nesting confirmations, with 75.8% of all records in the confirmed nesting category (Jacobs and Wilson 1997).

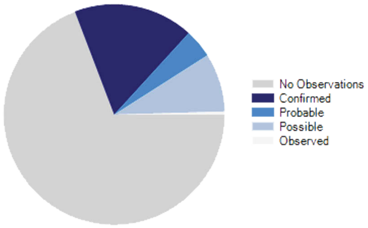
It appears that overall distribution of the Purple Martin was similar for both Iowa atlases, since it was found in all parts of the state. Even though this species was found in 45 more blocks during BBA II, it was detected in fewer counties. During the first atlas, this species was documented in blocks in all but eight counties (Jackson et al. 1996). There appeared to be more even distribution of block records across the entire state in the first atlas, while block records of the second atlas appeared especially tied to riparian areas. This could be related to the fact that habitat blocks were particularly clumped on reservoirs, at least in southern Iowa. Also, more Purple Martin detections occurred during the second atlas in southeastern Iowa; especially in Van Buren and Davis counties, where Amish and other local community members have erected hundreds of nest structures that were not present during the first atlas.

In eastern North America this large swallow now breeds almost entirely in human-made martin houses, and it is rare to find this species nesting in its ancestral nest sites—abandoned woodpecker holes in dead snags (Brown and Tarof 2013). Because the Purple Martin has become so dependent on artificial structures in which to nest, Jackson et al. (1996) point out the need for good nest structure maintenance and management. Without human intervention and management of colony sites, exotic cavity nesting competitors, like House Sparrow and European Starling, can cause local extinction of martins by taking over their nest cavities and making them unsuitable for martin use. Brown and Tarof (2013) note that encouraging the protection of winter roost sites in Brazil should also be a priority action to ensure a successful future for this species.

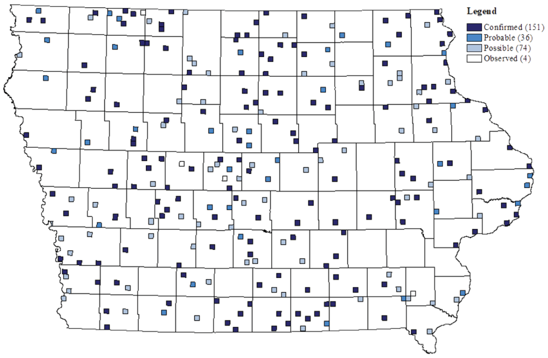
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	1	3	4
Possible	28	46	74
Probable	17	19	36
Confirmed	56	95	151
Conf & Prob	14.00%	28.60%	21.70%

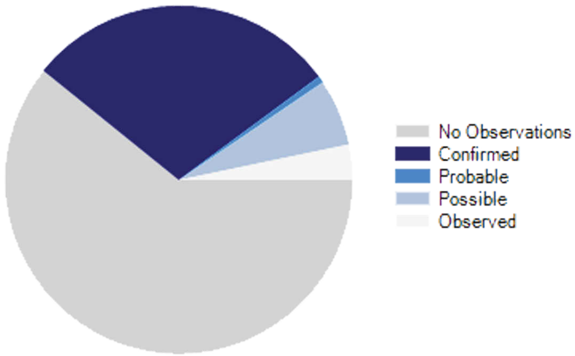
BBA I Results



BBA I



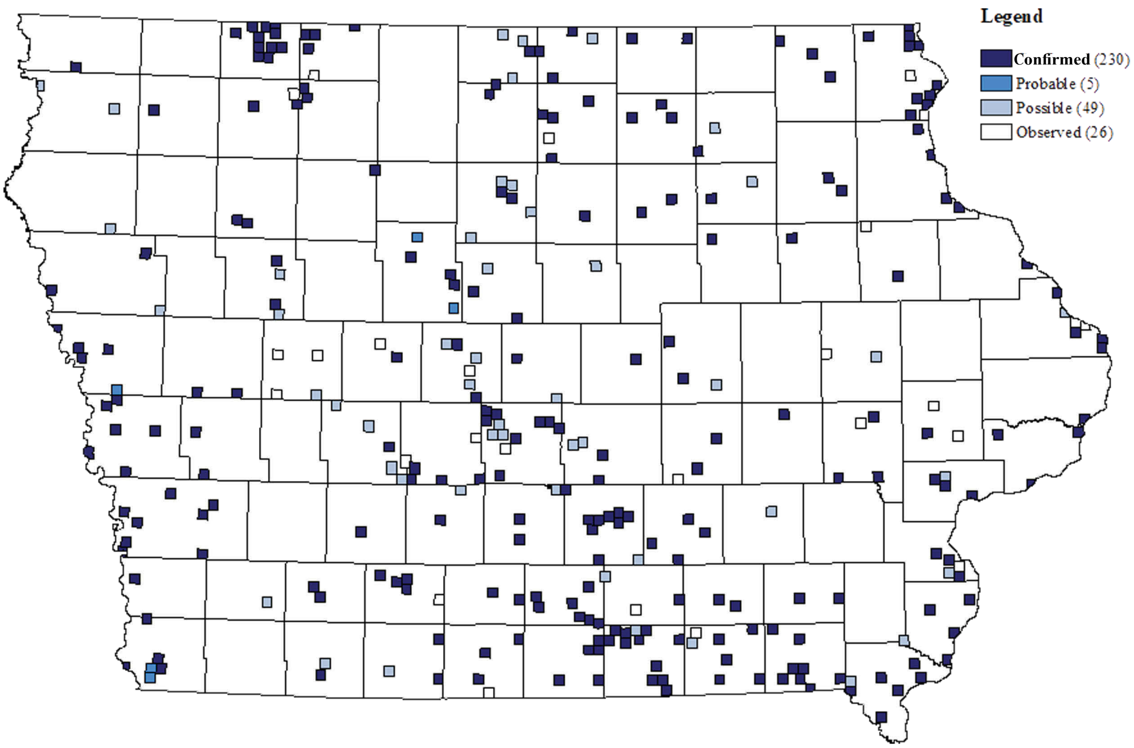
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	9	17	26
Possible	14	35	49
Probable	1	4	5
Confirmed	77	154	231
Conf & Prob	14.90%	39.60%	27.40%

BBA II



Sponsored by Pamela Wingert

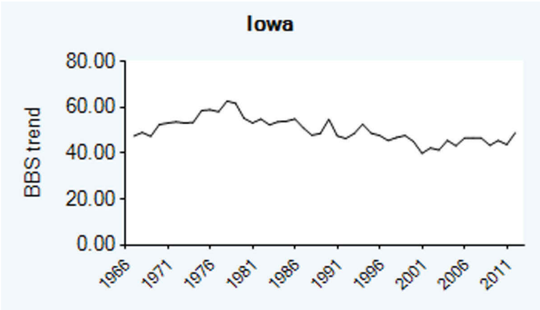
Barn Swallow *Hirundo rustica*

© Linda Rudolph

Habitat	Open country near water, particularly near farmsteads and bridges
Breeding Dates	20 Apr (PR)–31 Aug (CO)
Nest Type	Cup-shaped nest constructed of mud pellets, straw, and hair and lined with fine material and feathers and attached to buildings, bridges, and cliff faces
Clutch Size	First clutches 5–6 eggs; later clutches 3–4 eggs
Incubation	13–15 days
Fledging	18–23 days
Status	Common and abundant statewide breeding bird
BBS Trend	Stable (trend = 0.0, 95% CI is –0.7, 0.7) [Iowa]

Patterns since BBA I

The Barn Swallow is the most abundant and widely distributed swallow in the world, and Iowa's BBA data do not dispute that. This colorful swallow nests everywhere in the state and is the most detected swallow in Iowa, occurring in 789 (99.7%) blocks during this second atlas. It is also the fifth most detected bird species in the state, and it was the sixth most widely reported species in the first Iowa atlas (Jackson et al. 1996). According to BBS data, Iowa is one of a few areas in this country where Barn Swallow is most abundant (Brown and Brown 1999). Probably because this species tends to nest near humans and in a variety of locations, it was detected essentially equally in habitat (50.1%) blocks and in grid (49.9%) blocks. Since this species nests readily on and in buildings and beneath bridges, its nests are easily located and monitored. As a result, Barn Swallow was confirmed to nest in 95.4% of all blocks in which it was found. The BBA results from adjacent states are similar, and, for blocks where it was found, Barn Swallow was confirmed nesting in 88.7% of Illinois blocks (Kleen et al. 2004) and 82.9% of Missouri's blocks (Jacobs and Wilson 1997). The confirmed nesting codes most used (in Iowa) for Barn Swallow were occupied nest and recently fledged young.



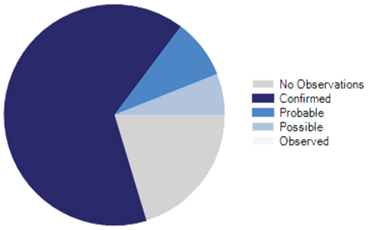
The distribution for Barn Swallow was similar for both atlases. The main difference was the increased number of blocks in which this swallow was detected during BBA II. This increase in detection may have resulted from more uniform coverage of all blocks in the second atlas than the first and because 74 more blocks atlassed during BBA II. While Illinois BBS data indicate a substantial population increase for this species in recent years (Walk et al. 2010b), Iowa BBS data indicate the Barn Swallow population has remained stable (Sauer et al. 2012).

Historically, Barn Swallows mostly used caves as nesting sites, and occasionally nests were built in holes or crevices in cliff faces (Brown and Brown 1999). This species now nests in almost every kind of building, shed, bridge, culvert, or other structure that provides a wall with an overhang or a flat ledge, where a nest can be built. Cooperative breeding is another strategy utilized by this species to increase nest success. Juveniles from first broods have been reported to feed siblings of second broods, and extra adults often help with feeding of young and fending off potential predators that venture near the nests (Brown and Brown 1999). Perhaps the only reason that this species was not confirmed nesting in every Iowa block was because of a reluctance of some atlassers to ask permission from landowners to check their buildings for evidence of nesting.

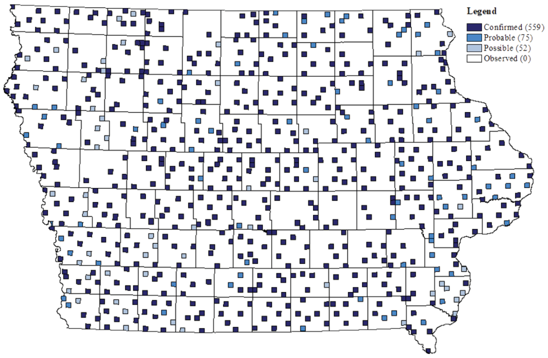
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	41	11	52
Probable	41	34	75
Confirmed	274	285	559
Conf & Prob	60.30%	79.90%	73.60%

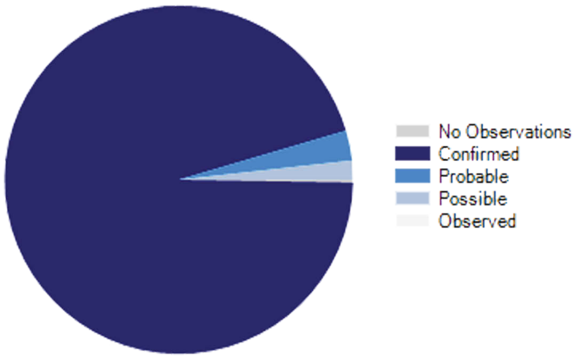
BBA I Results



BBA I



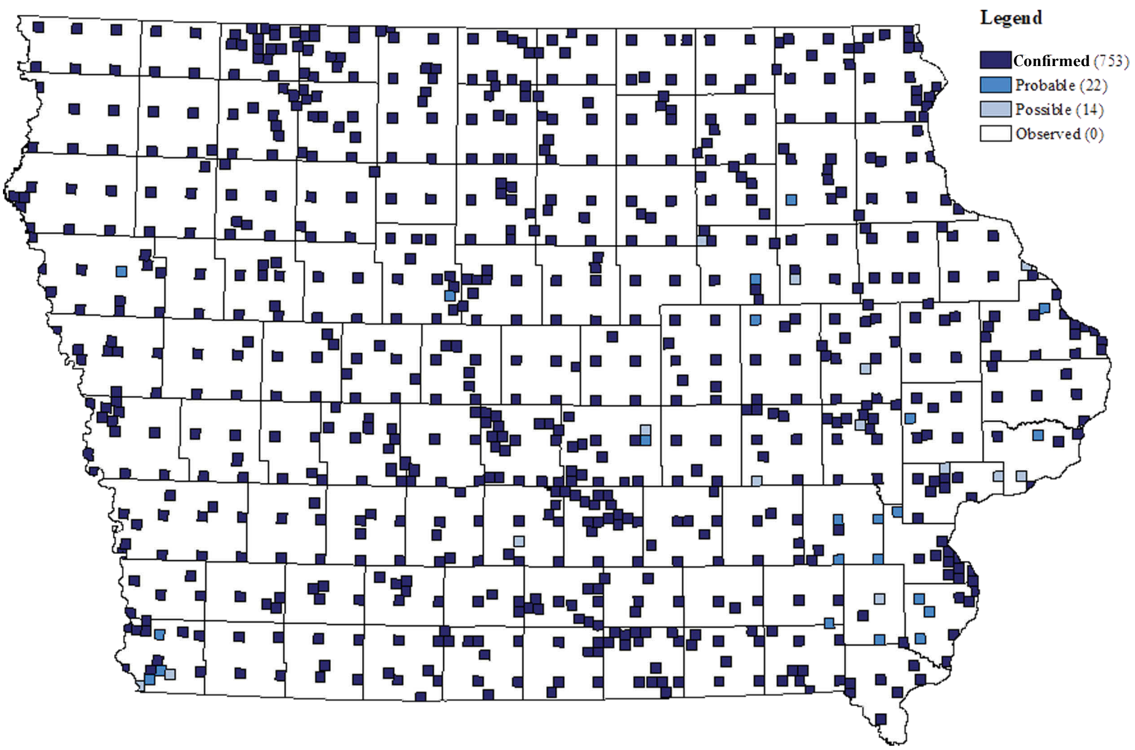
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	4	10	14
Probable	14	8	22
Confirmed	378	377	755
Conf & Prob	75.10%	96.50%	90.20%

BBA II

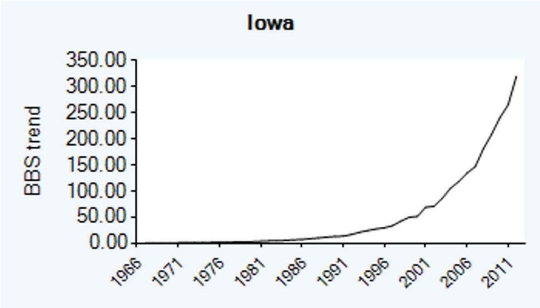


© Jim Mason

Habitat	Open country rivers and streams, particularly associated with overhanging cliffs or bridges
Breeding Dates	30 Apr (CO)–26 Aug (CO)
Nest Type	Gourd-shaped nest constructed of mud pellets and lined with grasses and feathers and placed on cliff faces, bridges, and buildings
Clutch Size	1–6 eggs (typically 3–4 eggs)
Incubation	11–16 days (typically 13–14 days)
Fledging	23–26 days
Status	Common and abundant statewide breeding bird
BBS Trend	Increasing (trend = 15.2, 95% CI is 13.1, 18.6) [Iowa]

Patterns since BBA I

The Cliff Swallow historically nested in Iowa in just a few places, primarily on rocky streamside cliffs. Now this species nests throughout the state, especially on the underside of bridges. Within the last 100 years, Cliff Swallow nesting range expanded dramatically with the construction of highway bridges and buildings (Brown and Brown 1995). During the second atlas, this swallow was detected in 767 (97%) blocks, an increase of 415 blocks since Iowa's first atlas when it was found in 352 (40.9%) blocks (Jackson et al. 1996). Iowa BBS data from 2001–2011 indicate this species has increased at an average annual rate of 15.2% (Sauer et al. 2012). Because of its apparent growing tendency to nest under bridges, Cliff Swallow was detected almost equally in habitat (50.6%) blocks and in grid (49.4%) blocks. Since this species nests readily under bridges and on buildings, its nests are easily located and monitored. Not surprisingly, it was confirmed to nest in 88.7% of all blocks. The BBA results from neighboring states were similar and, for blocks where it was found, Cliff Swallow was confirmed nesting in 71.6% of Missouri's blocks (Jacobs and Wilson 1997) and 85.2% of Illinois blocks (Kleen et al. 2004). The confirmed nesting codes most used (in Iowa) for this swallow were occupied nest, nest with young, and used nest.



The distribution of Cliff Swallow was similar for both atlases, but there was an apparent increase in the number of blocks where this species was detected in extreme southern Iowa and along the Mississippi River during the most recent atlas. While this species was not detected in Page, Clarke, and Henry counties in the first atlas, it was found in all 99 counties during the second atlas. Furthermore, the number of blocks in which the Cliff Swallow was detected, as well as the number of blocks in which it was confirmed nesting, more than doubled during BBA II. This increase in detection may have resulted from more uniform coverage of all blocks in the second atlas than the first; and it is almost certainly related to the dramatic increase of the population of this species and its widespread nesting under bridges in recent years (Kent and Dinsmore 1996, Walk et al. 2010b).

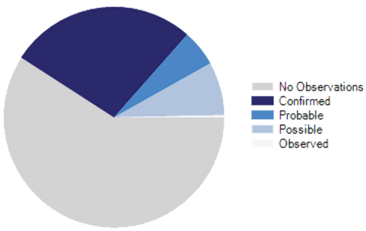
Colony sizes of 200 active nests or more were found throughout the state beneath concrete bridges, especially on larger rivers. Graber et al. (1972) pointed out that, in the past, local Illinois Cliff Swallow populations declined and sometimes disappeared because of competition for nest sites by House Sparrows. While House Sparrows and European Starlings were observed nesting in Cliff Swallow nests at most colony sites visited (Ehresman pers. obs.), perhaps the sheer number of Cliff Swallows at most sites can compensate for the nests usurped by these other invasive nest competitors.

Cliff Swallow

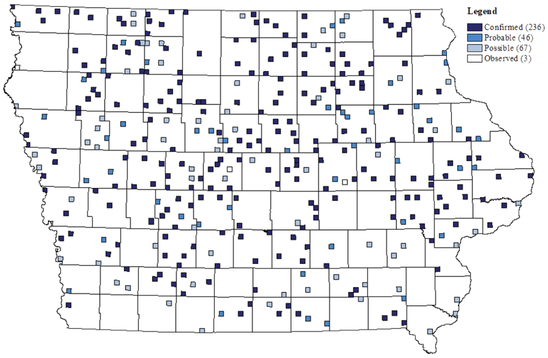
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	2	1	3
Possible	28	39	67
Probable	19	27	46
Confirmed	117	119	236
Conf & Prob	26.10%	36.60%	32.80%

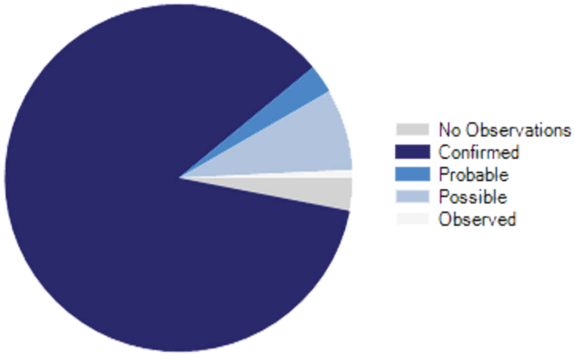
BBA I Results



BBA I



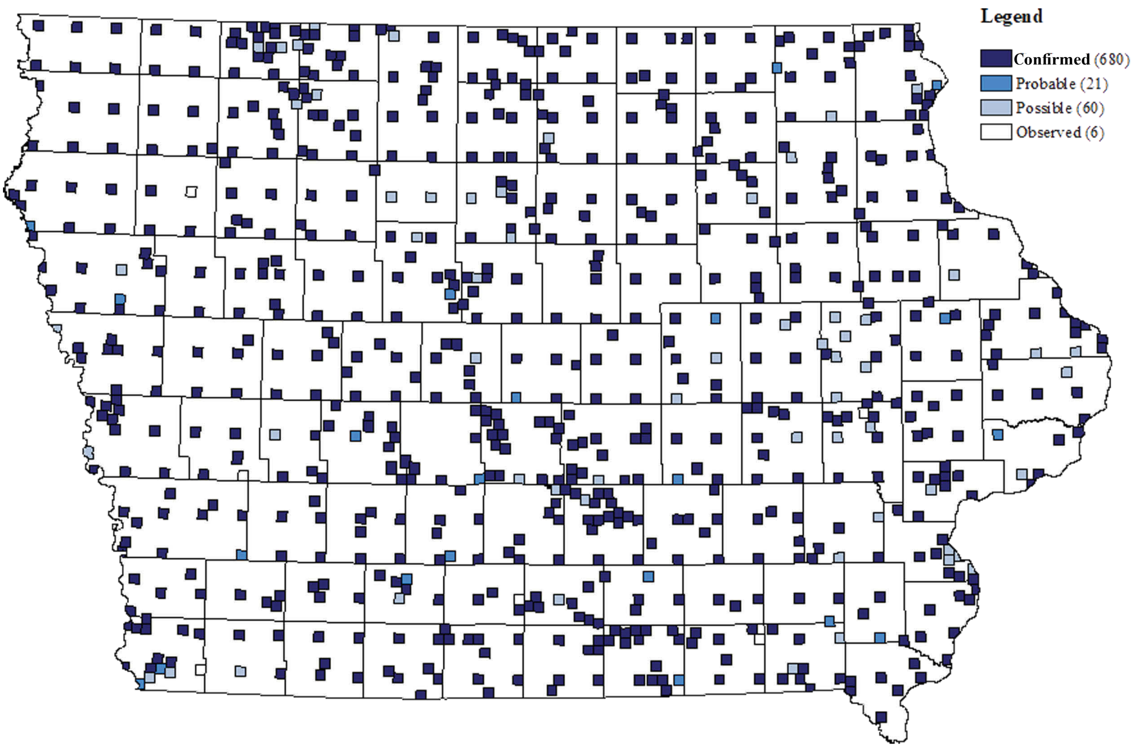
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	5	1	6
Possible	31	29	60
Probable	11	10	21
Confirmed	333	348	681
Conf & Prob	65.90%	89.70%	81.50%

BBA II



Sponsored by Scott & Rachel Hau Anderson

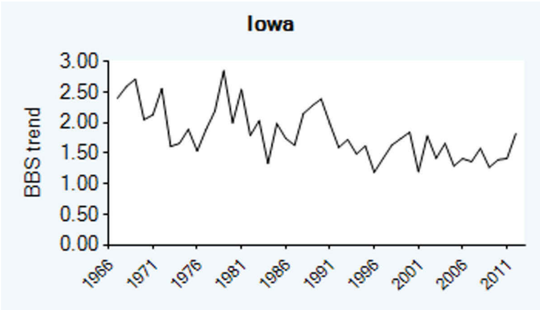
Black-capped Chickadee *Poecile atricapillus*

© Reid Allen

Habitat	Deciduous and coniferous woodlands, parks, backyards
Breeding Dates	15 Mar (CO)–31 Aug (CO)
Nest Type	Cavity in rotten wood, typically 4–20 ft. above ground
Clutch Size	Usually 6–8
Incubation	12–13 days
Fledging	28 days
Status	Common breeder
BBS Trend	Decreasing (trend = –1.7, 95% CI is –3.1, –0.3) [Iowa]

Patterns since BBA I

The Black-capped Chickadee is a common year-round resident everywhere in Iowa except for the extreme northwest corner. This species was detected in 88% of survey blocks. In blocks where they were confirmed/probable, they were much more frequent in habitat (61%), than grid (39%) blocks. Chickadees were confirmed breeding on 59% of the blocks in which they were detected. Although detections and breeding confirmations increased greatly over BBA I, chickadees appear to have suffered some range contraction in the northwestern counties. The BBS data since 1966 show a declining trend in Iowa, which is contrary to the increasing trend nationwide.



Forest clearing for agriculture can increase forest edge, the preferred habitat for chickadees. They show a preference for woodlot fragments that feature a large canopy of old trees (Grubb and Bronson 2001), and overzealous forest management can reduce or eliminate natural nest sites. Although feeders enhance chickadee survival, studies suggest that chickadees are a human-sensitive species (Odell and Knight 2001, Donnelly and Marzluff 2006).

Chickadees may form pairs in the fall. They will often excavate their own nest cavity from rotten wood. Clutches commonly contain 6–8 eggs. Replacement broods may have lower clutch sizes (Smith 1991). True second broods are rare. Young stay with the adults for 3–4 weeks after leaving the nest. Dispersed immatures will join winter flocks that may include local breeders and unrelated young from elsewhere. Most chickadees breed in their first year. Although irruptions may occur, chickadees are nonmigratory. Under most circumstances, a chickadee remains near its initial breeding territory for the rest of its life, which is 2.5 years on average.

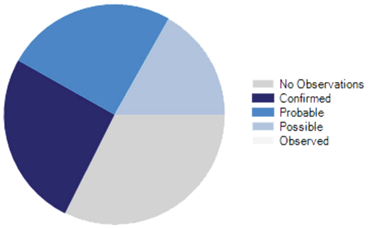
LaDeau et al. (2007) documented decreasing population size of chickadees following West Nile Virus infestations. The effect was particularly prominent at the eastern, but not the western, range limit.

Black-capped Chickadee

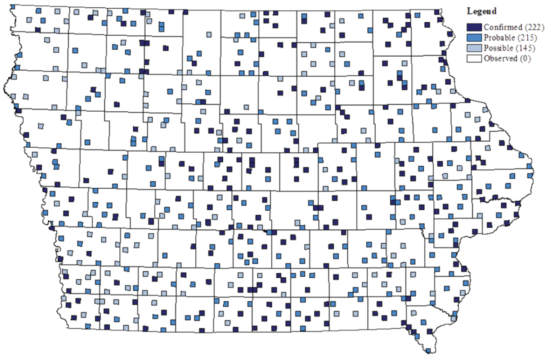
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	89	56	145
Probable	91	124	215
Confirmed	80	142	222
Conf & Prob	32.80%	66.70%	50.80%

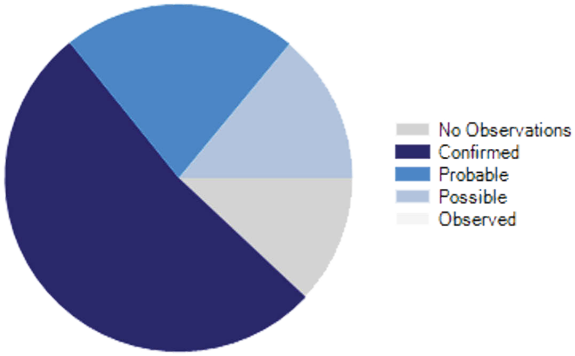
BBA I Results



BBA I



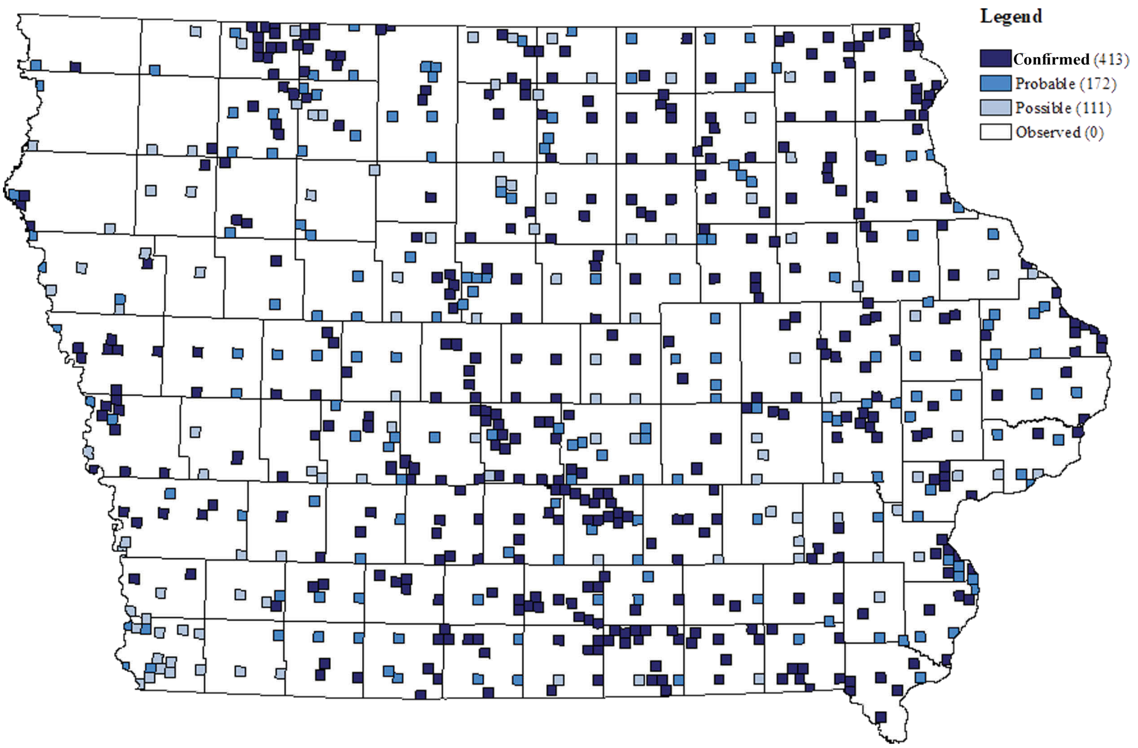
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	78	34	112
Probable	93	79	172
Confirmed	139	276	415
Conf & Prob	44.40%	89.00%	68.20%

BBA II

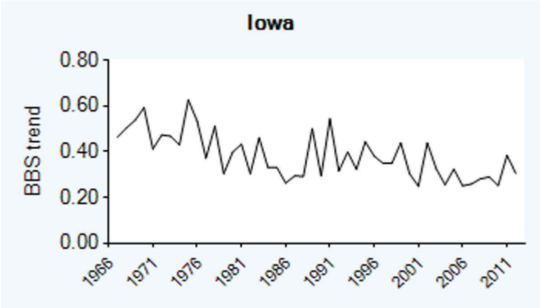


© Linda Rudolph

Habitat	Wide variety of deciduous or coniferous woodlands
Breeding Dates	6 Apr (PR)–19 Aug (PR)
Nest Type	Cavity 3–90 ft. up
Clutch Size	Usually 5–6 eggs
Incubation	12–14 days
Fledging	27–32 days
Status	Common breeder
BBS Trend	Stable (trend = 0.1, 95% CI is –1.7, 2.0) [Iowa]

Patterns since BBA I

The Tufted Titmouse is a common year-round resident across the southeast two-thirds of Iowa. This species was detected on 45% of all blocks. In blocks where they were confirmed/probable, they were substantially more frequent on habitat (77%) than grid (23%) blocks. Titmice were confirmed breeding on 32% of the blocks in which they were detected. This species' distribution shows minimal changes since BBA I. It has expanded north and west to Floyd and Mitchell counties and was detected in Cherokee, O'Brien, Dickinson, and Emmett counties. Blocks with breeding confirmations were greatly increased over BBA I especially in the south-central part of the state.



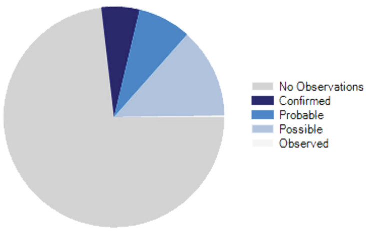
Preferred habitats contain tall vegetation, large numbers of tree species, and dense canopy (Conner et al. 1983). Because this species breeds in natural tree cavities, excessive tree felling could decrease its numbers. Tufted Titmice are nonmigratory. In winter they rely extensively on mast production of trees for their food but are also common visitors to artificial feeders. Utilizing these sources, individuals cache large amounts of food throughout their territories.

In early spring, titmouse flocks break up and the birds live in pairs or trios (Brackbill 1970). They do not appear to excavate a hole for breeding but use natural holes or cavities previously excavated. There is just one brood per year and the average clutch size is six eggs. After fledging some young are known to stay with their parents through the autumn and winter (Brackbill 1970), dispersing later in their second year. Helpers may aid the breeding pair in raising young, which is unusual for parids. These may be the offspring of the breeding pair of the previous season (Tarbell 1983).

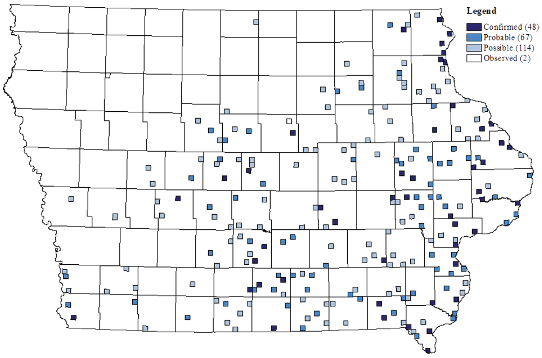
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	2	2
Possible	44	70	114
Probable	20	47	67
Confirmed	2	46	48
Conf & Prob	4.20%	23.30%	13.40%

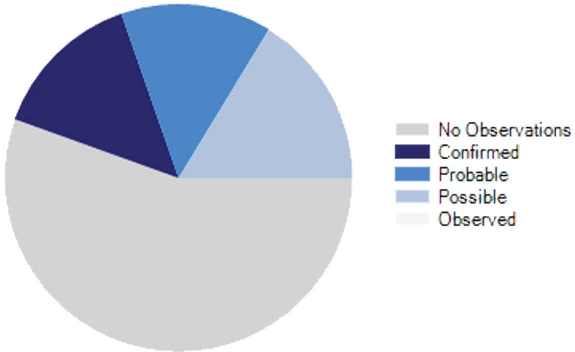
BBA I Results



BBA I



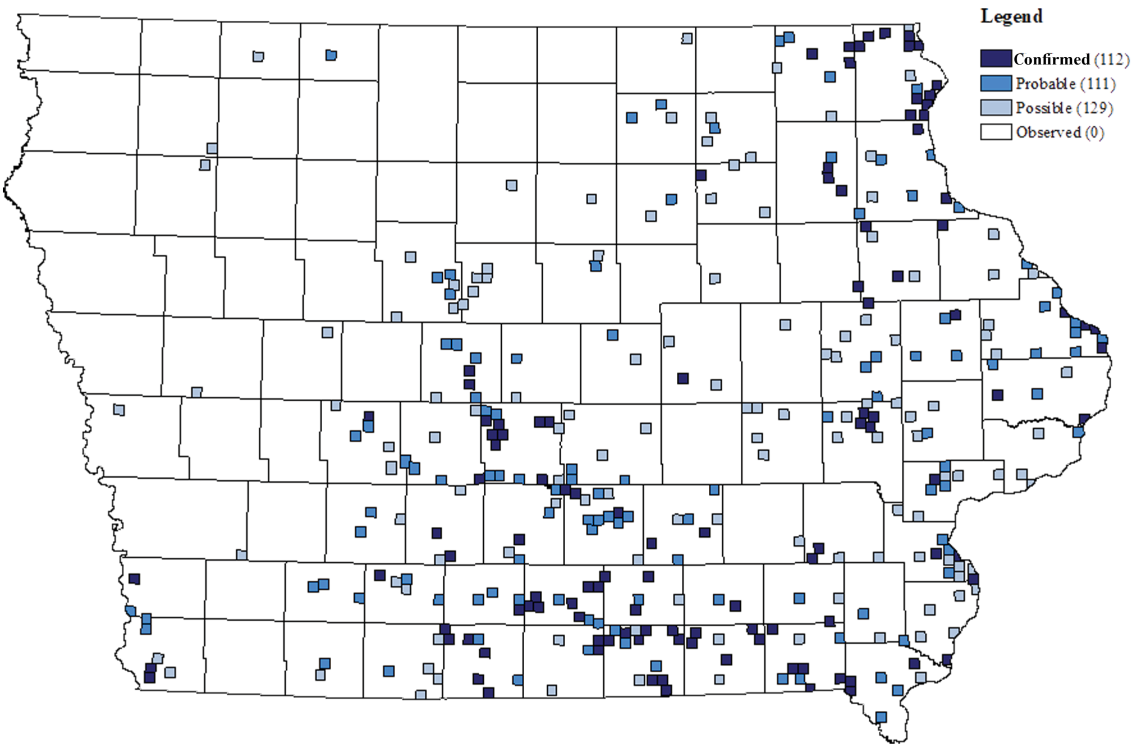
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	56	73	129
Probable	38	73	111
Confirmed	13	99	112
Conf & Prob	9.80%	43.10%	25.90%

BBA II



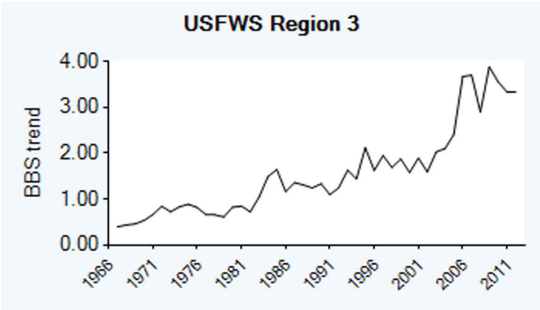
Sponsored by Linda and Joel Haack

Red-breasted Nuthatch *Sitta canadensis*

Habitat	Prefers coniferous woodland but maybe found in mixed woodlands
Breeding Dates	22 May (PR)–8 Aug (CO)
Nest Type	Tree cavity, woodpecker hole, nest box, or may excavate its own, usually 10–15 ft. up
Clutch Size	Usually 5–6 eggs
Incubation	12 days
Fledging	30–33 days
Status	Rare summer resident
BBS Trend	Increasing (trend = 2.6, 95% CI is 1.2, 4.3) [Central US]

Patterns since BBA I

Iowa is well south of what is considered the normal breeding range for Red-breasted Nuthatch. It prefers coniferous forests with a strong fir and spruce component, habitat not found here. The species was not detected on any blocks during BBA I. There is one nesting record prior to BBA I from Polk County in 1958 (Warters 1960). It remains an accidental nester in Iowa.



There was only one confirmed nesting of Red-breasted Nuthatch during BBA II in Franklin County. They were found in thirteen blocks scattered across the eastern two-thirds of the state. They are irregular winter residents in Iowa, occasionally returning in mid-August and remaining into late May. Six of the BBA II records were from May, but six were also from June or July. Most of these detections were likely nonbreeding wanderers.

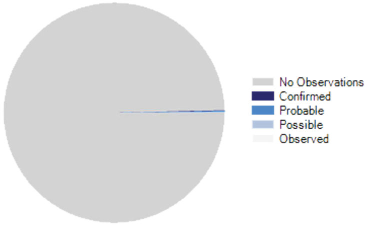
Red-breasted Nuthatches are the only nuthatch species to undergo regular irruptive movements driven by a shortage of winter food on the breeding grounds. Year to year variation in the number of wintering birds is high. Only the most northern populations appear to move south on a regular basis, and in years of good cone production, the center of population moves south minimally (Harrap and Quinn 1996).

Breeding birds typically excavate their own nest cavity and only rarely use existing cavities or boxes. A most unique aspect of nests is the application of sticky conifer resin applied with their bills. Occasionally pieces of bark are used as applicators (Tyler 1948). Most observers have hypothesized that the sticky resin serves as a barrier to prevent predators and competitors from entering the nest cavity. The parents may place small clumps of fur around the inner nest rim on the day of fledging. Presumably, this prevents the young from getting stuck in the pitch when they leave (Kilham 1975).

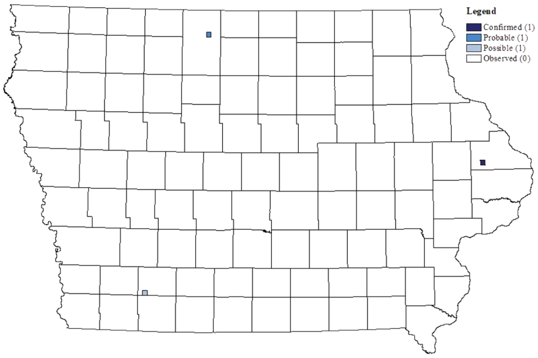
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	1	0	1
Probable	1	0	1
Confirmed	0	1	1
Conf & Prob	0.20%	0.30%	0.20%

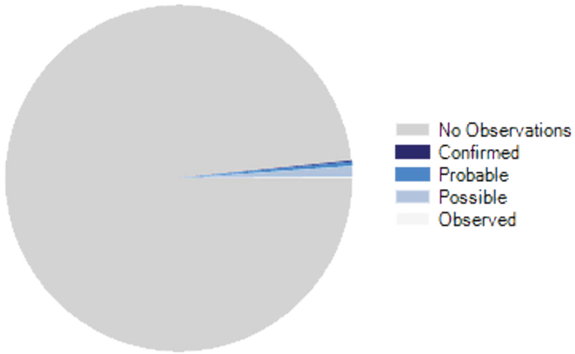
BBA I Results



BBA I



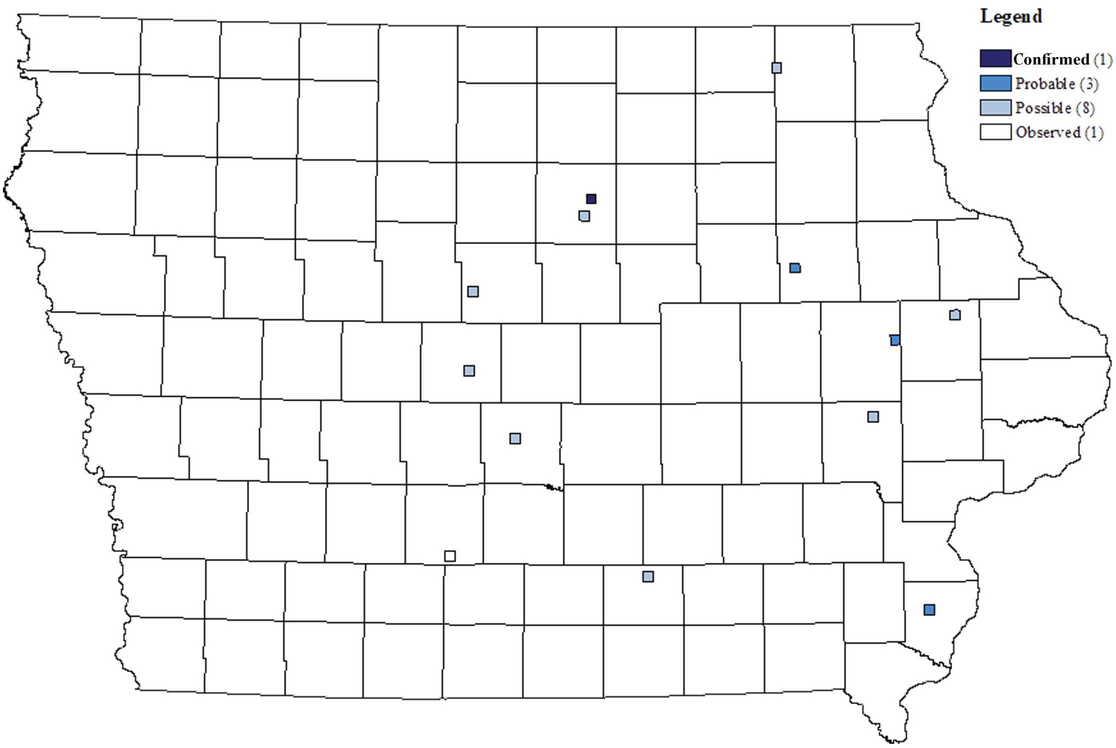
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	1	1
Possible	2	6	8
Probable	0	3	3
Confirmed	1	0	1
Conf & Prob	0.20%	0.80%	0.50%

BBA II

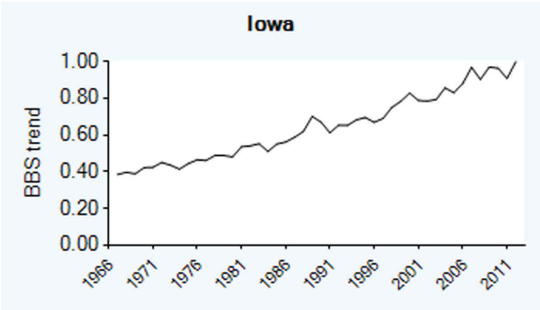


© Reid Allen

Habitat	Deciduous woodland, parks, backyards
Breeding Dates	6 Apr (PR)–31 Aug (CO)
Nest Type	Cavity up to 50 ft. above ground
Clutch Size	Usually 5–9 eggs
Incubation	12–14 days
Fledging	26–30 days
Status	Common breeder
BBS Trend	Increasing (trend = 2.1, 95% CI is 0.3, 3.7) [Iowa]

Patterns since BBA I

Common in woodlands statewide, White-breasted Nuthatches were detected in 82% of all blocks. Habitat blocks provided 65% of the probable/confirmed records. Detections and confirmations were greatly increased over BBA I, which follows the BBS trend for the state.



White-breasted Nuthatches prefer mature deciduous woodlands. Although found in very small woodlots in the American Midwest, nuthatch annual survivorship is sensitive to forest patch size (Doherty and Grubb 2002).

Pair bonds remain year-round, but courtship behavior starts usually at the end of winter (Kilham 1972). They may enlarge an existing hole, but they do not excavate a cavity on their own. It is important to leave old trees with natural cavities and old woodpecker holes to maintain nuthatch populations, especially in fragmented forests. They often reuse cavities from year to year and are known to utilize nest boxes, but sparingly (Harrison 1978). Pairs breed once per year. Young leave the nest on the 26th day after hatching, stay with their parents for several weeks and then disperse (Butts 1931).

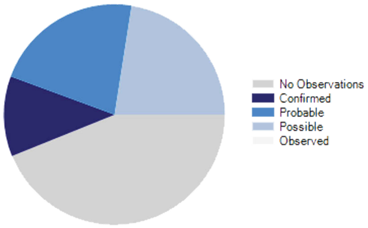
Generally, a resident species, some populations may irrupt, but it is possible that these birds are only juveniles. Upon dispersal juveniles do not return to their natal areas. There is little evidence of a return spring migration (Grubb and Pravosudov 2008).

Interestingly White-breasted Nuthatches are known to perform bill-sweeping with crushed insects around the nest entrance. This behavior may employ the insects chemical defense secretions to discourage predators (Kilham 1968).

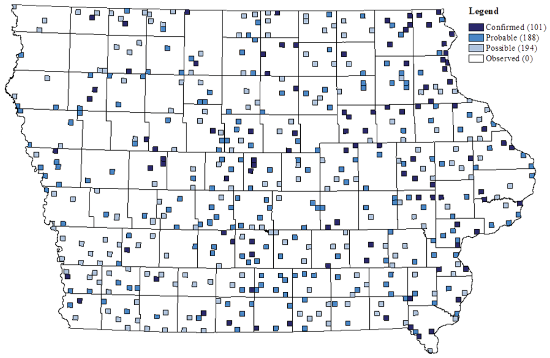
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	97	97	194
Probable	67	121	188
Confirmed	29	72	101
Conf & Prob	18.40%	48.40%	33.60%

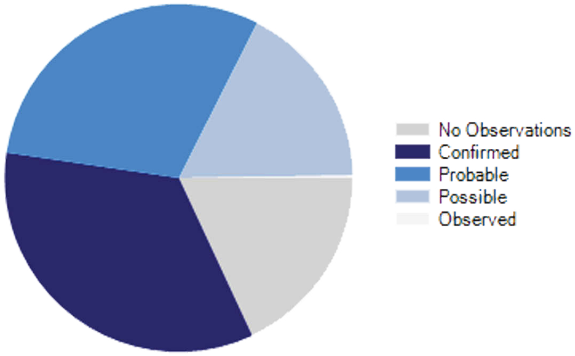
BBA I Results



BBA I



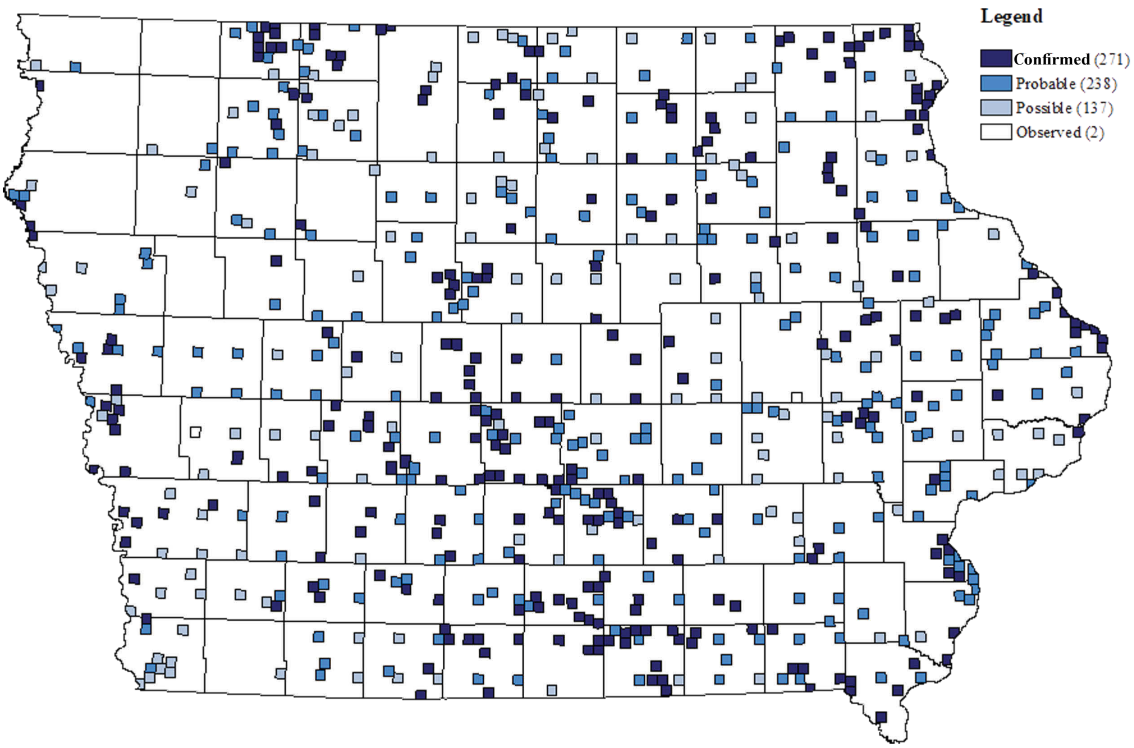
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	2	0	2
Possible	91	46	137
Probable	107	131	238
Confirmed	73	198	271
Conf & Prob	34.50%	82.50%	59.10%

BBA II

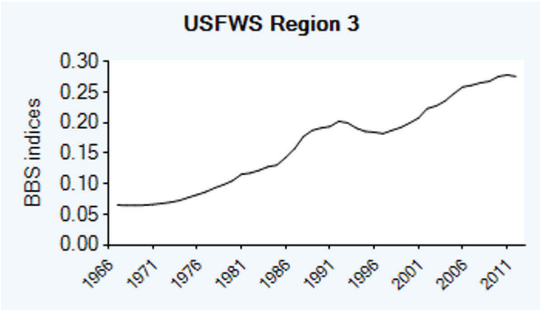


Sponsored by Karen Viste-Sparkman

Habitat	Coniferous woodlands, deciduous and bottomland forest with scattered large trees
Breeding Dates	8 Jun (PR)–26 Jul (CO)
Nest Type	Loose cup of twigs, fibers, hidden behind loose bark or in a tree crevice
Clutch Size	3–9 eggs, usually 6
Incubation	14 days
Fledging	28–30 days
Status	Rare breeder and uncommon winter resident
BBS Trend	No Trend Available

Patterns since BBA I

Brown Creepers are rare in Iowa during the breeding season and can be difficult to detect. They have a weak song and favor river bottom forests that can be hard to access. They were only detected in twenty-nine blocks, just two more than in BBA I. All Iowa breeding confirmations have been from along the Mississippi River and this was true for BBA II. Most other detections were along Mississippi tributaries. And unlike BBA I, there were not any detections from counties near the Missouri River.



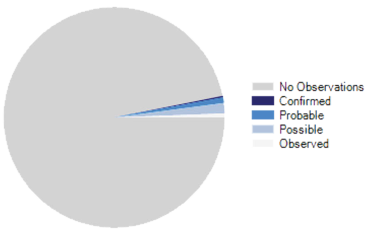
This species favors closed-canopy forests with an abundance of large dead or dying trees for nesting and large live trees for foraging. It is especially common in unlogged, old-growth stands of conifers. In fact, the Tongass National Forest has used the Brown Creeper as a management indicator species to help assess the effect of timber harvest on wildlife habitat (Poulin et al. 2013). In the Midwest it utilizes forests along major rivers (Peterjohn and Rice 1991).

Although generally considered a year-round resident throughout most of its range, northern breeding populations do appear in locations outside of their breeding range during the winter. The eastern subspecies appears to be strongly migratory (Webster 1986). Their migratory presence in Iowa peaks in the fall from mid-September to the end of October and in the spring from early April into May (Kent and Dinsmore 1996).

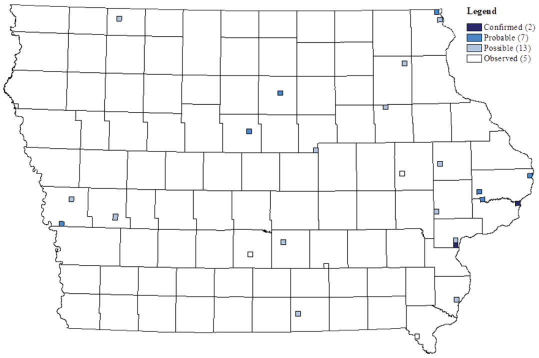
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	2	3	5
Possible	1	12	13
Probable	2	5	7
Confirmed	0	2	2
Conf & Prob	0.40%	1.80%	1.00%

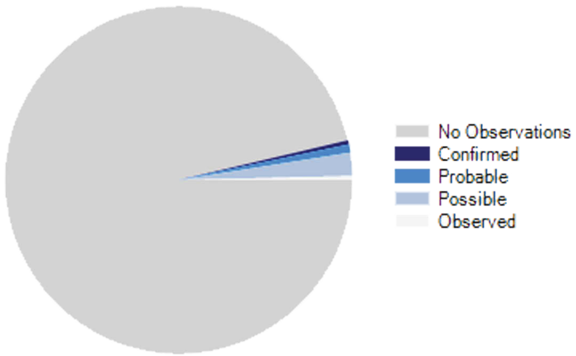
BBA I Results



BBA I



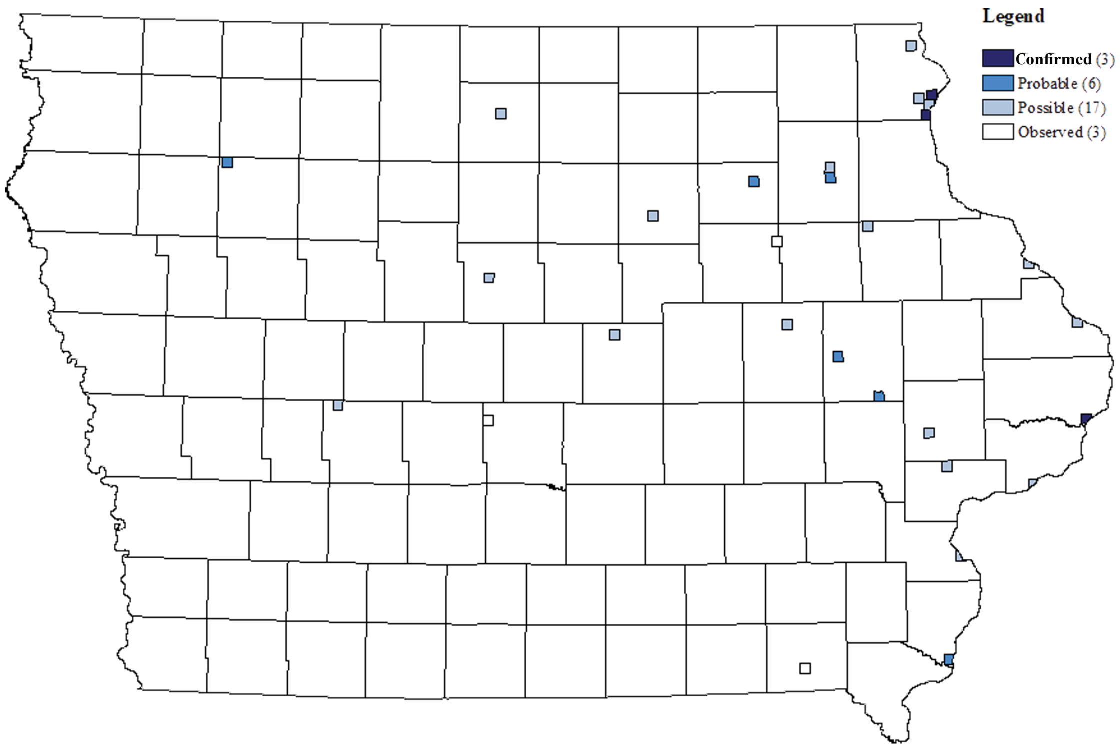
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	3	3
Possible	1	16	17
Probable	2	4	6
Confirmed	0	3	3
Conf & Prob	0.40%	1.80%	1.00%

BBA II



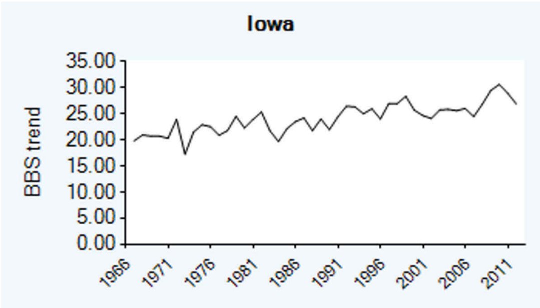
In Honor of Kirsten Winter (Carol Winter)

© Doug Harr

Habitat	Deciduous forest edge and open woodlands
Breeding Dates	23 Apr (PR)–4 Sep (CO)
Nest Type	Cavity
Clutch Size	Usually 6–8 eggs
Incubation	13–15 days
Fledging	25–33 days
Status	Abundant breeder
BBS Trend	Increasing (trend = 0.9, 95% CI is 0.3, 1.5) [Iowa]

Patterns since BBA I

Detections of House Wrens within breeding blocks increased significantly from BBA I to BBA II. Since they are very active and vocal during the breeding season, the increase probably isn't due to better coverage alone. The BBS data show them to be increasing in Iowa. Given their preference for open woodlands and forest edge, perhaps they are benefiting from plant succession on our public lands.



House Wrens are migratory in Iowa and arrive individually in late April. They readily use a variety of nest sites, natural and artificial. To prepare a cavity for nesting, the male may place hundreds of small sticks in the bottom to form a platform 5–20 cm tall, and then a nest cup of finer materials. Reuse of cavities is common (Sedgwick 1997). Females choose their mates, but territorial disputes between males is common and occasionally the challenger may drive off the resident male. If there is a nest, the usurper may remove the eggs and any nestlings. The female will then breed with the usurper about half the time (Kermott et al. 1991). Some males will advertise for secondary mates at surplus nest sites on their territories. In one study, polygyny occurred about 10% of the time (Johnson and Kermott 1991).

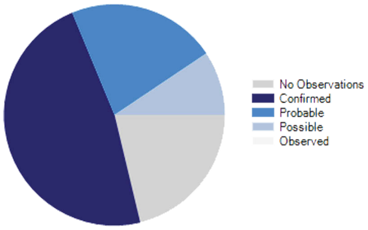
Second broods are typical of House Wrens, but mate switching is common. Pair bonds do not last past the end of the breeding season (Drilling and Thompson 1988), but they usually remain intact during first breeding attempts at least until mid-nestling stage, when young no longer require extensive brooding (Burns 1983). At this point one of the parents, more often the male, will desert the nest leaving the other to feed the young. After the brood reaches independence, the female may reunite with the male if he is still unpaired. Temporary polyandry has also occurred with a female tending a new nest while feeding nestlings on her original territory (Kendeigh 1941b).

There has been much debate over the impact of House Wren's destruction of other species' nests. Direct and strong circumstantial evidence exists for pecking or removing from nests offspring of other cavity and open-nesting species (Kendeigh 1941b). House Wrens have been shown to peck and remove eggs of all species (Belles-Isles and Picman 1986). Males attack eggs before pairing and females before laying (Kennedy and White 1996). For most species we still lack hard evidence; however, data suggest that House Wrens have negatively impacted Bewick's Wren in some areas. Usurpation of nest sites, sometimes accompanied by destruction of eggs or nestlings, is a primary source of nest failure for other cavity-nesting species including Prothonotary Warbler (Brush 1994, Flashpoler 1996), chickadees (Brewer 1963), Tree Swallows (Finch 1990), and bluebirds (Tuttle 1991).

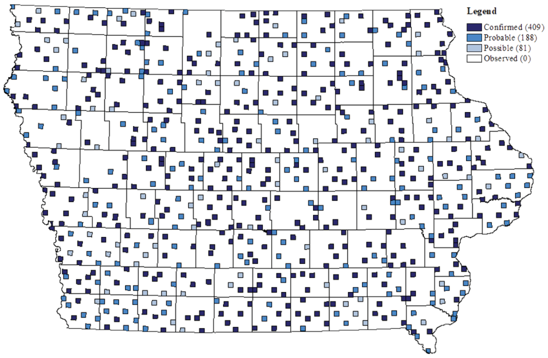
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	65	16	81
Probable	97	91	188
Confirmed	180	229	409
Conf & Prob	53.10%	80.20%	69.30%

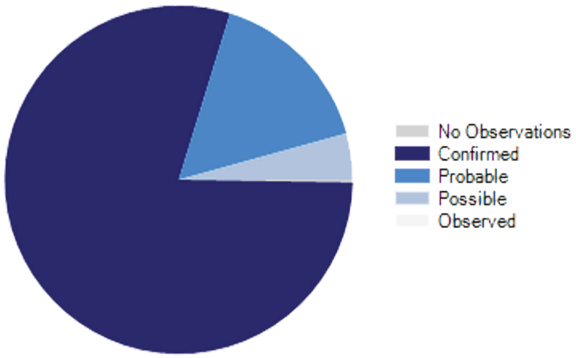
BBA I Results



BBA I



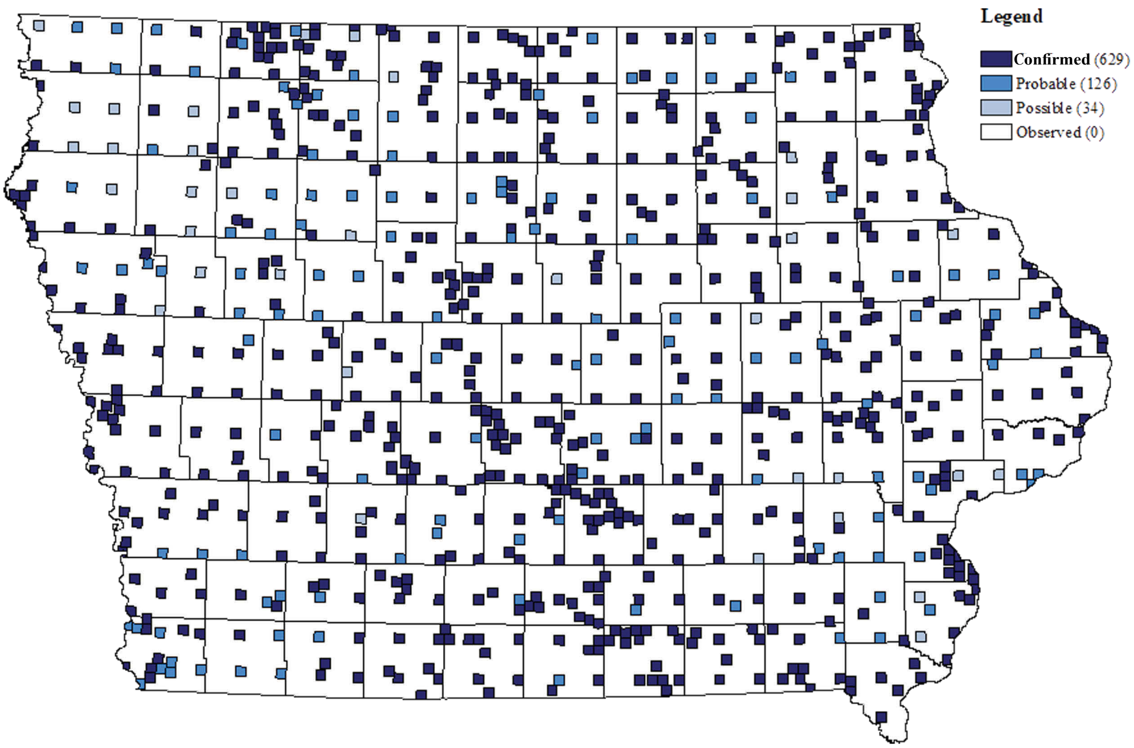
BBA II Results



BBA II (2008–2012) Breeding Evidence

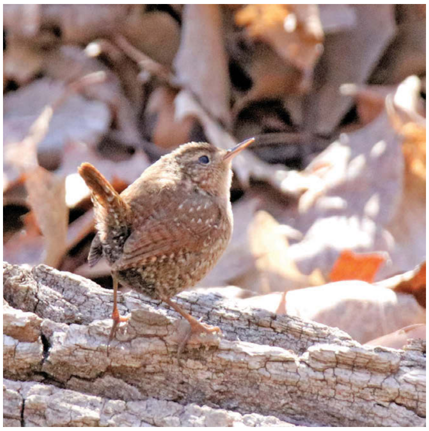
Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	33	2	35
Probable	91	35	126
Confirmed	272	361	633
Conf & Prob	69.50%	99.20%	88.20%

BBA II



Sponsored by Ric Zarwell

Winter Wren *Troglodytes hiemalis*

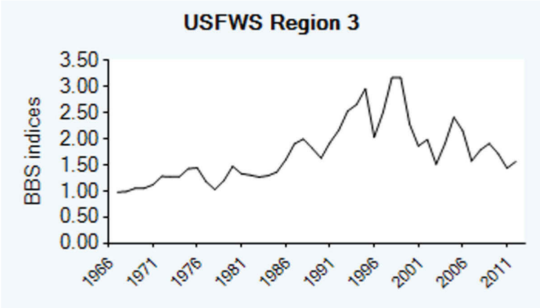


© Doug Harr

Habitat	Dense coniferous and deciduous woodlands
Breeding Dates	NA
Nest Type	Domed structure in cavity 0–10 ft. up in tree, upturned tree roots, or steep bank
Clutch Size	Usually 5–8 eggs
Incubation	14–17 days
Fledging	29–37 days
Status	Rare breeder
BBS Trend	No Trend Available

Patterns since BBA I

Winter Wrens are an uncommon migrant during April and October, and a rare, but regular winter resident. Their preferred breeding habitat of coniferous woods is in short supply in Iowa. Breeding confirmations all have been from counties along the Mississippi River, notably those with rugged topography and conifers. There were only two summer detections during BBA II from Winneshiek and Fayette counties and no probable/confirmed. Detections during early May from Polk and Jones counties may have been migrants.



Breeding territories are preferentially established along streams or other water sources. Nest sites are highly variable, from use of an existing tree cavity to creating a hole (e.g., in bank), to adding to a surface (e.g., on root wad), to creating an entirely free-hanging structure on a tree limb. Noncavity nests are usually domed structures with a circular entrance hole in the side (Heath 1920, Bent 1948) and they usually incorporate nearby vegetative material, like moss or rootlets, in the structure.

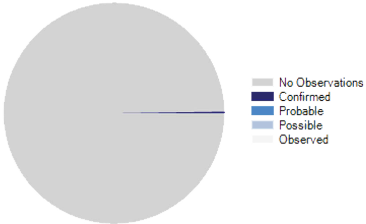
Winter Wrens are predominantly socially monogamous in North America, but bigamy occurs (McLachlin 1983). The percentage of polygynous males is often higher in optimal habitats (Armstrong and Whitehouse 1977). Early and late breeding dates for eastern Winter Wren also suggests two broods per season (Bent 1948).

The species is primarily associated with natural mature and old-growth forests. In Wisconsin, they were not found in narrow linear forest tracts, less than 100 ha (Fowler and Howe 1987). They also were not found in small openings created by patch clear-cutting into northern hardwood forest (Germaine et al. 1997). Timber harvesting and fragmentation studies have examined occupancy of potential breeding locations. The effect of forest management on nesting success, dispersal, and survival is unknown (Hejl et al. 2002).

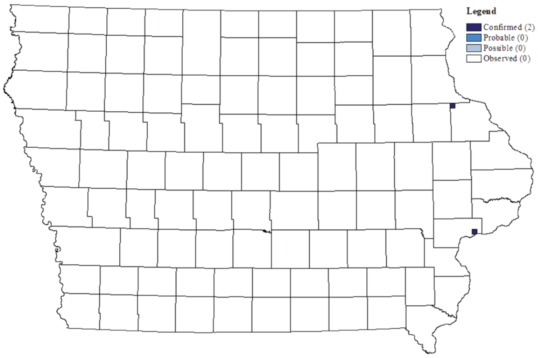
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	0	0	0
Probable	0	0	0
Confirmed	0	2	2
Conf & Prob	0.00%	0.50%	0.20%

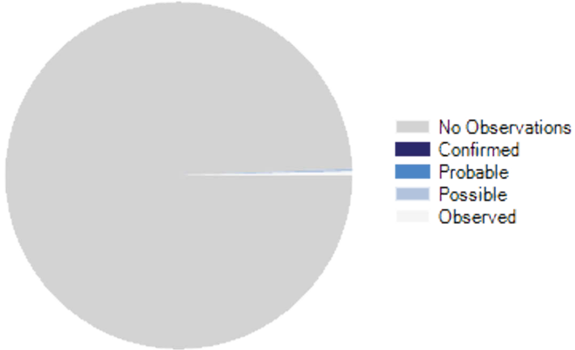
BBA I Results



BBA I



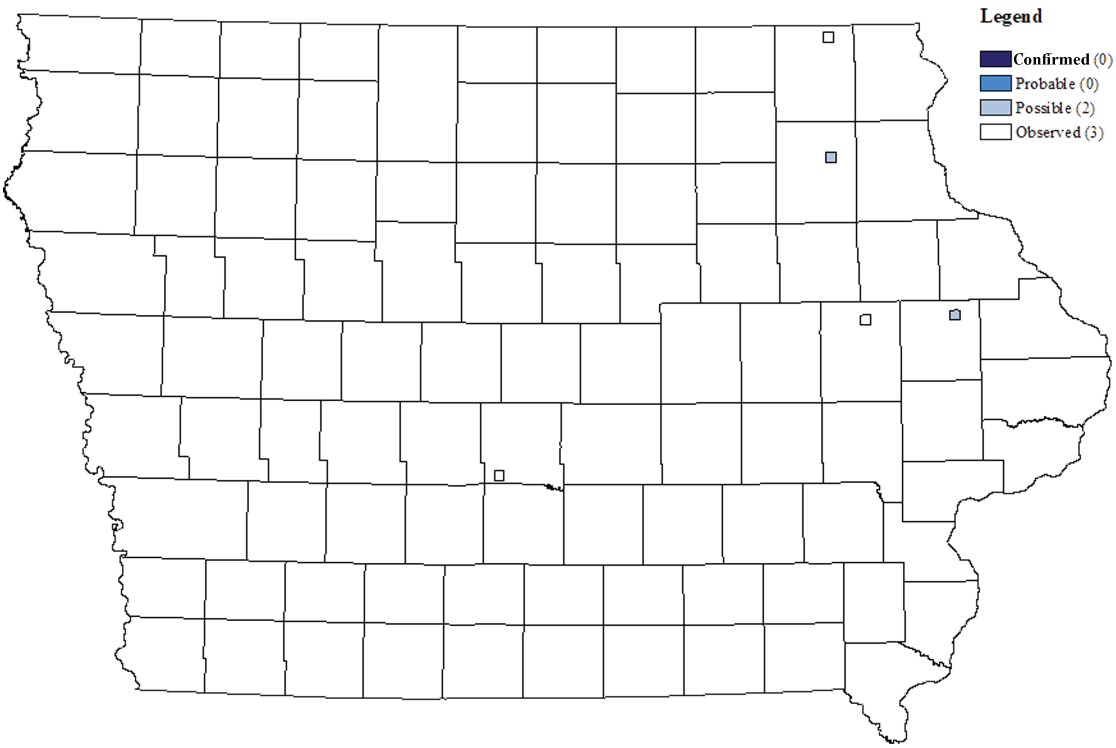
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	1	2	3
Possible	2	0	2
Probable	0	0	0
Confirmed	0	0	0
Conf & Prob	0.00%	0.00%	0.00%

BBA II



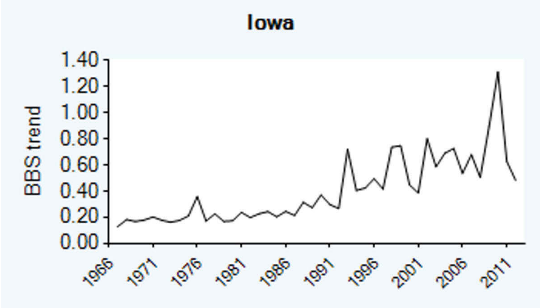
In Honor of Lloyd and Gaylan Crim
(Bruce Ehresman)

© Stanley Buman

Habitat	Wet meadows or drier areas of marshes dominated by grasses or sedges
Breeding Dates	3 May (PR)–12 Sep (PR)
Nest Type	Ball of dry grasses or sedges with side entrance, low to ground or over shallow water
Clutch Size	Usually 6–7 eggs
Incubation	12–14 days
Fledging	24–28 days
Status	Widespread, but uncommon and local
BBS Trend	Increasing (trend = 5.2, 95% CI is 2.7, 8.2) [Iowa]

Patterns since BBA I

Sedge Wrens showed a dramatic increase over BBA I when only 19.3% of the blocks provided detections. During BBA II they were detected in an amazing 73.5% of all blocks. They are opportunistic nesters and grid blocks provided nearly half (44%) of the probable/confirmed records. Most confirmations were in the south-central and Des Moines Lobe regions. Peterjohn and Sauer (1999) credited increases in Sedge Wren populations in the Great Plains during the 1990s to the creation of new grassland habitat through the Conservation Reserve Program and increased annual precipitation in the region.



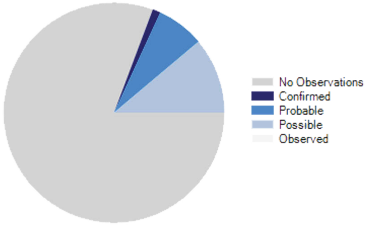
Sedge Wrens nest among dense tall growths of sedges and grasses in wet meadows, hayfields, retired croplands, and upland margins of ponds and marshes. These habitats are characterized by vegetation and soils highly susceptible to drying or flooding caused by annual and seasonal variations in rainfall. This habitat instability has led to a nomadic lifestyle and low breeding site fidelity. In fact, the males do not learn their song from nearby wrens as do Marsh Wrens (Brenowitz et al. 1995). Instead, each male improvises or invents his own repertoire of species' typical songs (Kroodsma and Verner 1978). Breeding occurs in widely different portions of its range at different times during the season. A first nesting period occurs in the upper midwestern United States and adjacent Canada, during late May and June. A second more widespread nesting period occurs later in the summer from July to September.

In Iowa, spring migrants pass through during April and May, but do not return to breed until late June or early July (J. J. Dinsmore et al. 1984). Males usually arrive on breeding grounds two weeks before females (Schramm et al. 1986). Territories are fluid and a male may shift his activity and defend new areas as the breeding season progresses (Burns 1982). Males build the exterior of multiple nests and the female will finish off the interior of one of them. Males may be serially or simultaneously polygynous and females may be serially polyandrous. Sedge Wrens are reported to be single brooded in Iowa (Crawford 1977). Both male and female Sedge Wrens destroy nests of conspecifics, as well as other species that nest near them (Picman and Picman 1980).

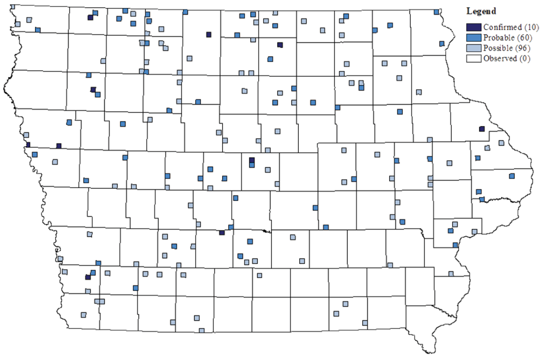
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	41	55	96
Probable	20	40	60
Confirmed	3	7	10
Conf & Prob	4.40%	11.80%	8.10%

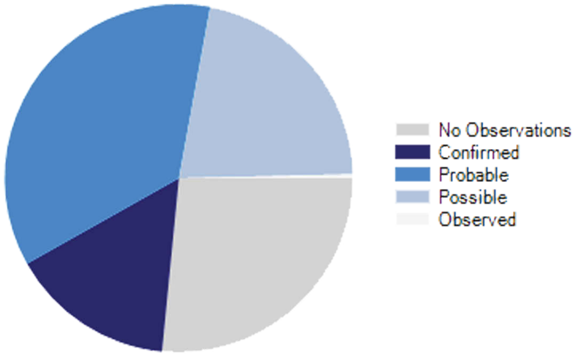
BBA I Results



BBA I



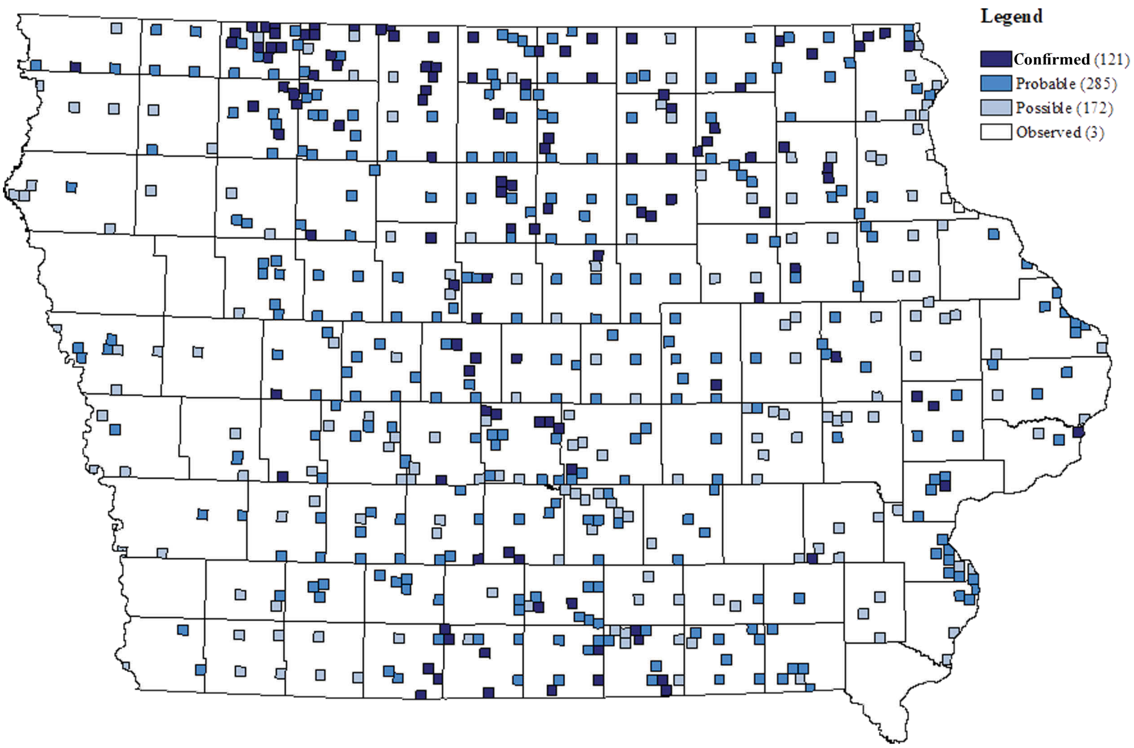
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	3	3
Possible	94	78	172
Probable	143	142	285
Confirmed	35	86	121
Conf & Prob	34.10%	57.10%	47.20%

BBA II



Sponsored by Katy Patterson

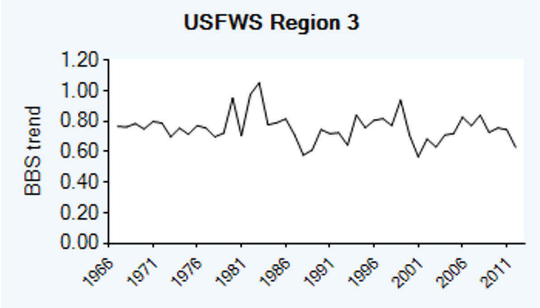
Marsh Wren *Cistothorus palustris*

© Stanley Buman

Habitat	Tall marsh grasses, cattails, bulrushes, sedges
Breeding Dates	30 Apr (PR)–20 Aug (CO)
Nest Type	Rounded grass structure taller than wide, with upper entrance tube woven around supports
Clutch Size	Usually 5–8 eggs
Incubation	12–14 days
Fledging	25–29 days
Status	Common local breeders where suitable wetlands occur
BBS Trend	Increasing (trend = 3.3, 95% CI is 2.0, 4.8) [Central US]

Patterns since BBA I

The Marsh Wren has shown a marked increase statewide over BBA I. Detections occurred in 22% of all blocks, compared to only 9% in BBA I. Unlike Sedge Wrens, probable/confirmed detections of Marsh Wrens greatly favored habitat blocks (81%) due to their preference for permanent wetlands. Many detections in the northwestern Iowa Great Lakes and Des Moines Lobe regions were of the probable/confirmed variety. Marsh Wrens are now also finding suitable habitat in scattered locations across southern Iowa and along the Mississippi, Missouri, and Big Sioux Rivers.



Marsh Wrens nest preferentially in cattail marshes. Bulrushes are used later in the year when cattails have dried out (Verner and Engelsen 1970). Nests are typically oblong and dome-shaped, with a single opening in the upper half (Verner 1965). Males arrive on the breeding grounds 7–10 days before the females and build numerous nests. Prospective females, escorted about by the resident male, will inspect these nests and will either finish one for nesting (Verner 1964) or alternatively initiate a new nest. Males are polygynous and will continue to build nests and sing in a new courting center, attempting to attract an additional female. Attempts by females at second broods vary by year. Females need a minimum of six weeks to complete breeding cycle before a second brood might be attempted (Kale 1965).

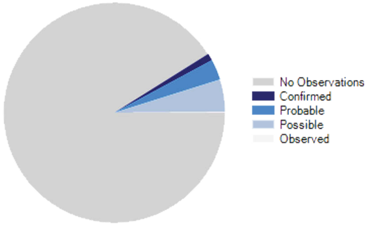
Marsh Wrens from recent fledglings to adults, and both males and females, peck at and destroy eggs and young nestlings of their own species and other species (Picman et al. 1993). For this reason, breeding females have sub-territories around their nests, and do not tolerate other females (Welter 1935). Yellow-headed Blackbirds are aggressive towards this wren and appear to limit nesting area available to it in a marsh (Verner 1975). Both male and female Red-winged Blackbirds often attack singing Marsh Wrens (Verner 1975), and aggressive behavior may also occur with Song and Swamp Sparrows (Willson 1967).

Adult breeding dispersal between breeding seasons can be considerable in populations where marsh water levels are unpredictable. Marsh Wrens will make use of restored wetlands, even if they seem to prefer those naturally occurring (Delphey and J. J. Dinsmore 1993), and so will likely benefit from any increases in permanent wetlands.

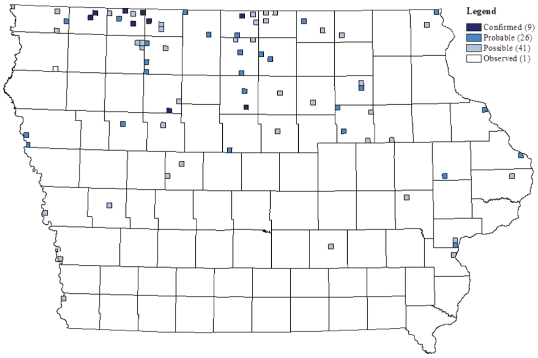
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	1	0	1
Possible	10	31	41
Probable	5	21	26
Confirmed	2	7	9
Conf & Prob	1.30%	7.00%	4.10%

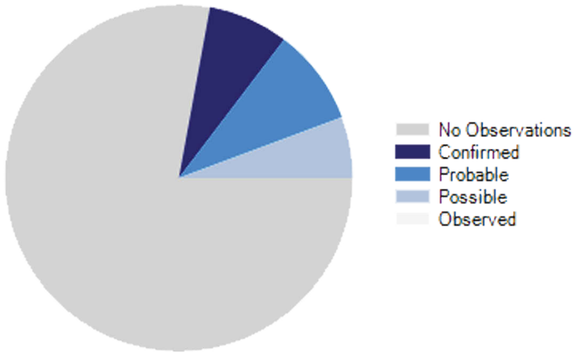
BBA I Results



BBA I



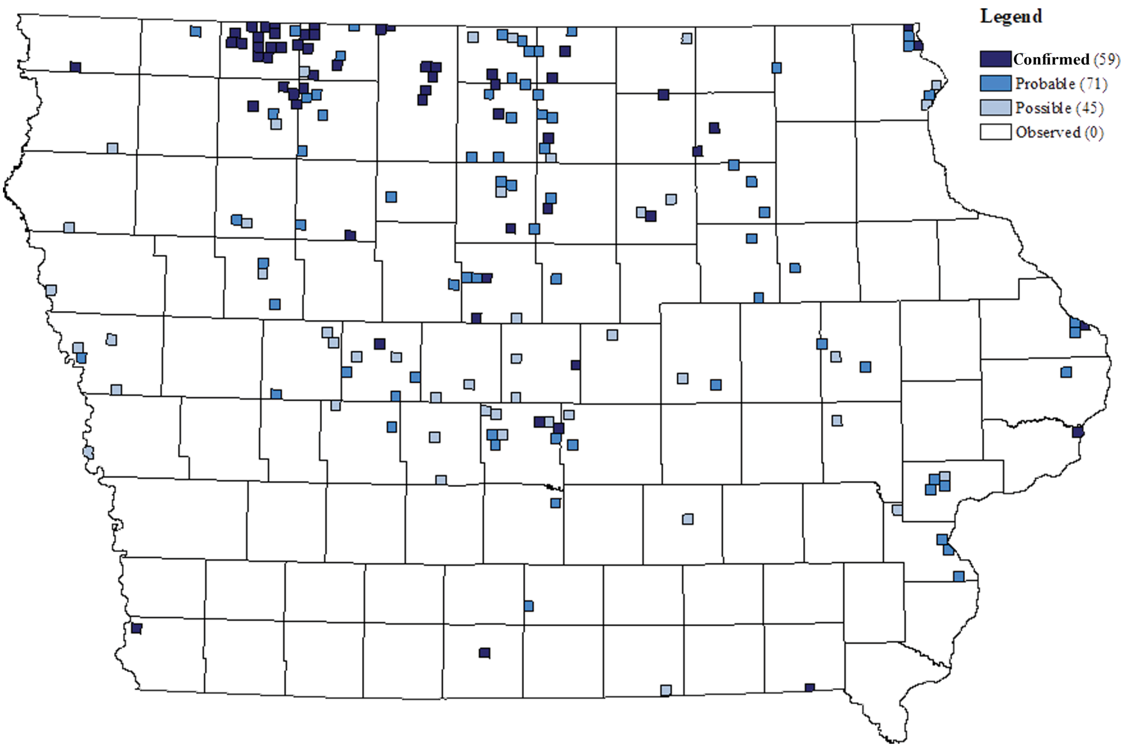
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	17	28	45
Probable	15	56	71
Confirmed	10	49	59
Conf & Prob	4.80%	26.30%	15.10%

BBA II



Sponsored by Graham Michael Harms

© Larry Dau

Habitat Woodlands with good low cover, thickets, brush and rock piles, stream banks, etc.

Breeding Dates 8 May (PR)–25 Aug (PR)

Nest Type Cavity usually within 10 ft. of ground, sometimes higher

Clutch Size Usually 4–6 eggs

Incubation 12–14 days

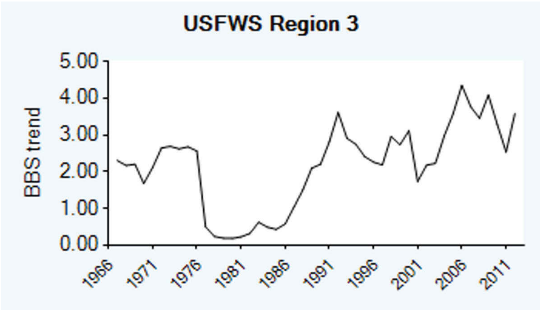
Fledging 24–28 days

Status Uncommon permanent resident

BBS Trend Increasing (trend = 1.2, 95% CI is 0.6, 1.7) [Central US]

Patterns since BBA I

Iowa is at the northwestern edge of the Carolina Wren's range and the population cycles. Cold winters with ice and snow can have devastating effects on local populations, but they often recover within a few years. After the severe winters of 1978–1979 and 1984–1985, they were only detected in 4.4% of blocks during BBA I. During BBA II they were detected in 15.5% of all blocks. Although concentrated in south-central and southeastern Iowa, they were also found in Pocahontas, Dickinson, and Osceola counties. Eighty-four percent of probable/confirmed detections heavily favored habitat blocks.



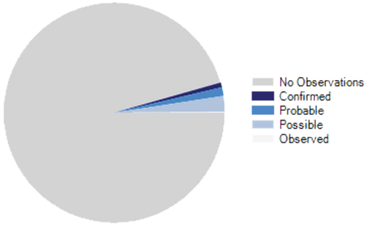
Their preference is for moist bottomland woods rather than dry upland woods (Graber and Graber 1979). They are also found in wooded residential areas with shrubs (Beissinger and Osborne 1982). Feeding stations can be used to supplement natural foods (Andrle and Carroll 1988). Carolina Wrens extended their range northward throughout the twentieth century (Brewer et al. 1991). In Iowa, they were considered very rare and restricted to the south early in the twentieth century, but by 1954 had moved northward over much of the state (J. J. Dinsmore et al. 1984). Forest fragmentation and production of successional thickets and forests have probably benefited this species (Brewer et al. 1991).

Pair formation may occur in fall of hatching year and before male acquires territory (Morton 1982). Pair bonds and territories are maintained year-round until mate dies or is possibly displaced (Laskey 1948). Warm temperatures may stimulate early nesting (Devore 1968). Males may often build multiple nests on territory that may or may not be used for egg-laying (Laskey 1948). In natural habitats nest can be in tree cavities, tree crotches, vine tangles, conifer branches, upturned roots, overhangs, and tree stumps (Bent 1948). A cup nest is made, usually domed with entrance at the side. Nest has a more haphazard appearance compared to Bewick's Wren and House Wren nests. A new nest is constructed for each nesting attempt, but occasionally new nests are built at same site as previous nest (Ramsay 1987). Fledglings stay together after leaving nest. Young from previous brood usually disappear from natal territories by the time parents start feeding young of another brood (Dury 1877). Carolina Wrens are parasitized by Brown-headed Cowbirds. Adults will accept the cowbird eggs and nestlings and can raise fledglings to independence (Woodward 1983).

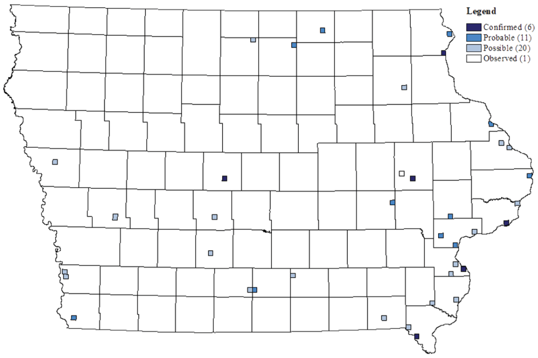
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	1	1
Possible	1	19	20
Probable	2	9	11
Confirmed	0	6	6
Conf & Prob	0.40%	3.80%	2.00%

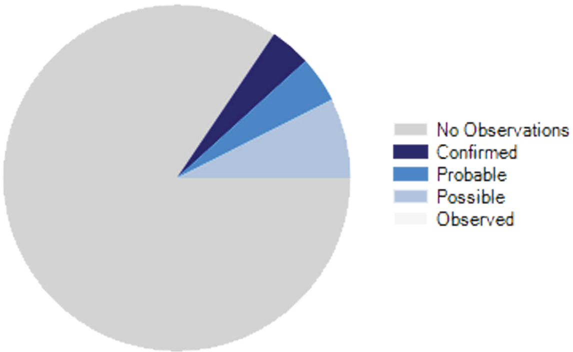
BBA I Results



BBA I



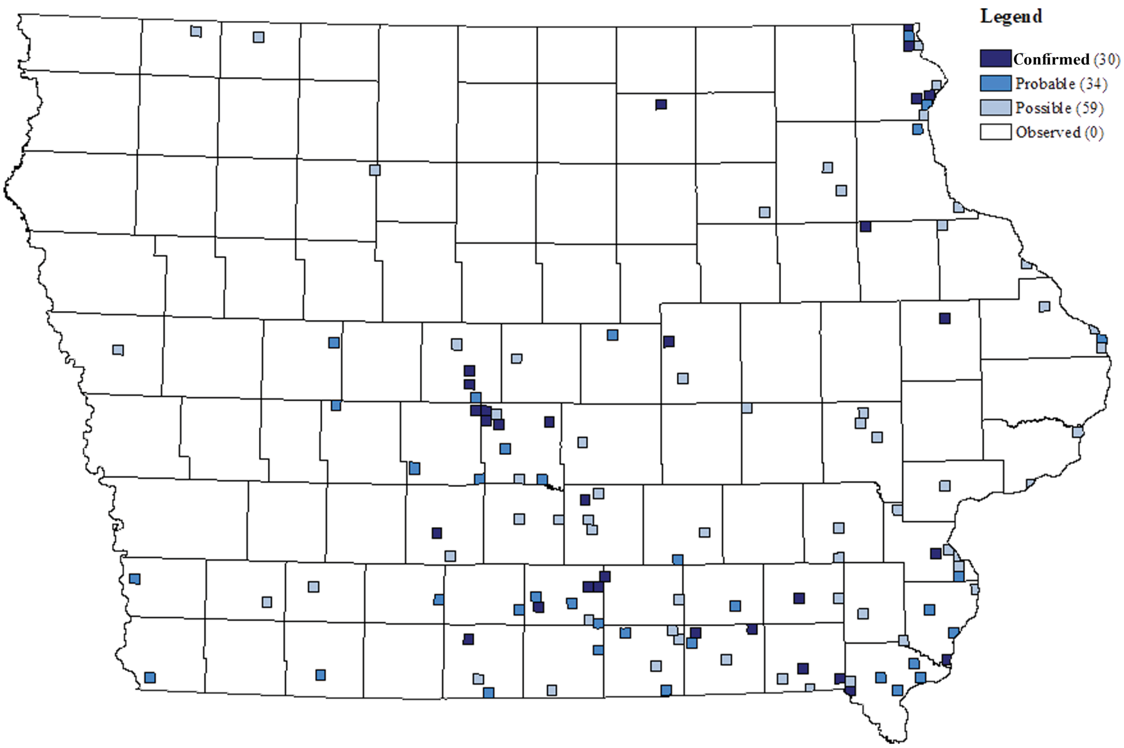
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	14	45	59
Probable	8	26	34
Confirmed	2	28	30
Conf & Prob	1.90%	13.50%	7.40%

BBA II



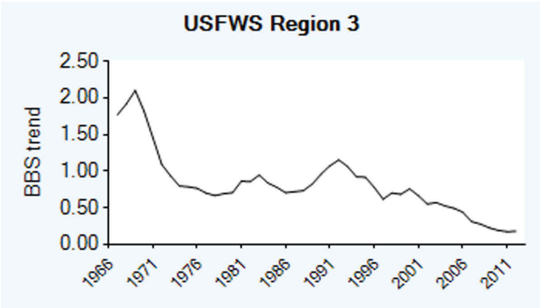
In Honor of Beth Brown (Bruce Ehresman)

© Doug Harr

Habitat	Open woodlands, upland thickets, junkyards
Breeding Dates	NA
Nest Type	Cavity within 20 ft. of ground, including trees, posts, dirt bank, rock piles, pipes, etc.
Clutch Size	usually 5–7 eggs
Incubation	14 days
Fledging	28 days
Status	Rare and inconsistent breeder
BBS Trend	Decreasing (trend = −1.4, 95% CI is −2.3, −0.5) [Central US]

Patterns since BBA I

Bewick's Wren is a rare summer resident in Iowa and local populations may abruptly disappear (Kent and Dinsmore 1996). It is found most often in extreme southern Iowa, but occasionally is reported north to the middle third of the state. There was only one detection of Bewick's Wren within an atlas block during BBA II; that was in Decatur County.



Breeding territories usually contain mixtures of thick scrubby vegetation and open woodland (Bent 1948). It usually makes a cup nest in a cavity, but the nest is occasionally domed. In large nest boxes it does not fill the cavity with a foundation as does the House Wren. The male may abandon a completed nest if unable to acquire a mate, but it does not produce multiple dummy nests. Bewick's Wrens are chiefly monogamous, but cases of polyandry and polygyny are known. Birds with early first clutches may have a second brood. The young remain together and are fed by parents for about two weeks after fledging. The young may disperse short distances at about five weeks of age, but some stay longer, and some stay on their natal territory until the following spring (Kroodsma 1974). They are short-distance migrants or year-round residents.

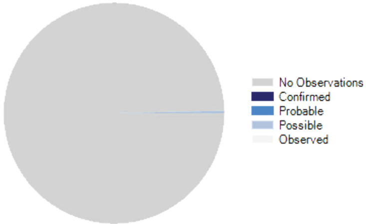
The range of Bewick's Wren has expanded and contracted since it was first discovered in 1821. In the east, its range expanded in mid- to late-1800s into the northern Midwest, including southern Iowa, south-eastern Minnesota, southern Wisconsin, southern Michigan, southern Ontario, and into western Appalachia (American Ornithologists' Union 1983). The species may have moved from the south and west when fragmentation of extensive forests of Appalachian and Allegheny Plateaus into farmland and pasture created an abundance of suitable habitat (Wilcove 1990, Palmer-Ball 1996). Then a population decline occurred beginning in the 1920s, which continued through the 1970s.

It is more common than House Wren in drier, more open habitats. It has all but disappeared east of the Mississippi River, however, and has declined in western parts of its range (Kennedy and White 2013). Numerous hypotheses have been suggested for the decline, but most do not support its magnitude (Wilcove 1990). Competition from the nest destroying House Wren, whose range expansion has accompanied the quiet exit of Bewick's Wren, is often cited.

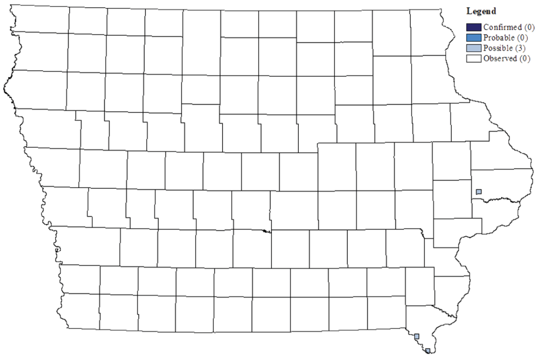
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	0	3	3
Probable	0	0	0
Confirmed	0	0	0
Conf & Prob	0.00%	0.00%	0.00%

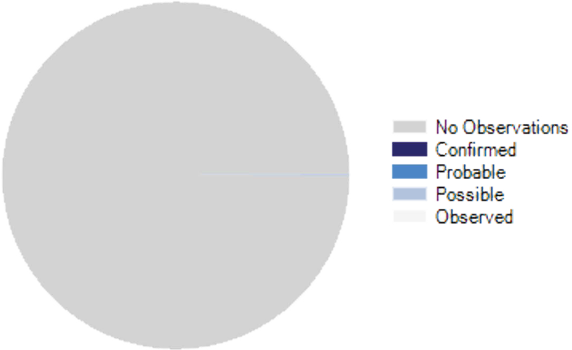
BBA I Results



BBA I



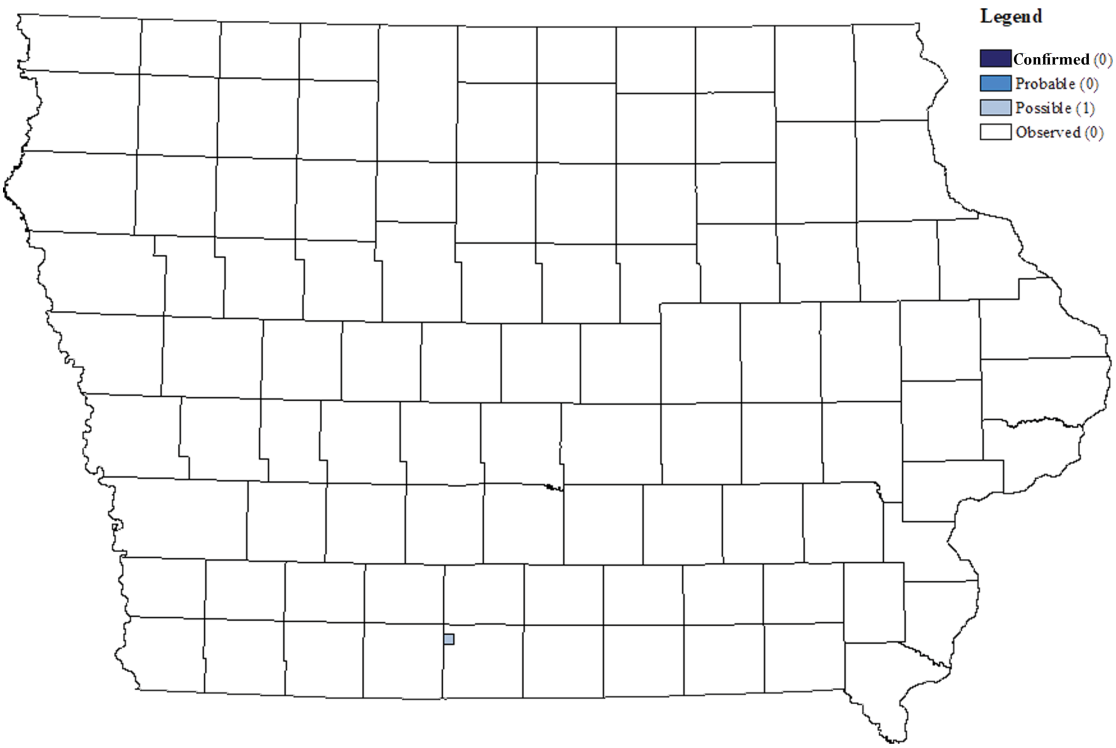
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	0	1	1
Probable	0	0	0
Confirmed	0	0	0
Conf & Prob	0.00%	0.00%	0.00%

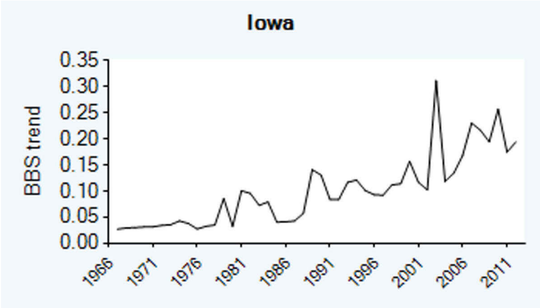
BBA II



Habitat	Utilizes wide variety of woodlands
Breeding Dates	21 Apr (PR)–27 Aug (CO)
Nest Type	Deep rounded cup of fine fibers covered with lichen flakes, on tree branch 3–80 ft. up
Clutch Size	Usually 4–5 eggs
Incubation	15 days
Fledging	24–30 days
Status	Fairly common breeder
BBS Trend	Increasing (trend = 6.2, 95% CI is 2.2, 12.7) [Iowa]

Patterns since BBA I

Detections of Blue-gray Gnatcatchers were up markedly from BBA I, from 23% to 62% of all blocks. Probable/confirmed detections greatly favored habitat blocks, 72%, as the species favors deep woods with broad-leaved trees. The species utilizes a wide variety of woodlands, however, and may be benefiting from plant succession on public lands as evidenced by the significant expansion into the Iowa Great Lakes and Des Moines Lobe regions. They appear to be increasing along the Missouri River as well.



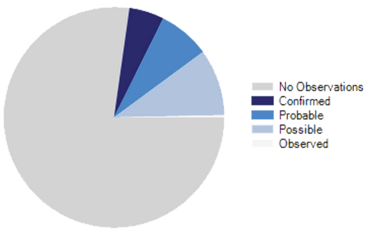
These are one of the earliest nesting small insectivorous songbirds. Nests are typically built well out on side limbs, the majority saddled on limbs (Nickell 1956). Most pairs raise a single brood, but second broods are not uncommon. Intact nests used only in a single nesting attempt. Material from earlier nests often is recycled into second nests. Loss of nest will induce renesting. They may be persistent in renesting attempts; up to six attempts recorded in a single season (Root 1969). Parental feeding lasts for three weeks after young fledge. This may cease as early as day 18 after nest departure if adults are tending a second brood (Ellison 1991). Adults appear to depart breeding areas as soon as young are independent, mid-to-late August.

Blue-gray Gnatcatchers are regularly parasitized by Brown-headed Cowbirds (Friedman 1963). They are one of the smallest regular hosts and have no ability to eject or puncture cowbird eggs. Once parasitized, gnatcatchers rarely rear their own young (Goguen and Mathews 1996), and nests are often deserted. Parasitism may be contributing to local or regional population declines; however, populations of this species have increased over the past 25 years, expanding northward, most dramatically in the northeastern United States and southeastern Canada (Kershner and Ellison 2012).

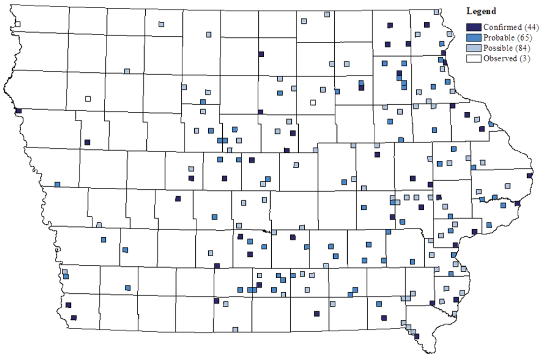
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	1	2	3
Possible	26	58	84
Probable	14	51	65
Confirmed	8	36	44
Conf & Prob	4.20%	21.80%	12.70%

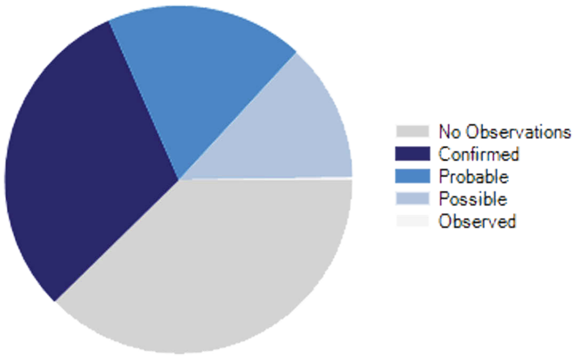
BBA I Results



BBA I



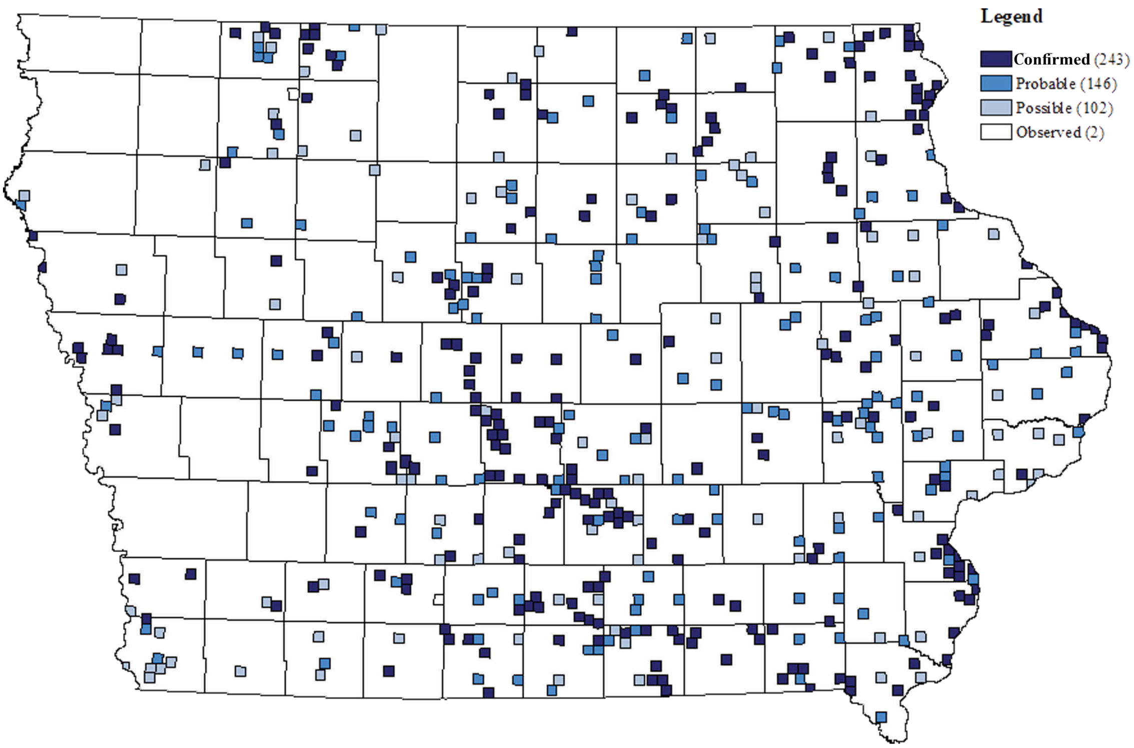
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	1	1	2
Possible	58	44	102
Probable	62	84	146
Confirmed	47	196	243
Conf & Prob	20.90%	70.20%	45.20%

BBA II



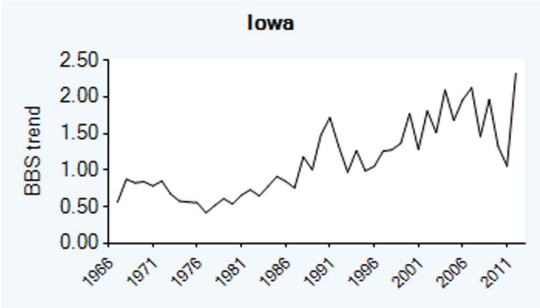
Sponsored by Sharon McKelvey

© James Scheib

Habitat	Parks, orchards, pastures, and other open areas with scattered trees or woody edges
Breeding Dates	15 Mar (PR)–3 Sep (PR)
Nest Type	A loose cup of twigs, pine needles, grasses, hair and small feathers in a tree cavity or artificial nesting box
Clutch Size	4–5 eggs
Incubation	12–15 days
Fledging	15–18 days
Status	Common Iowa breeding bird
BBS Trend	Stable (trend = 1.9, 95% CI is 0.0, 3.6) [Iowa]

Patterns since BBA I

There is little doubt that Eastern Bluebirds continue to recover from their Iowa, and range-wide, decline through the first two-thirds of the twentieth century. Found in 485 (56.3%) survey blocks in BBA I, detections increased to 656 (82.9%) survey blocks during BBA II. Northwest Iowa's relatively lower numbers remained mostly unchanged, except for notable increases in Clay, Dickinson, and Emmet counties of the Iowa Great Lakes Region. Across the remainder of Iowa, populations remained high and many block data gaps in BBA I were filled during the new project. The North American BBS similarly demonstrates a continuing increase in the species from 1966 to 2012, both in Iowa and range wide. Today, Eastern Bluebirds have re-attained virtually common status across the entire state.



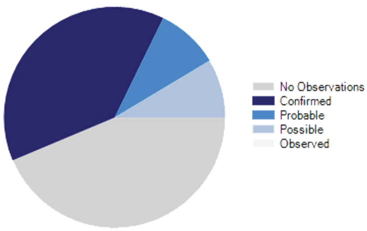
Iowa's growing bluebird population might appear in conflict with a continuing loss or degradation of this species' preferred habitat; that is, open country with scattered trees (savanna), orchards, and cutover woodlands. The species is a cavity nester, so woodland snags and hollow trees are highly desirable as the best natural habitat. But while savanna continues disappearing in Iowa, orchards, cutover woodlands, forest edges, and parklands are more abundant today than just a few decades ago. Popularity of establishing bluebird nest boxes and trails (a string of nest boxes spread across a large area of landscape) has grown with the general public, and some people now are willing to leave standing an occasional dead tree, thus providing natural cavities for nesting as the trunks decay.

House Sparrows often usurp bluebirds from nest boxes and cavities, but livestock is today more frequently in confinement operations than free ranging. Because House Sparrows tend to most commonly associate with livestock, their populations seem to have shifted towards confinements and away from former pasturelands, somewhat decreasing completion with bluebirds for nest cavities. In summary, the future looks bright for Eastern Bluebirds.

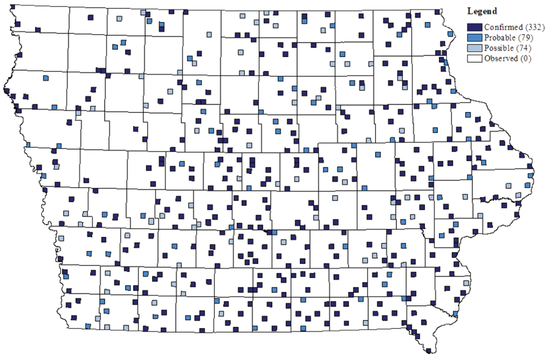
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	37	37	74
Probable	36	43	79
Confirmed	137	195	332
Conf & Prob	33.10%	59.60%	47.70%

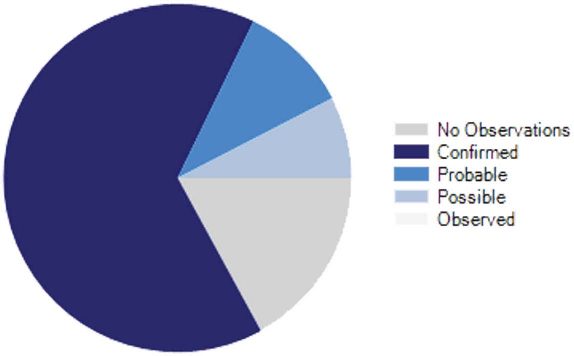
BBA I Results



BBA I



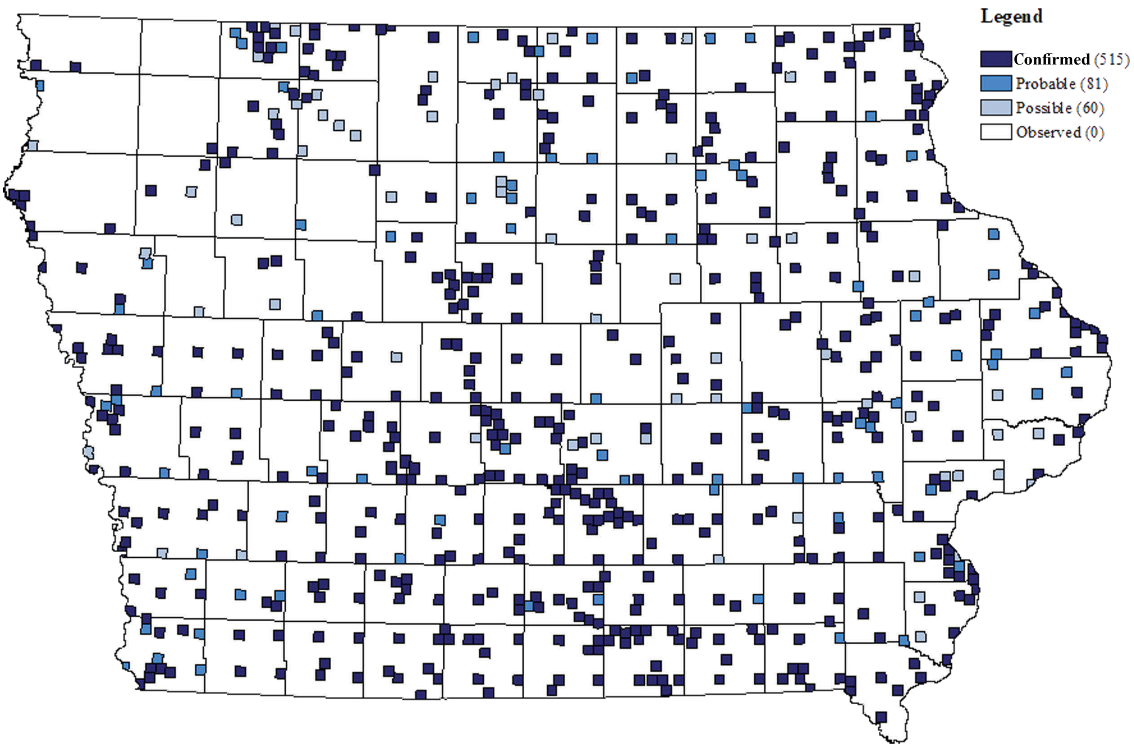
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	35	25	60
Probable	45	36	81
Confirmed	204	311	515
Conf & Prob	47.70%	87.00%	69.20%

BBA II



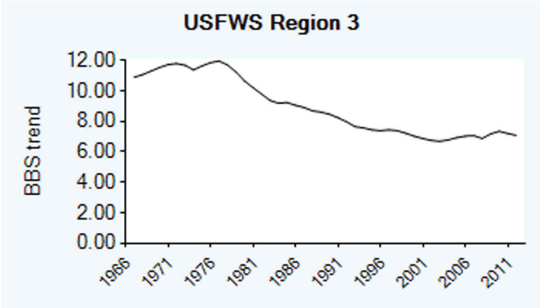
In Memory of Carolyn E. Von Ehwegen
(Jerry Von Ehwegen)

© Reid Allen

Habitat	Moist deciduous forests with a well-developed understory
Breeding Dates	5 May (PR)–27 Jul (PR)
Nest Type	Substantial cup of twigs, bark strips, grass and moss, lined with grass, rootlets and bark constructed on or near the ground
Clutch Size	3–5 eggs
Incubation	10–14 days
Fledging	10–12 days
Status	Uncommon Iowa breeding bird
BBS Trend	Stable (trend = −1.0, 95% CI is −2.3, 0.1) [Central US]

Patterns since BBA I

Early Iowa records appear to indicate that Veeries were somewhat common nesters in perhaps two-thirds of the state, where suitable habitat occurred. The Veery prefers larger tracts of mature, lowland forest with a very well-developed understory, a habitat drastically reduced in Iowa over the past century. During the first BBA project Veeries were detected in just 40 survey bocks (4.6%), while BBA II detections were in only 31 blocks (3.6%). Most of the latter encounters were centered in blocks of intact forestlands in northeastern Iowa, along the Des Moines River valley of central Iowa, and in the Cedar-Iowa river valleys of Johnson and nearby counties of east-central Iowa. This is a somewhat more restricted distribution than that of BBA I. As might be expected, most BBA II detections occurred in habitat blocks, rather than grid blocks, because of superior extant forest cover and understory. The North American BBS data show a continuous decline nationwide from 1966–2011, although that survey has not yielded enough detections in Iowa to provide a reliable state trend.

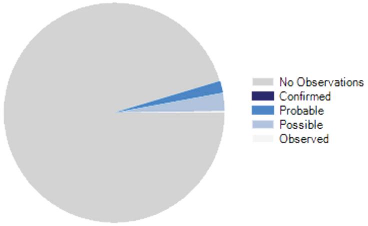


Iowa realized a very significant increase of more than a million forest acres since the 1970s (Leatherberry et al. 2006), beneficial for many forest bird species. Much of today's forestland, however, still does not provide suitable habitat for Veeries. Recovering or replanted forestlands typically are far from mature and seldom contain a well-developed understory, while mature forests sometimes have been overgrazed by livestock and native white-tailed deer, resulting in little or no understory. Concern is now growing among conservationists over recently updated forest cover maps showing Iowa's forest cover again in decline, as farming, housing, and other human developments encroach on remaining areas where Veeries still nest. Because Veeries require large, intact stands of mature forest, human activities almost certainly will result in more fragmentation of remaining suitable habitat, leading to further decreases in resident nesting populations.

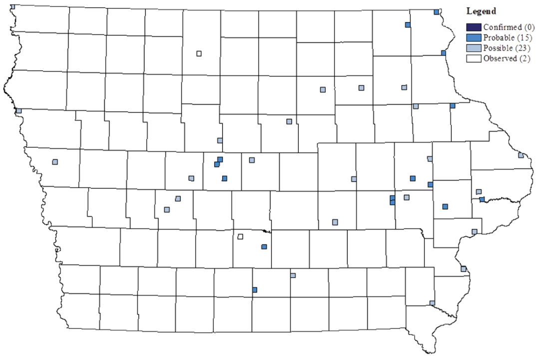
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	1	1	2
Possible	3	20	23
Probable	3	12	15
Confirmed	0	0	0
Conf & Prob	0.60%	3.00%	1.70%

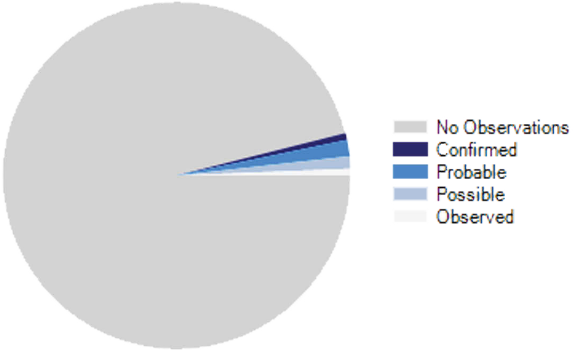
BBA I Results



BBA I



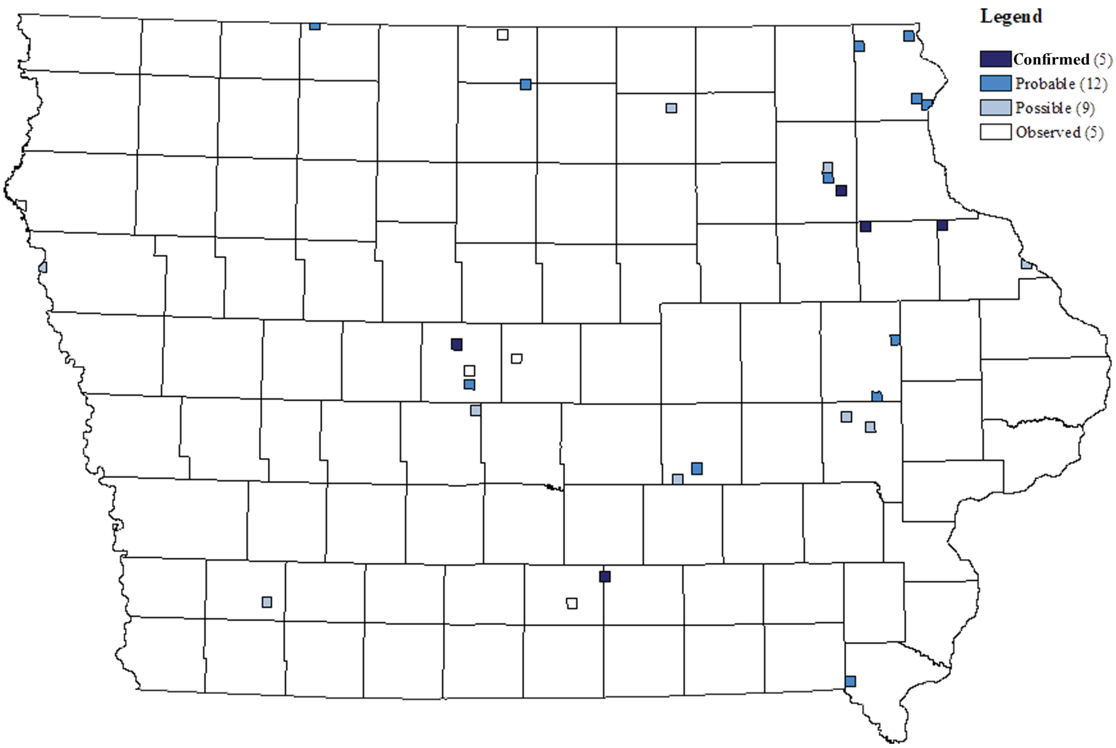
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	1	4	5
Possible	2	7	9
Probable	2	10	12
Confirmed	0	5	5
Conf & Prob	0.40%	3.80%	2.00%

BBA II



In Honor of Elaine and Steve Thrune
(Bruce Ehresman)

Habitat Forests, especially in mature lowland areas near water

Breeding Dates 5 May (PR)–19 Aug (PR)

Nest Type A cup of twigs, mud, and strips of paper or cloth constructed on a low, horizontal tree branch

Clutch Size 3–4 eggs

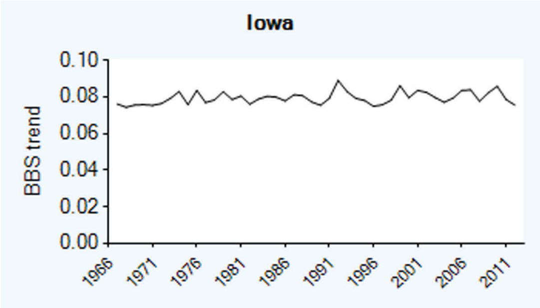
Incubation 12–14 days

Fledging 12–13 days

Status Common nesting species in eastern Iowa woodlands; uncommon in woodlands across the rest of the state

BBS Trend Stable (trend = 1.3, 95% CI is −1.5, 4.2) [Iowa]

Patterns since BBA I



Although fairly widespread across the eastern United States, in suitable habitat both historically and today, the Wood Thrush is experiencing a slow but range-wide, long-term decline in numbers. North American BBS data indicate just such an overall national decline, but BBS data for both Iowa and the western extremes of its range now show the species to be fairly stable to slightly increasing. Comparisons between Iowa BBA I and BBA II data similarly indicate that the species appears to be increasing here. BBA I detections occurred in 248 survey blocks (35%), increasing to 300 blocks (37.9%) in BBA II. About 59.6 % of the latter encounters were in habitat blocks, most of which retain relatively good Wood Thrush habitat.

This species is more adaptable to a somewhat larger range of habitats than some of the other, closely related, forest thrushes. It will select both lowland (preferred) and upland forest for nesting and does not require quite as large a patch of intact forest for its purposes as other thrushes. Fully mature forests are not an absolute requirement; hence, Wood Thrushes increasingly may be in second growth forests, provided there is suitable understory. This species will even nest in wooded residential areas, if habitat fragmentation is not too severe.

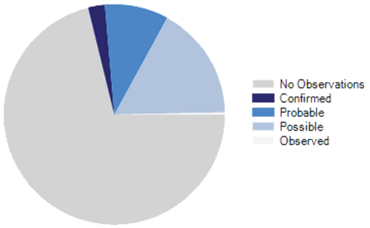
Known for hauntingly beautiful song that echoes through our forests, Wood Thrushes are not yet removed from all danger of future population declines. Human-related landscape changes cause the species to be pushed into more marginal habitats, where cowbird parasitization and predation often have greater effects on nest success. Nevertheless, recent apparent stabilization of its Iowa numbers, combined with recent decades of increasing forest habitat, may forecast better times for this emblematic woodland bird.

Wood Thrush

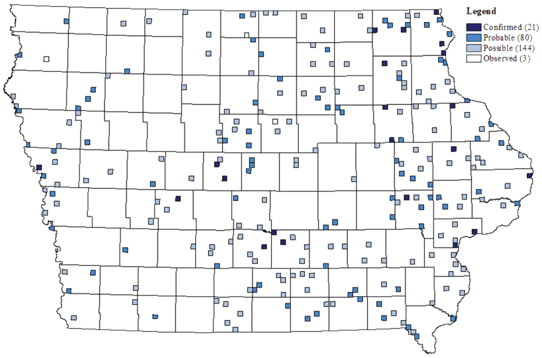
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	3	0	3
Possible	47	97	144
Probable	18	62	80
Confirmed	1	20	21
Conf & Prob	3.60%	20.60%	11.70%

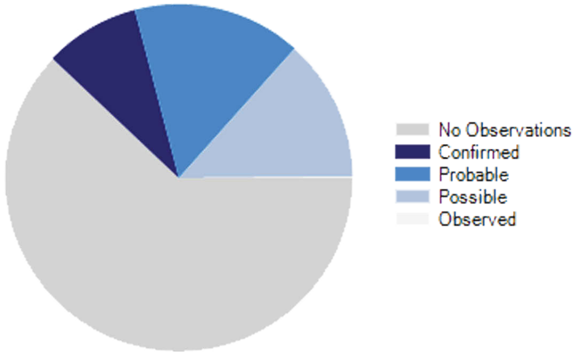
BBA I Results



BBA I



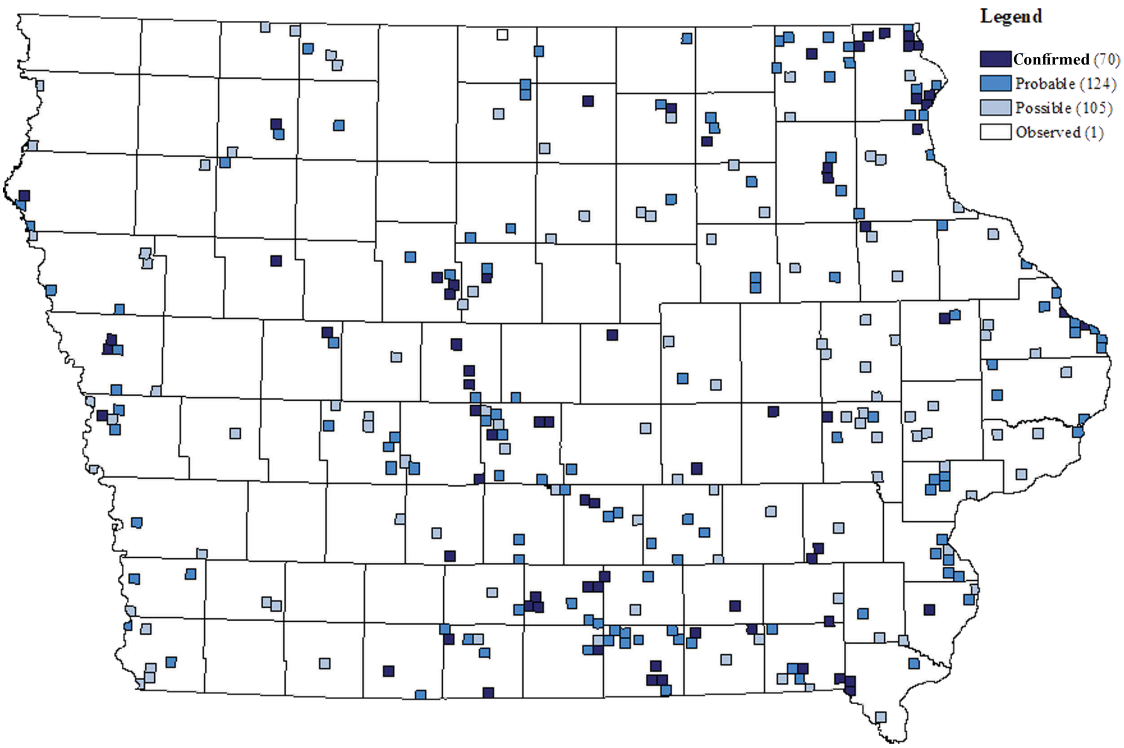
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	1	1
Possible	32	74	106
Probable	27	97	124
Confirmed	5	65	70
Conf & Prob	6.10%	40.60%	22.50%

BBA II



Sponsored by Mary Beth Hunt

© Linda Petersen

Habitat Yards, parks, orchards, open deciduous and coniferous woodlands, and a large variety of other habitats with trees

Breeding Dates 24 Mar (PR)–4 Dec (CO)

Nest Type A mud cup with grasses and weed stalks and lined with fine grasses; in a variety of trees, shrubs, and on building ledges with overhead protection

Clutch Size 3–5 eggs

Incubation 11–14 days

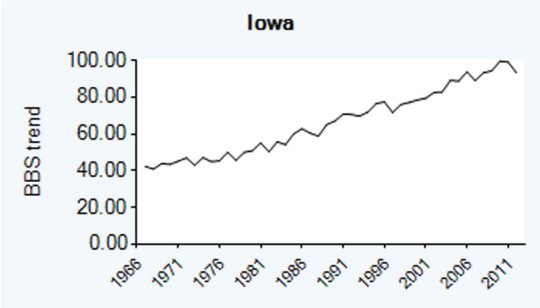
Fledging 14–16 days

Status Very abundant nesting species found uniformly across all of Iowa

BBS Trend Increasing (trend = 2.1, 95% CI is 1.7, 2.6) [Iowa]

Patterns since BBA I

Among the most widespread of all birds on the continent, American Robins continue to adapt well to human-influenced environments. This generalist species was detected in 695 blocks (76.9%) during BBA I but was recorded in all 791 survey blocks (100%) in BBA II. Additionally, robins were confirmed or probable nesters in all but a single block (99.9%) this time. While some of this increase may simply confirm this thrush's adaptability to almost every habitat, several northwestern Iowa blocks may not have been surveyed completely in BBA I, resulting in a slight under-detection during the first project. Nevertheless, robins were and continue to be one of Iowa's most common and familiar breeding birds. The annual North American BBS also indicates robins are increasing both in Iowa and continent-wide.

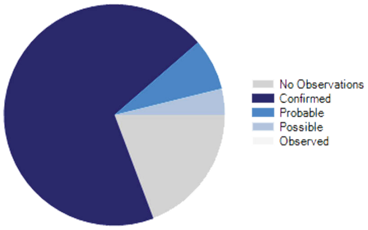


Because the species is a habitat generalist, it may be found in all kinds of woodlands, from forest edges to open savanna; in agricultural landscapes and farmsteads; near wetlands; and especially in urban-suburban situations, where robins thrive in parks, golf courses, and residential neighborhoods. Their mud and plant stem nests are constructed in all types of trees, especially conifers, tall shrubs, and even on building ledges with low overhead protection. While depredation of nests and young by animals both wild and domestic can be significant, along with occasional mortality from pesticides, multiple nests each year assure a steady supply of new generations. Such overall adaptability should assure continuing prosperity for the American Robin.

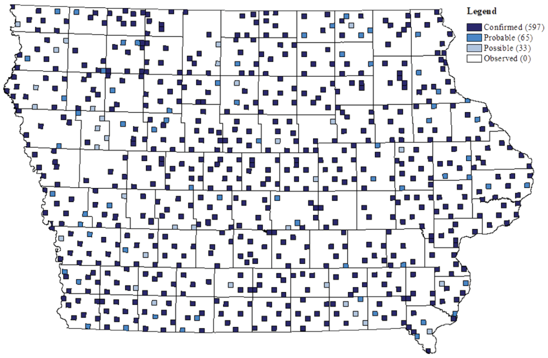
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	29	4	33
Probable	44	21	65
Confirmed	286	311	597
Conf & Prob	63.20%	83.20%	76.90%

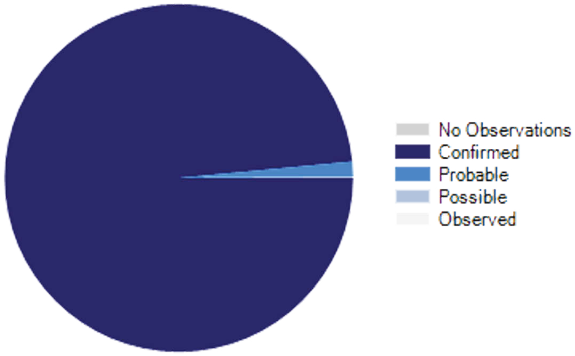
BBA I Results



BBA I



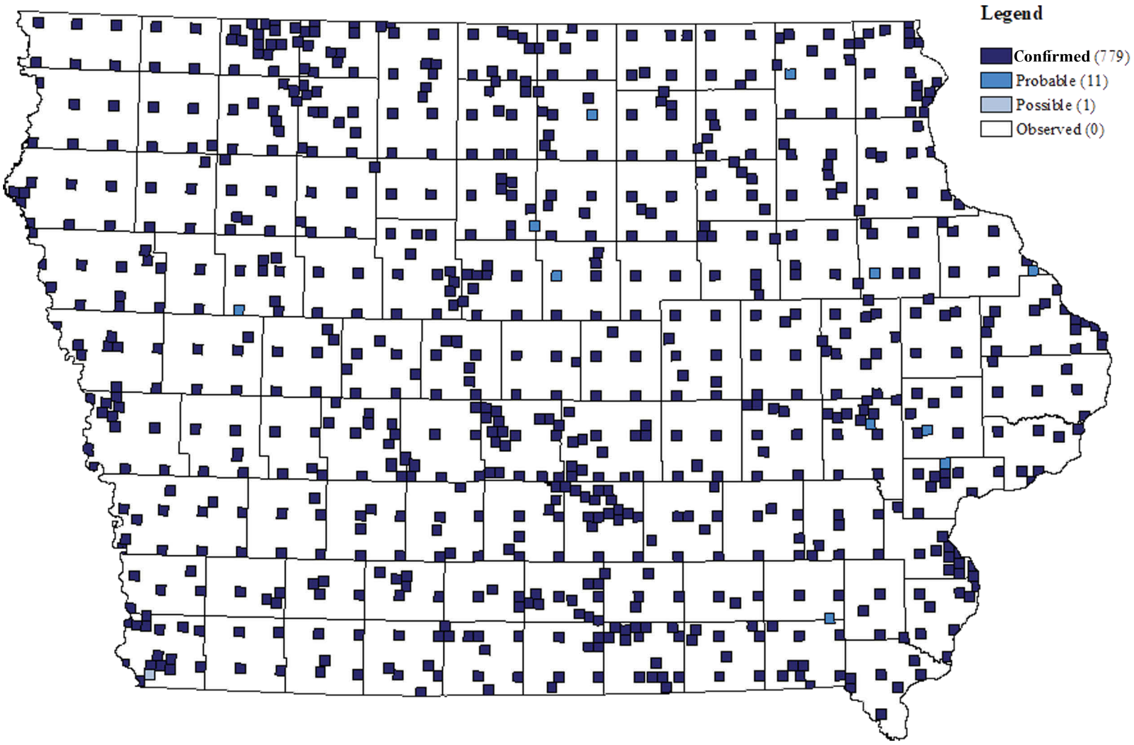
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	0	1	1
Probable	6	5	11
Confirmed	390	390	780
Conf & Prob	75.90%	99.00%	91.90%

BBA II



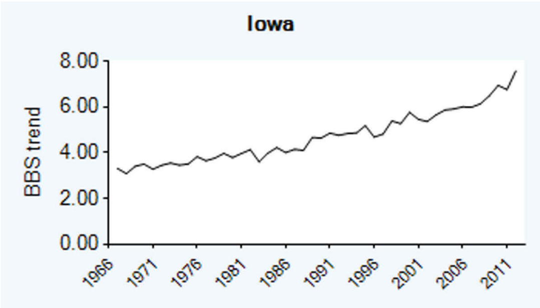
In Memory of Gladys Black (Kirsten Winter)

© Kip Ladage

Habitat	Dense thickets, shrubbery, forest edges, vine tangles in rural and urban areas
Breeding Dates	23 Apr (PR)–27 Aug (PR)
Nest Type	A well-concealed, deep cup of twigs, vines, weed stems, strips of paper, lined with fine rootlets
Clutch Size	3–5 eggs
Incubation	12–13 days
Fledging	10–11 days
Status	Abundant nester across all of Iowa
BBS Trend	Increasing (trend = 1.4, 95% CI is 0.7, 2.2) [Iowa]

Patterns since BBA I

The Gray Catbird might be considered extremely common, especially in brushy forest edges with tangled vines and even urban-suburban yards, provided there is sufficiently dense shrubbery, in which it prefers to seek concealment and nesting sites. Abundant even in Iowa records of a century ago, the species has continued to increase notably. In BBA I it was detected in 72.8% of all survey blocks, increasing to 98.9% of all blocks in BBA II. In the latter project, it was a probable or confirmed nester in 93.2% of all blocks, making catbirds among the most common breeding birds in Iowa. North American BBS data indicate the species remains relatively stable nationally and is experiencing a slight increase in Iowa.



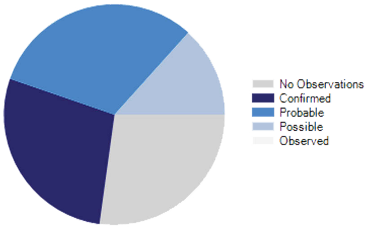
The only minor holes in Gray Catbird distribution occur in small areas of extreme northwest and north-central Iowa. This distribution pattern is fairly well matched in both BBA I and BBA II. These areas of the state contain some of the most intensively farmed agricultural lands with very little of the brushy habitat preferred by catbirds; even stream sides frequently are barren of enough trees and brush to attract the species. Nevertheless, over time catbirds have slightly reduced the size of those blank spaces on the distribution maps, as they continue adapting to farmsteads and small towns with suitable habitat. Gray Catbird nests can sometimes be difficult to locate because they are so typically hidden in nearly impenetrable vegetation. That may be beneficial, however, as it results in relatively successful egg-laying and fledging of young due to reduced chances of predation or nest parasitism. Juvenile birds may be observed without too much difficulty later in the nesting season, in brushy habitat with attending adults.

Gray Catbird

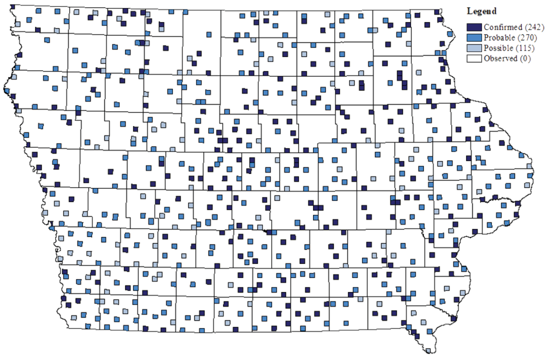
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	67	48	115
Probable	142	128	270
Confirmed	88	154	242
Conf & Prob	44.10%	70.70%	59.50%

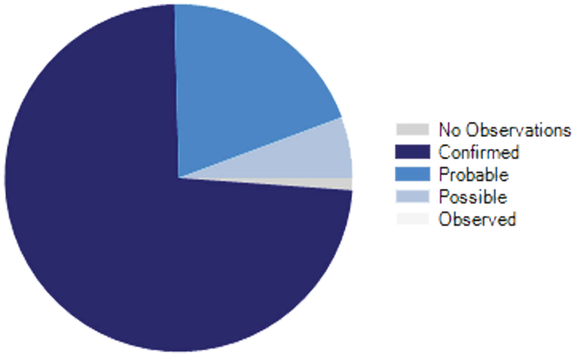
BBA I Results



BBA I



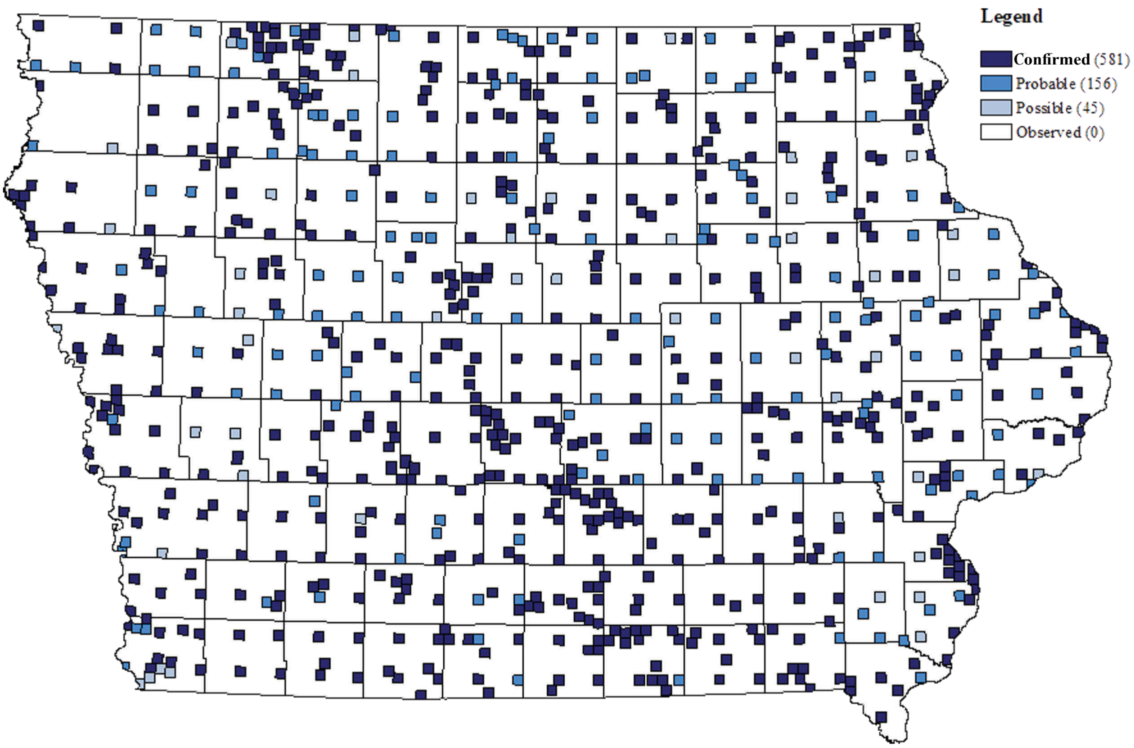
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	41	6	47
Probable	106	50	156
Confirmed	242	341	583
Conf & Prob	66.70%	98.00%	85.80%

BBA II



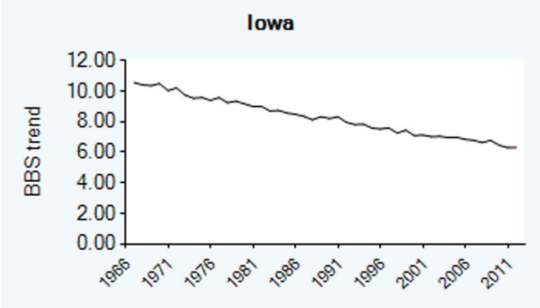
Sponsored by Paul, Miriam, Daniel, & Annalise Skrade

© Adam Ciha

Habitat	Thickets, hedgerows, brushy second-growth woodlands, and woodland edges in rural and suburban areas
Breeding Dates	18 Apr (PR)–1 Sep (PR)
Nest Type	A layered cup of twigs, dried leaves, grasses, and bark
Clutch Size	3–5 eggs
Incubation	11–14 days
Fledging	9–12 days
Status	Abundant but gradually declining Iowa nesting species
BBS Trend	Decreasing (trend = −0.9, 95% CI is −1.5, −0.3) [Iowa]

Patterns since BBA I

Abundant from the Rocky Mountains to the eastern U.S. coast, Brown Thrashers are familiar songsters in both rural and urban settings. The species was detected in 77.5% of all Iowa BBA I survey blocks and in 99.7% of all BBA II blocks, with detections nearly equal between grid and habitat blocks in the recent project. Confirmed and probable detections rose from 65% to 82.3% between the two BBA surveys. This would appear to indicate that Brown Thrashers are increasing in Iowa. Trends found in the North American BBS, however, show gradually declining populations between 1966 and 2011, both in Iowa and nationwide. The apparent increase in Iowa may be related to more thorough observations made during BBA II than during BBA I.

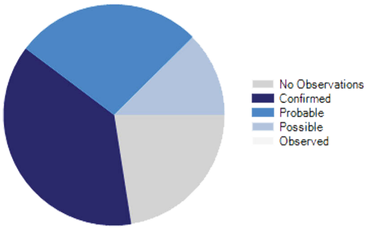


Very few gaps appear in Brown Thrasher detections across Iowa. In both BBA I and BBA II, only a small number of survey blocks in northwestern and north-central regions lacked any observations of this species. Because it is relatively adaptable to a variety of habitats, from suburban backyards to field hedgerows and brushy forest edges, the Brown Thrasher should realize a relatively secure future statewide. An exception may be intensively farmed northern parts of the state, where old farmsteads are being removed to make room for more row crop agriculture. As habitat in open rural areas continues to disappear, Brown Thrashers will likely decline somewhat in those areas.

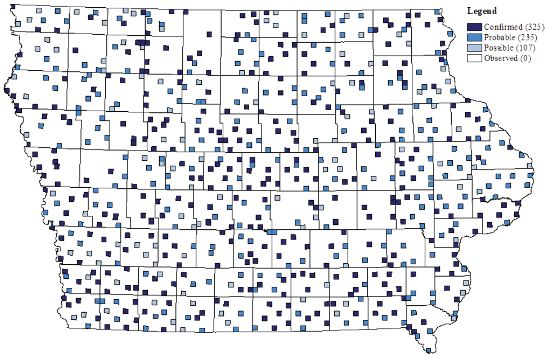
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	71	36	107
Probable	124	111	235
Confirmed	137	188	325
Conf & Prob	50.00%	74.90%	65.00%

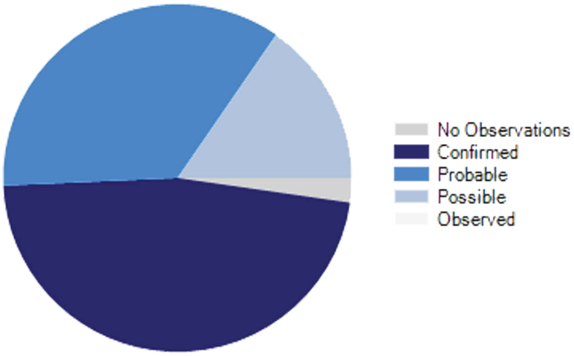
BBA I Results



BBA I



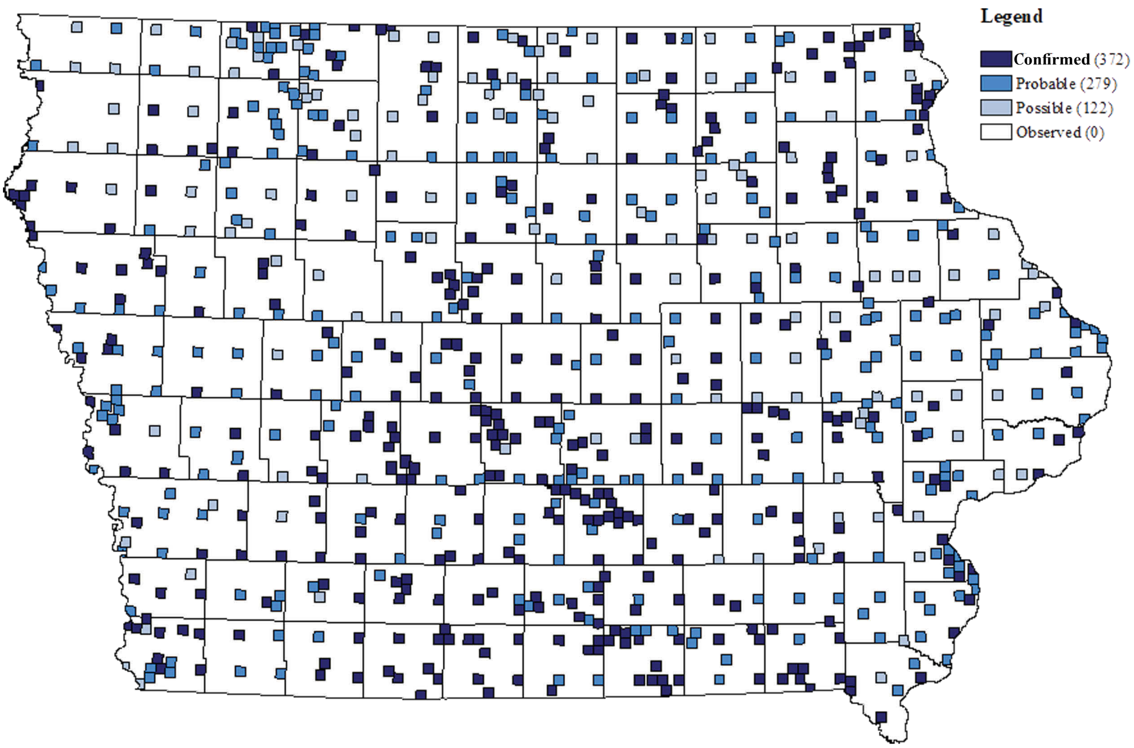
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	84	38	122
Probable	150	129	279
Confirmed	146	226	372
Conf & Prob	56.70%	89.00%	75.60%

BBA II



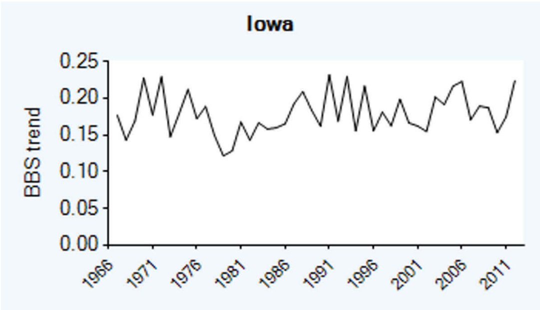
Sponsored by Diane Buman

© Adam Ciha

Habitat	Thickets in farmlands, parks, forest edges, and residential areas
Breeding Dates	8 May (PR)–16 Aug (CO)
Nest Type	A base layer of twigs, with inner layers of mosses, dried leaves, and hairs
Clutch Size	3–5 eggs
Incubation	11–14 days
Fledging	12–14 days
Status	Uncommon nesting species in southern Iowa, rare in northern Iowa
BBS Trend	Stable (trend = 0.0, 95% CI is –2.8, 2.5) [Iowa]

Patterns since BBA I

Northern Mockingbird distribution and numbers have changed little between the first and the recent BBA projects. In BBA I, detections of this species were made in 8.8% of the survey blocks and occurring in 9% of the blocks during BBA II. There was little difference in detections between grid (8.1%) and habitat (9.8%) blocks. Confirmed or probable nesting was observed in only 3.9% of all BBA II blocks, however. The North American BBS indicates mockingbirds to be stable in Iowa, with a small national decline.

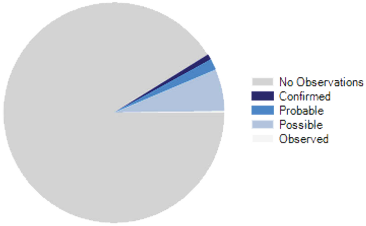


Although rare in early Iowa history, with increasing European settlement mockingbirds expanded their range to the northwest and populations increased, both across Iowa and the northwestern United States. Today the species remains an uncommon to common breeding bird in southern Iowa and rare in northern Iowa, where detections have decreased somewhat since BBA I. Northern Mockingbirds in Iowa exist within the more northerly portions of their U.S. range, probably somewhat limited by cold weather and lack of preferred habitats, especially in much of north-central and northwestern Iowa. It has been predicted that climate change could result in future northerly range and population expansion (Matthews et al. 2004). Lack of suitable habitat especially in north-central and northwestern Iowa, however, still might prevent any highly significant range expansion in much of the state.

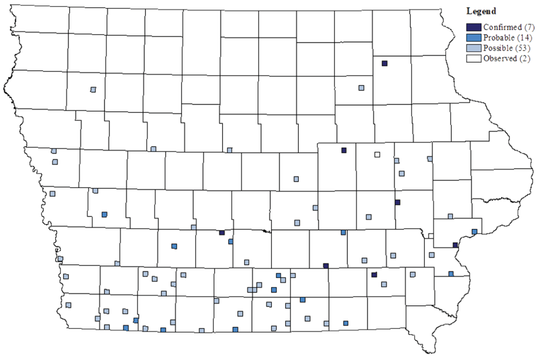
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	1	1	2
Possible	28	25	53
Probable	8	6	14
Confirmed	3	4	7
Conf & Prob	2.10%	2.50%	2.40%

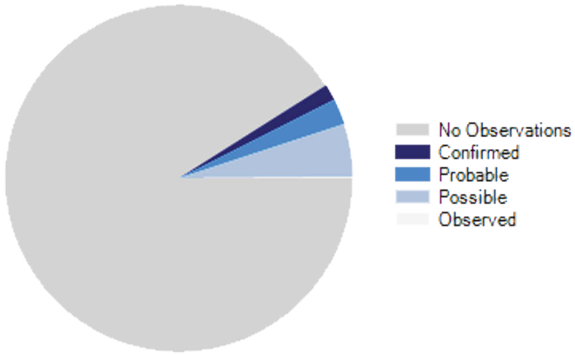
BBA I Results



BBA I



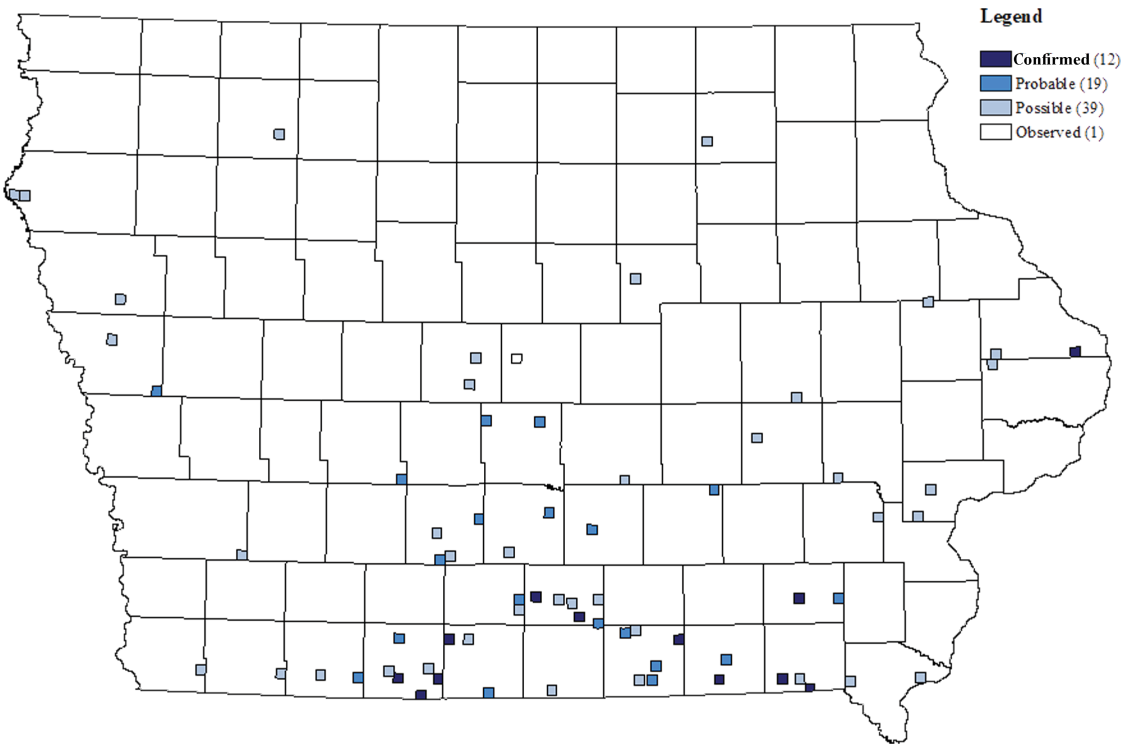
BBA II Results

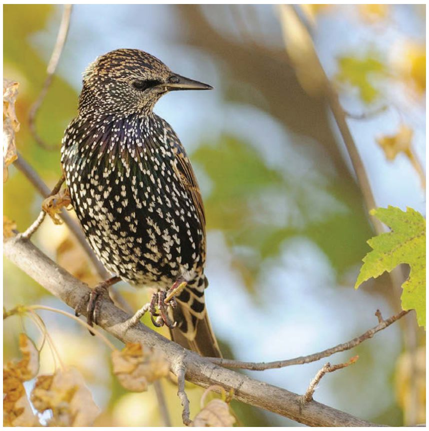


BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	1	0	1
Possible	17	22	39
Probable	8	11	19
Confirmed	6	6	12
Conf & Prob	2.70%	4.30%	3.60%

BBA II

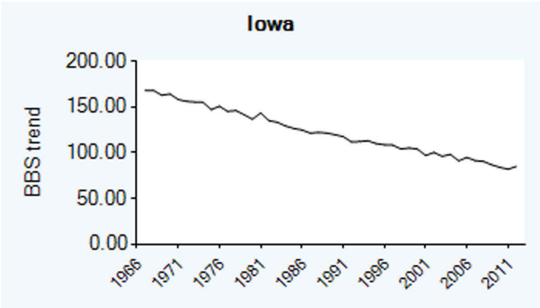




Habitat	Hollow trees, cut bank holes, recesses in building, artificial nest boxes; highly adaptive generalist in both urban and rural areas
Breeding Dates	6 Mar (CO)–4 Sep (CO)
Nest Type	A mass of twigs, weeds, string, corn husks, lined with fine grass and feathers
Clutch Size	5–7 eggs
Incubation	12–15 days
Fledging	20–22 days
Status	Very abundant permanent resident
BBS Trend	Decreasing (trend = −1.5, 95% CI is −2.3, −0.7) [Iowa]

Patterns since BBA I

Introduced to the United States in 1890 and first appearing in Iowa in 1922, European Starlings quickly expanded to become one of our most common avian species. Detected in all but two survey blocks (99.7%) during BBA II, starlings appear to have increased statewide since BBA I, when they were detected in 78.2% of the survey blocks. They were confirmed or probable breeders in 775 blocks (98%) during BBA II. Starlings were found almost equally in grid or priority blocks, and grid or habitat blocks, in BBA I and BBA II, respectively.



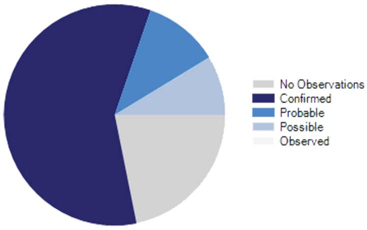
This increase in starlings appears to conflict with the North American BBS data, which indicate the species to be declining both in Iowa and nationwide. Divergence of BBA and BBS data is difficult to explain, but it could be related to differing survey methodologies. European Starlings often are seen to concentrate in urban areas and around open livestock facilities, where they can forage most easily. It could be theorized that the BBS, with a very limited number of Iowa survey routes, may increasingly miss small, once common, farmstead livestock yards. Those have greatly declined in overall numbers, consolidated into larger confinement operations. The BBA survey blocks, however, are more likely to still encompass livestock yards of some kind in most survey blocks, thus yielding starlings in each block. Additionally, many towns where starlings are common were included in BBA survey blocks. By contrast, BBS routes infrequently pass through cities or towns. Regardless of which data may be more accurate, there is no doubt European Starlings are, and will continue to be, among our most numerous resident birds.

European Starling

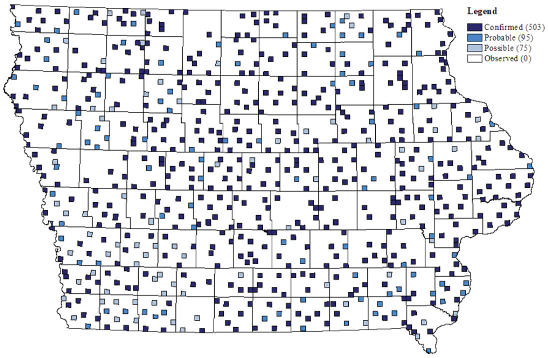
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	51	24	75
Probable	62	33	95
Confirmed	230	273	503
Conf & Prob	55.90%	76.70%	69.50%

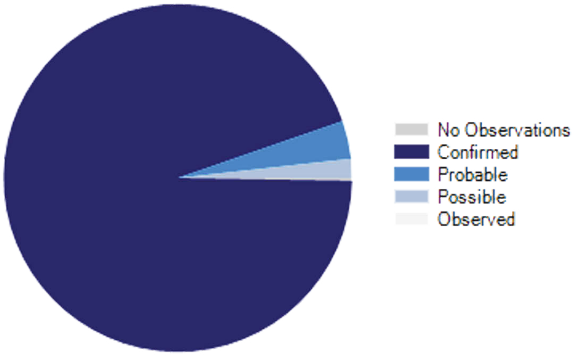
BBA I Results



BBA I



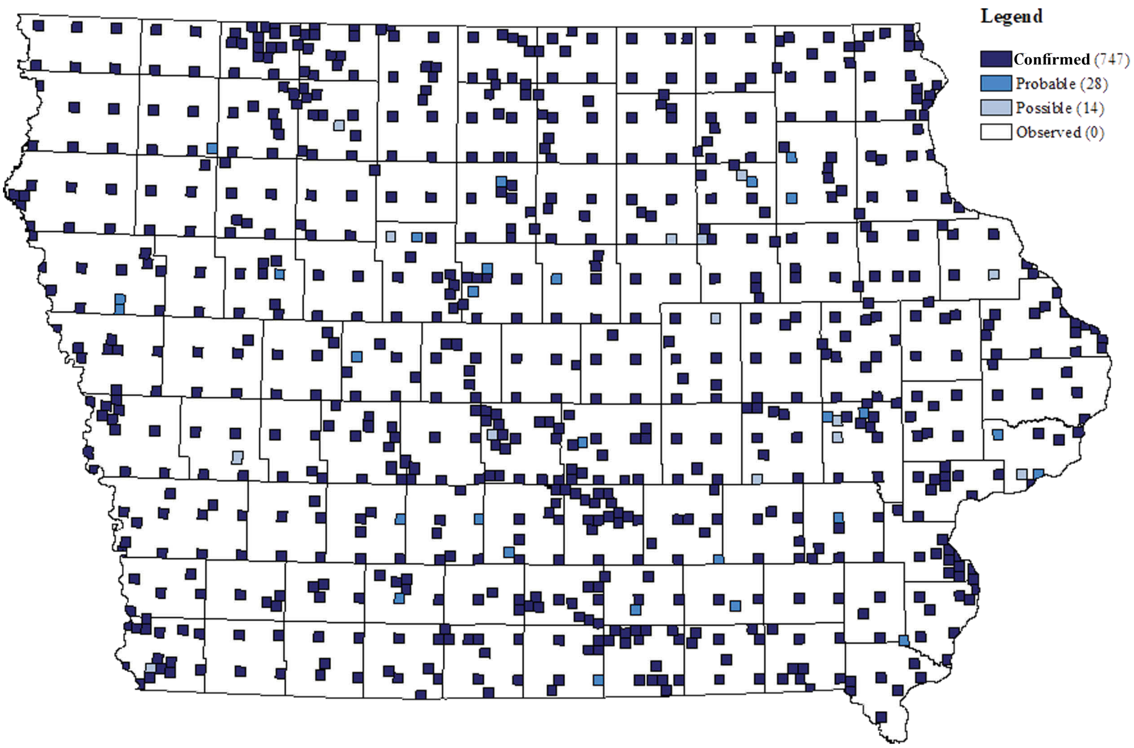
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	6	8	14
Probable	14	14	28
Confirmed	377	372	749
Conf & Prob	74.90%	96.70%	90.20%

BBA II

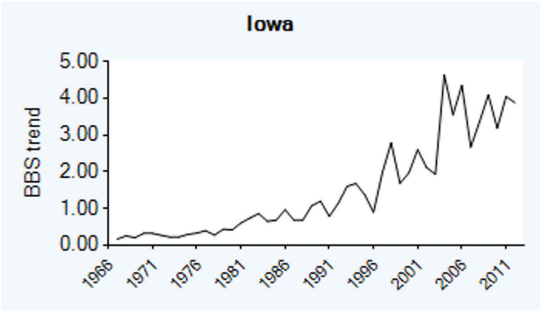


© Jeff Tisl

Habitat	Open woodlands, forest edges, parks, orchards, cedar groves, and well-planted suburbs
Breeding Dates	8 May (PR)–7 Sep (CO)
Nest Type	A loosely woven structure of grasses, twigs, string and fibers, lined with fine rootlets and grasses
Clutch Size	3–5 eggs
Incubation	12–14 days
Fledging	16–18 days
Status	Uncommon to common, erratic nesting species
BBS Trend	Increasing (trend = 8.2, 95% CI is 6.3, 11.1) [Iowa]

Patterns since BBA I

Known for both their gregariousness and erratic wanderings in search of food, Cedar Waxwing numbers may fluctuate greatly from year to year. This fact can influence encounters with the species on any survey. BBA I found Cedar Waxwings present in 42.7% of survey blocks, with probable or confirmed nesting in 25.8% of the blocks. Detections jumped to 83.4% of blocks during BBA II, with probable or confirmed nesting in 69%. In habitat blocks, detections reached 95.5%, compared with just 26% in grid blocks. This difference can be explained, at least partially, by a much richer source of preferred foods in recent years. Fruiting plants such as juneberry, crab apples, honeysuckle, red cedar, plus numerous other wild or domesticated berries, have increased both rural and suburban habitats. The BBS data also show the species increasing both in Iowa and nationwide.

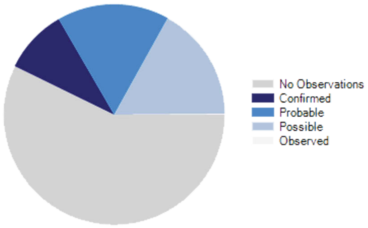


Although Cedar Waxwing detections grew significantly between BBA I and 2, similar notable gaps appear on the map in northwestern and west-central Iowa for both projects. Patterns of detection in those areas correlate closely with the existence of wooded river valleys. By contrast, large blank spaces tend to match vast, open, row-crop agricultural lands where few preferred food plants might be found. At any time of year, however, this resident species will wander widely in search of fruit and can be adversely affected in years of poor berry crops. In summer, waxwings are found congregating along wooded streams to take advantage of flying insects that are caught over the waterways and fed to young in need of protein. Because fruit and berry trees are increasingly planted in suburban neighborhoods and on rural acreages or farmsteads, Cedar Waxwings are likely to realize a fairly promising future in Iowa.

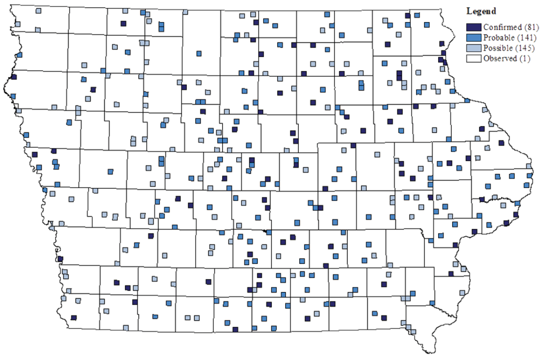
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	1	0	1
Possible	58	87	145
Probable	49	92	141
Confirmed	23	58	81
Conf & Prob	13.80%	37.60%	25.80%

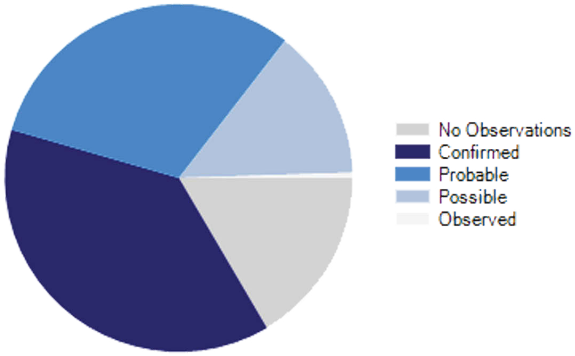
BBA I Results



BBA I



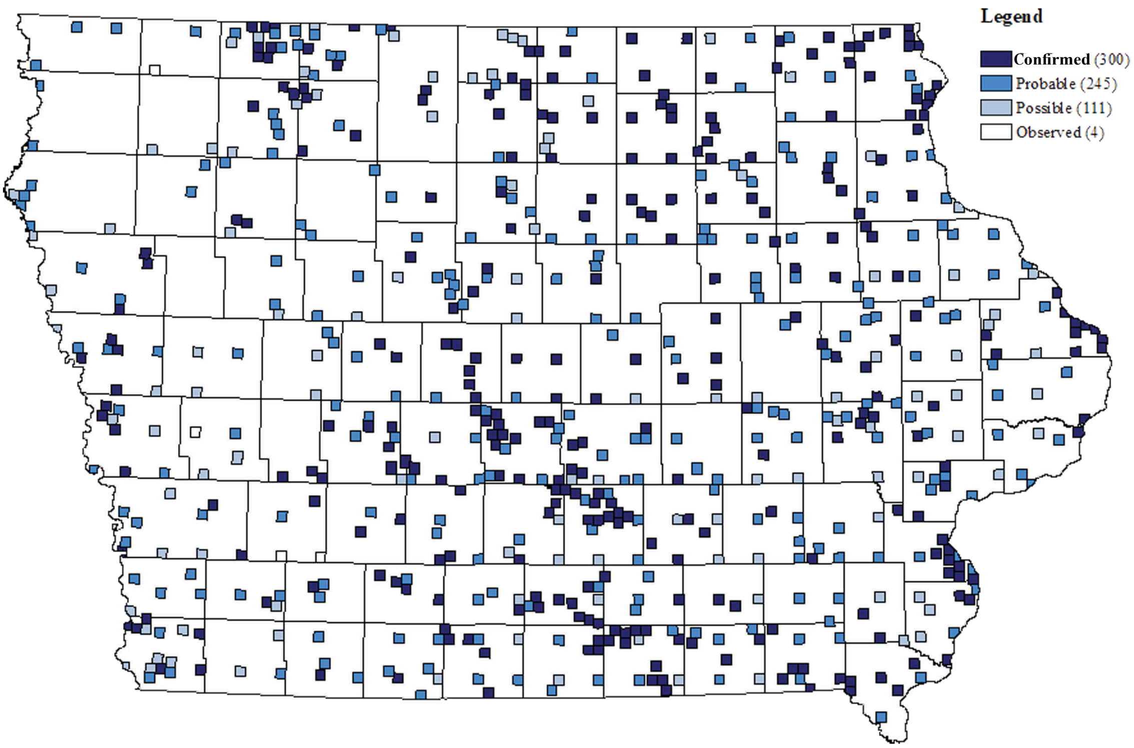
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	4	0	4
Possible	72	39	111
Probable	117	128	245
Confirmed	89	212	301
Conf & Prob	39.50%	85.20%	63.40%

BBA II

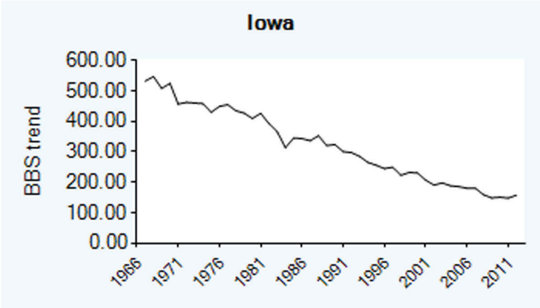


Sponsored by Mary Beth Hunt

Habitat	Breeding habitat associated with human modified environments; farms, residential, and urban areas
Breeding Dates	22 Mar (PR)–31 Aug (CO)
Nest Type	Typically a cavity nest; domed structure made of dried grass and lined with feathers and other softer materials
Clutch Size	1–8 eggs; ave. = 5
Incubation	10–14 days; ave. = 11
Fledging	~14 days
Status	Regular and abundant permanent resident
BBS Trend	Decreasing (trend = −3.0, 95% CI is −3.7, −2.3) [Iowa]

Patterns since BBA I

The nonnative House Sparrow was introduced to this country in 1852 and inhabited every state, including Iowa, by the late 1800s (Barrows 1889). This species was documented in 100% of blocks in this second atlas project and was confirmed nesting in 96% of all blocks. Similarly, the House Sparrow was the most widely distributed species reported during the first atlas, with confirmed nesting for 90% of all records (Jackson et al. 1996). The BBA results from adjacent states are similar, and for blocks where it was found, House Sparrow was confirmed nesting in 96.5% of Illinois blocks (Kleen et al. 2004) and 86.3% of Missouri's blocks (Jacobs and Wilson 1997). Because this species tends to nest near humans and in a variety of locations, it was detected essentially equally in habitat (49.9%) blocks and in grid (50.1%) blocks. Since this bird readily nests in buildings, in nest boxes, and beneath bridges, its nests were easily located. This bird had the highest nesting confirmation rate of any species monitored. The high rate of nest confirmation is also undoubtedly related to this species' long nesting season and its ability to raise four broods per year (Lowther and Cink 2006).



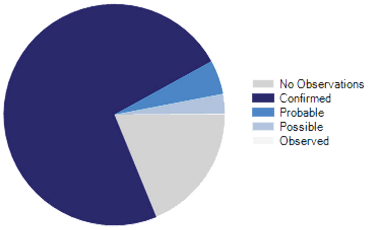
Iowa BBS data for this species indicate an average annual decline of 3% per year, and continent-wide BBS data show an average annual decline of 3.7% per year, since 1966 (Sauer et al. 2012). Beginning in the 1960s, changes in farming practices toward larger farms and a much higher percentage of the landscape planted to monoculture crops have probably contributed to an overall decline in continental populations of House Sparrows (Lowther and Cink 2006). This appears to especially be the case for Iowa, where there are substantially fewer small farms with livestock than existed several decades ago; farms that once supplied a ready supply of grain and hay for House Sparrow food and nesting material.

While Iowa House Sparrow populations may be declining, they continue to be commonly seen and heard throughout the state. Due to their very aggressive nature, House Sparrows are despised by a majority of Eastern Bluebird enthusiasts, particularly because these sparrows routinely outcompete bluebirds at nest boxes and very often kill adult bluebirds and/or their young by ambushing them inside the nest box. For those who favor native bird species over nonnative invasive ones, seeing House Sparrow numbers continue to decrease will not go unappreciated.

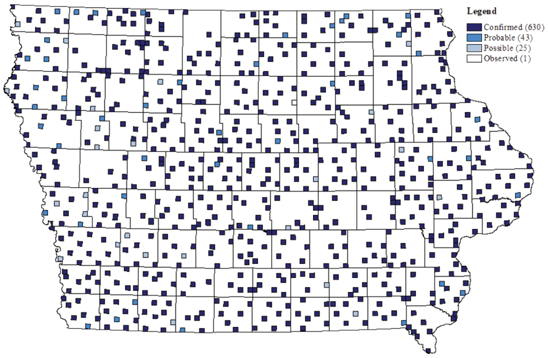
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	1	0	1
Possible	19	6	25
Probable	34	9	43
Confirmed	307	323	630
Conf & Prob	65.30%	83.20%	78.20%

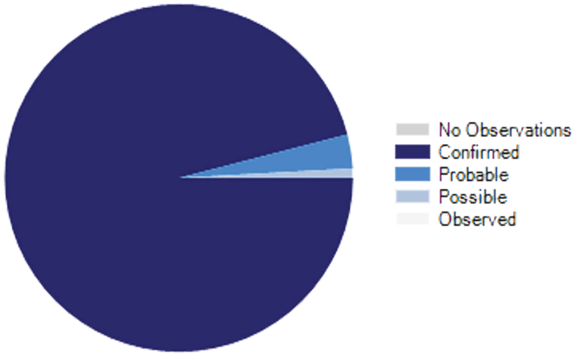
BBA I Results



BBA I



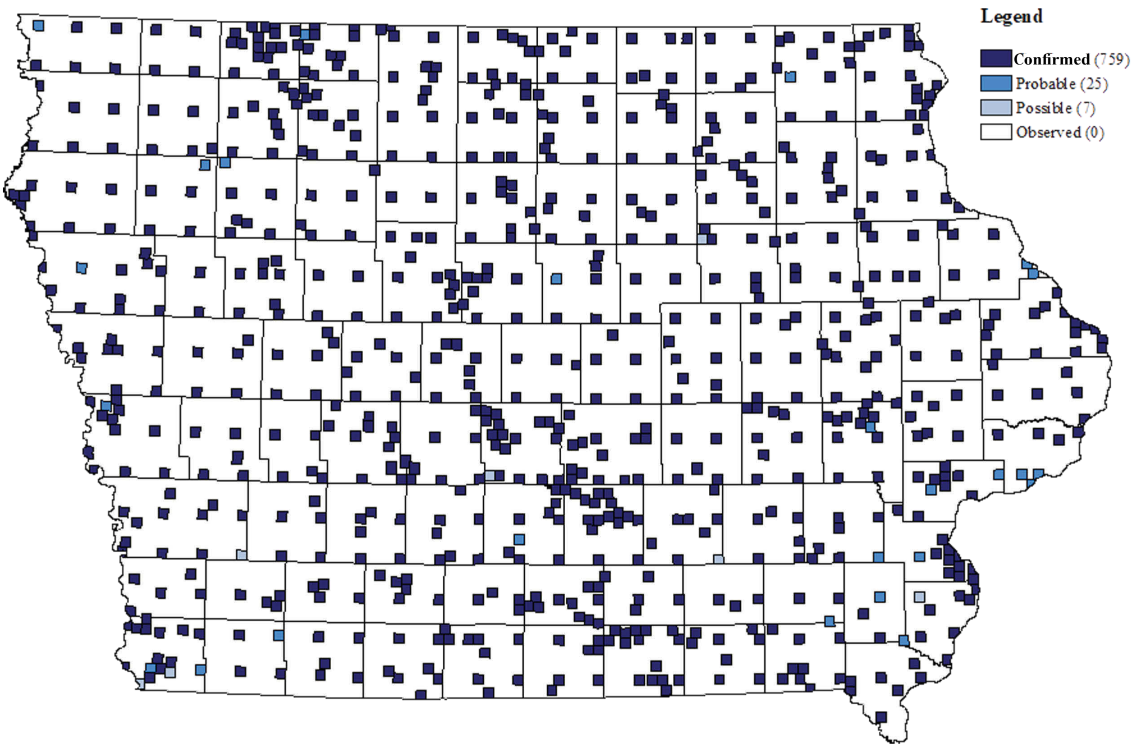
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	3	4	7
Probable	12	13	25
Confirmed	380	379	759
Conf & Prob	75.10%	98.20%	91.10%

BBA II



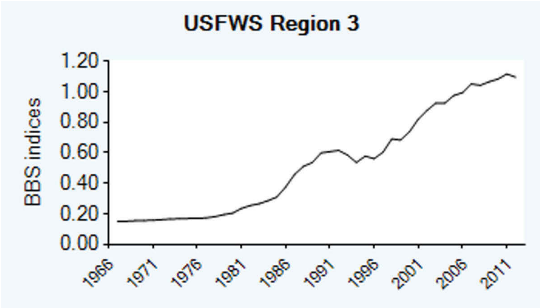
Eurasian Tree Sparrow *Passer montanus*

© Mark Brown

Habitat	Residential areas and parks, open woodlands, and open country with trees
Breeding Dates	9 May (PR)–11 Sep (CO)
Nest Type	Cavity nest; domed structure of vegetation with lining of softer materials
Clutch Size	4–7 eggs; avg. = 5 eggs
Incubation	10–15 days; avg. = 12 days
Fledging	14 days
Status	Regular nesting species in southeastern Iowa
BBS Trend	No Trend Available

Patterns since BBA I

The Eurasian Tree Sparrow, a nonnative species, was imported from Germany, and a small number of these sparrows were released in St. Louis, Missouri in April 1870 (Barlow and Leckie 2000). This sparrow was first documented in West Branch, Iowa (Cedar County) during the spring of 1987. In fact, this was the only BBA record from the first atlas. This species was first confirmed nesting, through discovery of an adult with two young, in Iowa in 1993 (J. J. Dinsmore 1993). During BBA II, this species was detected in 37 (4.7%) blocks, with confirmed nesting in 16 (43.2%) of those blocks and probable nesting in 14 (37.8%) blocks. Most records (67.6%) came from habitat blocks, which may be related to the fact that a high proportion of records were noted on public land along river corridors, where there may have been better access to this species' preferred habitat than occurred on private land.



West-central Illinois holds the largest population of the species in this country, and Eurasian Tree Sparrows were found in 148 blocks during the Illinois BBA, with confirmed nesting records in 75% of these blocks (Kleen et al. 2004). During Missouri's BBA, this species was found in just 13 blocks and confirmed nesting in 12 of those blocks (Jacobs and Wilson 1997). The BBS data for this species come primarily from Illinois, where the long-term nonsignificant trend (1966–2012) is a 6.83% increase annually (Sauer et al. 2012). Iowa has no BBS trend data for this species.

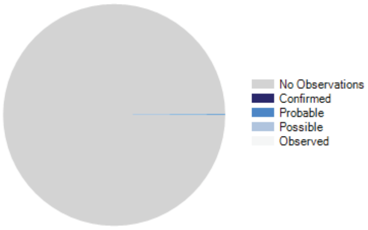
BBA records indicate that the southeastern portion of the state continues to be the stronghold of the .Eurasian Tree Sparrow in Iowa, although it appears this species is moving north and west. For example, the northern-most record for this species was found in Linn County, and the western-most record was found in Iowa County. Overall, this species was documented in 12 different counties, while it was found only in Cedar County during the first atlas. There is other evidence of this species' range moving further west. For instance, a single Eurasian Tree Sparrow was documented along Little Bear Creek (near Brooklyn), perched in a snag containing a woodpecker hole during a Breeding Bird Survey in Poweshiek County on 5 June 2014 (Ehresman pers. obs.). During Iowa's second BBA, this species was observed on numerous occasions occupying cavities in snags that had been created by woodpeckers. This was especially observed to be the case within the floodplains of the Mississippi and Iowa rivers. The two main categories of nest confirmation for this species were attending young and occupied nest. The high rate of confirmed and probable nesting for this species is likely related to the fact that this species is easily identified, has a sedentary nature, and will nest up to four times per year (Barlow and Leckie 2000).

Competition with the House Sparrow may be the main limiting factor in the range expansion for Eurasian Tree Sparrow. The larger and more aggressive House Sparrow is known to outcompete the Eurasian Tree Sparrow for both artificial and natural nest cavities, and the House Sparrow's tendency to initiate breeding about ten days earlier than the Eurasian Tree Sparrow could also be a factor favoring House Sparrow (Anderson 1978).

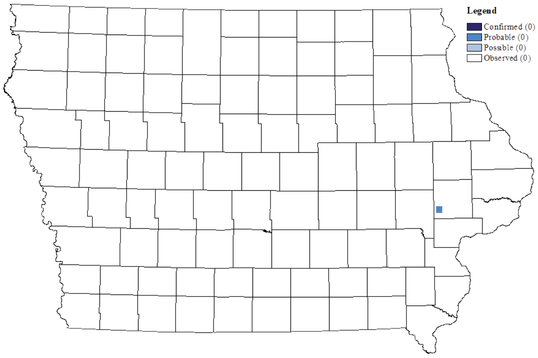
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	0	0	0
Probable	0	1	1
Confirmed	0	0	0
Conf & Prob	0.00%	0.30%	0.10%

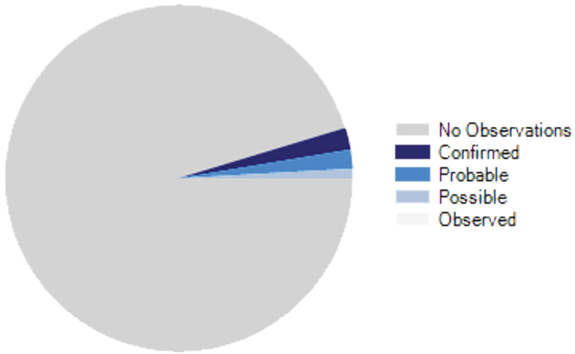
BBA I Results



BBA I



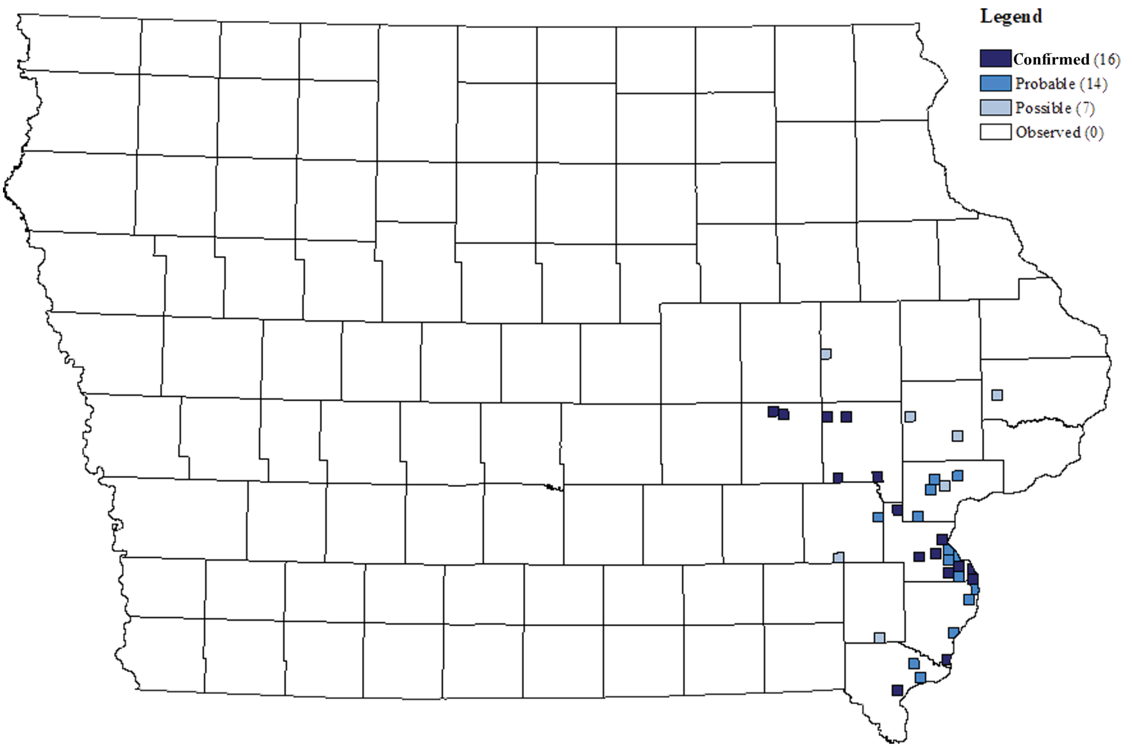
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	4	3	7
Probable	5	9	14
Confirmed	3	13	16
Conf & Prob	1.50%	5.50%	3.50%

BBA II



Sponsored by Kirsten Winter

© Reid Allen

Habitat Human settlements with buildings, lawns, and small conifers, including urban centers

Breeding Dates 18 Mar (CO)–31 Aug (CO)

Nest Type Cup nest of fine weed and grass stems, leaves, rootlets, twigs, string, wool, or feathers, lined with similar and finer material and placed on horizontal limb or structure

Clutch Size 2–7 eggs: avg. = 5 eggs

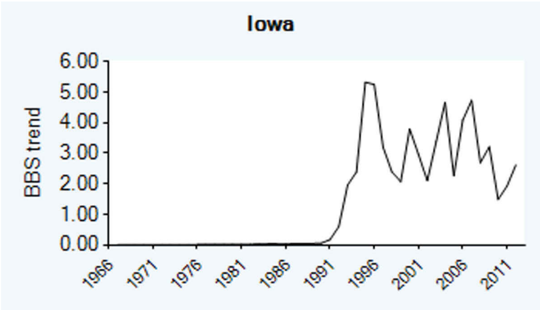
Incubation 12–14 days

Fledging 14–16 days

Status Common permanent resident

BBS Trend Increasing (trend = 14.4, 95% CI is 12.4, 27.2) [Iowa]

Patterns since BBA I



The House Finch was first reported at several locations in Iowa in 1982 (Kent 1982), and the first nests were documented in Wayne and Scott counties in 1986 (S. J. Dinsmore and Petersen 1986). Since that time, populations have steadily increased. During the first atlas project, the House Finch was observed in 52 blocks (6%) in 34 counties, especially in the eastern half of the state (Jackson et al. 1996). Records collected during BBA II indicate this finch was documented in 436 (55.1%) blocks in 97 counties, with 40.1% of those records in the confirmed nesting category and 35.6% of the records in the probable nesting category. During BBA I the House Finch was confirmed nesting in 31% of the blocks (13 counties), and 25% of the records were probable nesting. The BBA results from Illinois are similar to Iowa's most recent atlas results, and the House Finch was documented in 40.7% of Illinois blocks (Kleen et al. 2004). On the other hand, Missouri's atlas (1986–1992) results were most similar to Iowa's first atlas results, with 57 total records from just 4.7% of all blocks, and 33.3% of those records were confirmed nesting (Jacobs and Wilson 1997).

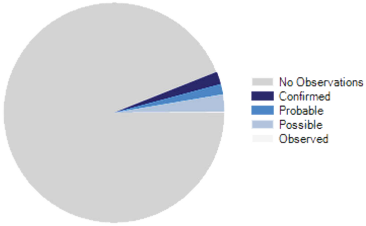
Iowa distribution for the House Finch changed significantly since the first atlas, and this species now inhabits every county of the state. While BBA II records were lacking for Page and Jefferson counties, this species was confirmed nesting in Page County during the first atlas; and this finch is known to inhabit downtown Fairfield (Jefferson County) during summer months (Ehresman pers. obs.). Since the House Finch has a strong propensity to live near humans, it was most readily found inhabiting towns, cities, and suburban areas that occurred within BBA blocks. This species also was occasionally found on rural farms, especially those with young conifers in the yards or windbreaks. The House finch is a prolific breeder and can produce as many as three broods per year (Badyaev et al. 2012). Iowa BBS data indicate an increasing House Finch population trend at the rate of 14.4% annually (Sauer et al. 2012). While the explosive growth of House Finch populations was interrupted in 1994 by a severe outbreak of *Mycoplasma gallisepticum* (MG), otherwise known as House Finch (eye) disease (Badyaev et al. 2012), the species has by now widely recovered. Because House Finches are quite gregarious around bird feeders, the disease can be quickly transmitted through direct contact with infected birds. Exposure to contaminated surfaces may serve to immunize birds against developing more severe infections than direct exposure to infected birds (Dhondt et al. 2007). House Finches do not seem to compete with any native species for nesting sites or food away from feeders, and it appears its future as an Iowa backyard bird is secure.

House Finch

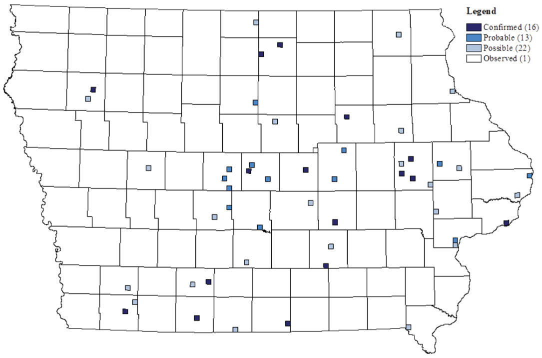
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	1	1
Possible	7	15	22
Probable	6	7	13
Confirmed	6	10	16
Conf & Prob	2.30%	4.30%	3.40%

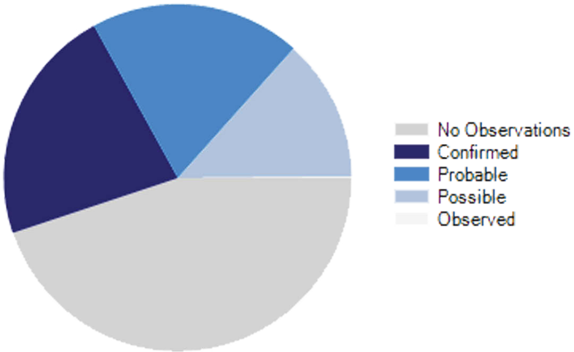
BBA I Results



BBA I



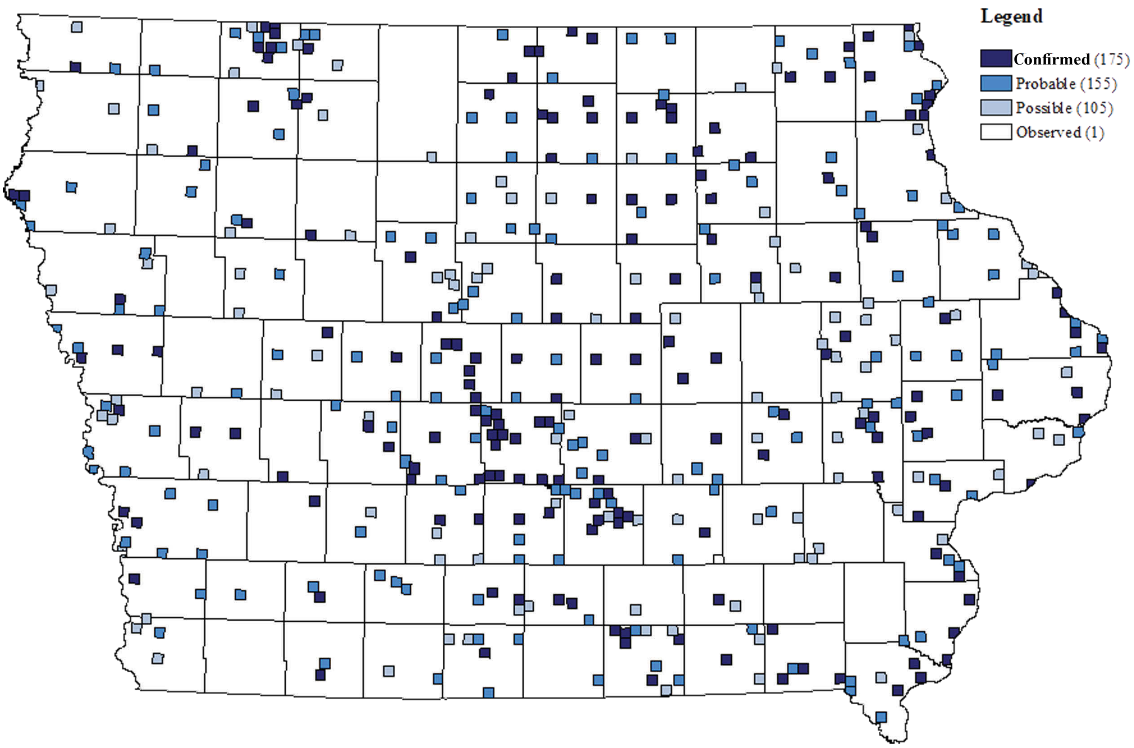
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	1	0	1
Possible	50	56	106
Probable	71	84	155
Confirmed	71	104	175
Conf & Prob	27.20%	47.10%	38.30%

BBA II



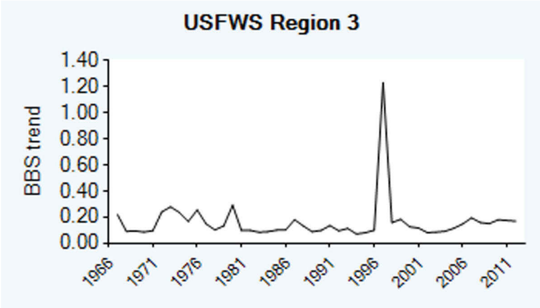
Sponsored by Chris Jennelle

© Adam Ciha

Habitat	Mature spruce and pine forests and mixed coniferous-deciduous forests; in Iowa, often found in conifer stands in cemeteries
Breeding Dates	9 Jun (PR)–9 Jun (PR)
Nest Type	Bulky cup-shaped structure, placed on horizontal branch away from the trunk, and constructed of conifer twigs, plant stems, needles, and lichens; lined with grass and other soft material
Clutch Size	2–6 eggs (usually 3 eggs)
Incubation	12–16 days
Fledging	15–25 days
Status	Regular; occasionally nests
BBS Trend	Increasing (trend = 4.4, 95% CI is 1.3, 9.3) [Central US]

Patterns since BBA I

The Red Crossbill is a most unique bird. With its characteristic crossed bill, designed to extract seeds from pinecones, it has an extreme dependence on conifer seeds and lives a very nomadic lifestyle. While this is a rare summer bird in northern Minnesota and northern Wisconsin, wandering birds sometimes reach states further south (including Iowa and Arkansas) where nesting can occur.



The Red Crossbill is a regular and cyclic winter visitor that occasionally nests in Iowa. From 1960 to 1995, this species was found on 20 of 36 CBCs (Kent and Dinsmore 1996). The first evidence of nesting involved an observation of nest-building in Des Moines (Polk County) from 22 to 25 April 1982 (Kent 1982). The next record is of a pair feeding four young in Des Moines (Polk County) on 9 and 10 July 1986 (J. J. Dinsmore 1986). Numerous summer reports of this species are recorded between 1970 and 1996. Most Iowa records come from mid-October through March, and most records are from urban areas where there typically exists more of the preferred conifer habitat. Especially in years when there are invasions of crossbills, there are some early records beginning in August, with even more records in May (Kent and Dinsmore 1996).

Throughout its North American range, the overall numbers of Red Crossbill appear relatively stable, with a nonsignificant average annual decreasing BBS trend of 1.2%, between 1966 and 2011 (Sauer et al. 2012). With so few summer records for this species there is no BBS trend for Iowa.

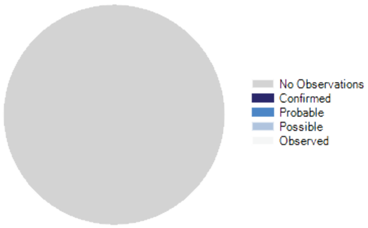
There were no records of Red Crossbills in the first atlas and only four records during the second atlas. There were no confirmed nests, and the highest level of confirmation was a pair of crossbills seen in suitable habitat in Kent Park (Johnson County) on 9 June 2008. There were two possible nesting records, one each in Jasper County (4 July 2008) and Hamilton County (10 July 2010). The latter record from Hamilton County included a sighting by Jaclyn Hill of a pair of adult birds with two fledglings, perched on a fence line. The two young were food-begging, and an adult was observed feeding the young. Both young were observed to have yellow gapes and short, barely crossed bills. According to Craig Benkman, an authority on Red Crossbills, "The shorter and less crossed the bills of the juveniles the more likely they bred there. If the mandibles were barely crossed, then I strongly suspect they bred there" (Craig Benkman pers. comm.). According to Levad (1998), observations of Red Crossbill fledglings being fed, during Colorado's BBA, was accepted as confirmation of nesting, because the young "probably hatched nearby." There were conifers at the Hamilton County site, but no nest was documented. The observation of an adult feeding fledglings would have been accepted as confirmed nesting for virtually any other species in Iowa. Because Red Crossbill young can be mobile soon after fledging, however, it could not be conclusively proven that the young fledged from the BBA block within which they were seen. The fourth atlas record was a bird observed on 12 August 2012 in Webster County.

Red Crossbills mainly breed during periods of abundant seed availability from a cone crop of particular species of trees. During Colorado's BBA, over half of the confirmations of nesting occurred in spruce/fir habitats (Levad 1998). Crossbills can breed repeatedly until food supplies grow low, and food may be the most important factor influencing the timing of breeding (Benkman 1990).

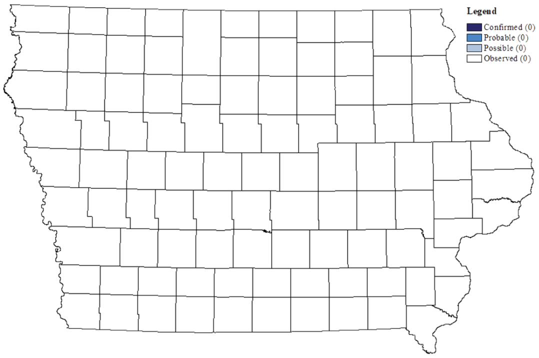
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	0	0	0
Probable	0	0	0
Confirmed	0	0	0
Conf & Prob	0.00%	0.00%	0.00%

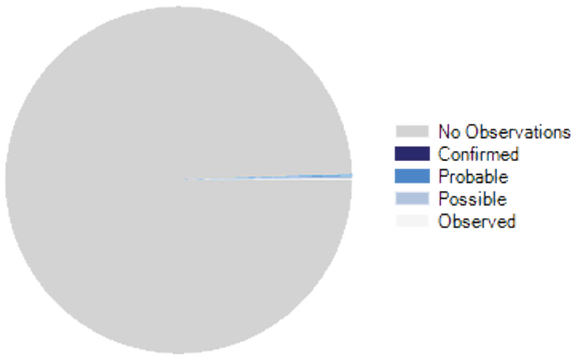
BBA I Results



BBA I



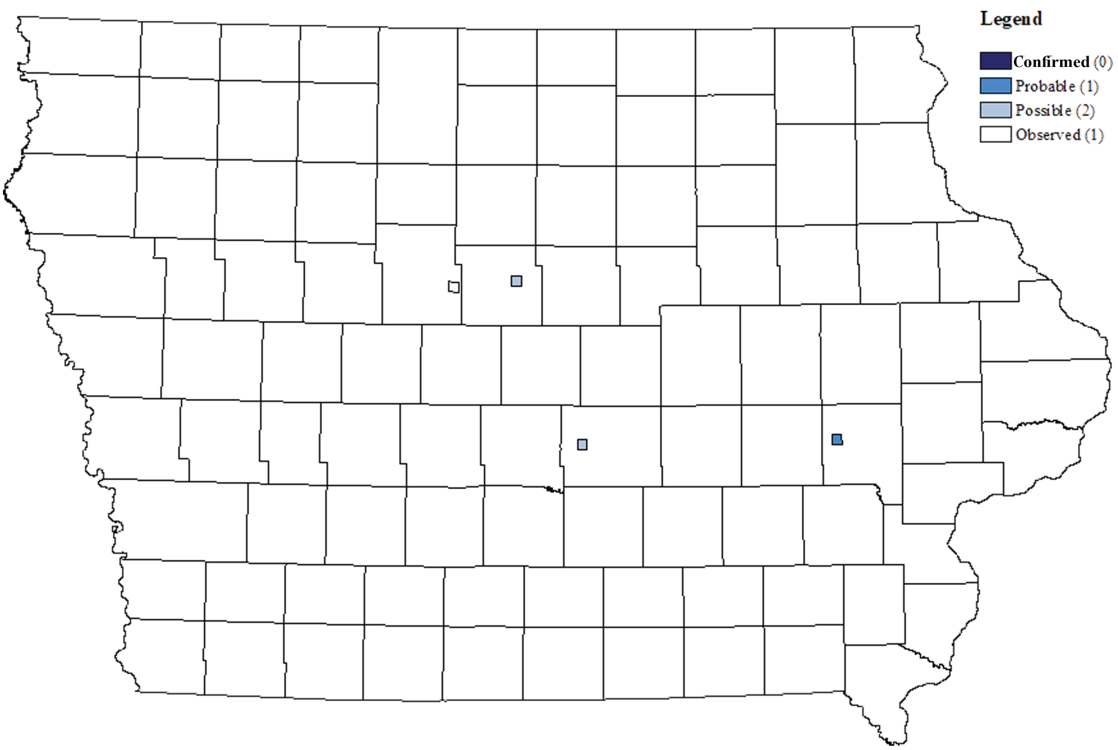
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	1	1
Possible	1	1	2
Probable	1	0	1
Confirmed	0	0	0
Conf & Prob	0.20%	0.00%	0.10%

BBA II



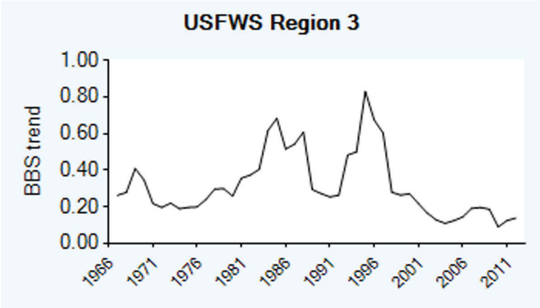
Sponsored by Paul Hertzel

© Paul Roisen

Habitat	Primarily nests in open coniferous forests, as well as in ornamental conifers in parks, cemeteries, and urban areas
Breeding Dates	22 Apr (PR)–27 May (CO)
Nest Type	Cup nest placed on horizontal branch and consisting of small twigs, grass, and other vegetation and lined with fine material like moss and hair
Clutch Size	3–4 eggs
Incubation	13 days
Fledging	11–15 days
Status	Irregular nesting species and common winter resident
BBS Trend	Stable (trend = 0.7, 95% CI is −4.7, 3.4) [Central US]

Patterns since BBA I

The Pine Siskin is primarily a bird of the northern coniferous forest, and it is a sporadic Iowa breeder and irruptive winter wanderer. This bird was detected in just 12 (1.5%) blocks during this second atlas, while it was in 22 (2.5%) blocks during the first atlas. The BBA results from adjacent states are similar, and the Pine Siskin was confirmed nesting in 1.7% of Illinois blocks (Kleen et al. 2004) and <1% of Missouri's blocks (Jacobs and Wilson 1997). This species was confirmed nesting in only two (9.1%) of BBA I blocks and in four (33.3%) of BBA II blocks. Confirmed nests were found in Wright and Boone counties during BBA I and in urban settings of Fairfield (Jefferson County), Ames (Story County), and Ankeny (Polk County), and a suburban site in Palo Alto County during the recent atlas project. Two probable nesting sightings included a pair of siskins at Sergeant Bluff (Woodbury County) and a territory held in Boone (Boone County).



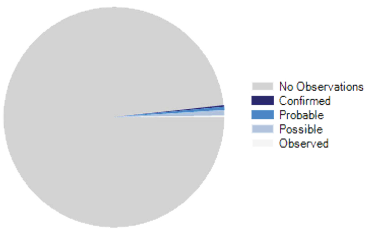
The main similarity in distribution for Pine Siskin during both atlases is the cluster of records from central Iowa. Otherwise, more widespread distribution appeared to occur within the first atlas. For instance, there appeared to be a cluster of records in east-central Iowa in the first atlas that was not documented in the second atlas. Overall, many records were associated with conifer plantings in urban areas in cemeteries, parks, and residential yards. With so few records for this species, Iowa BBS data show no trend. Survey-wide BBS data show an average annual decline of −2.26% from 1966–2012 (Sauer et al. 2012). Since this species is irruptive, it can occur in a given locality one year and then be absent the next. This pattern may be in some way related to annual variation in the distribution and abundance of seeds that make up most of its diet, and its migratory movements seem more influenced by food availability than by weather (Bock and Lepthien 1976). As was pointed out after the first atlas, it is likely that some records for siskins were missed because some observers have trouble identifying its buzzy, high-pitched song (Jackson et al. 2006). Since this species often nests very early in the season (beginning in April), atlas observers, who typically concentrated their efforts later in the field season, may have also missed some Pine Siskins.

Because of the many reports of Pine Siskins nesting in conifers that have been planted around homes, in parks, and in cemeteries, continuing to promote conifer plantings may well serve this species. In addition, increasing the number of backyard bird feeders may also contribute to better winter survival and expand this bird's breeding range, as more birds remain to nest (Dawson 2014).

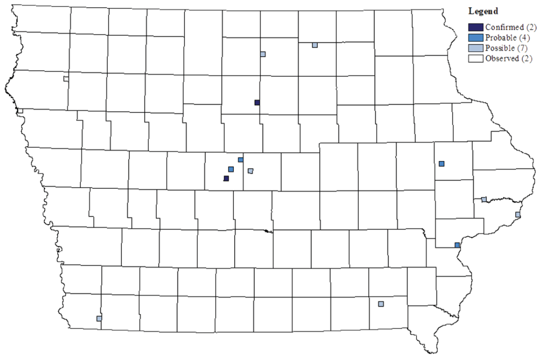
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	1	1	2
Possible	2	5	7
Probable	2	2	4
Confirmed	1	1	2
Conf & Prob	0.60%	0.80%	0.70%

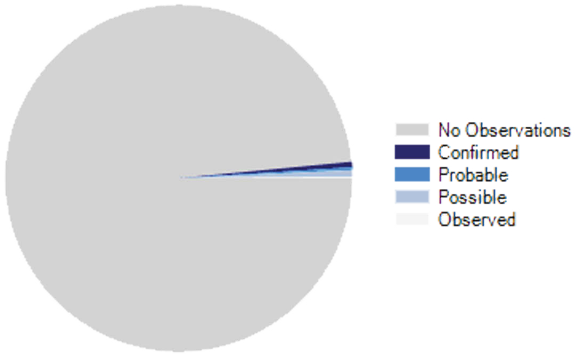
BBA I Results



BBA I



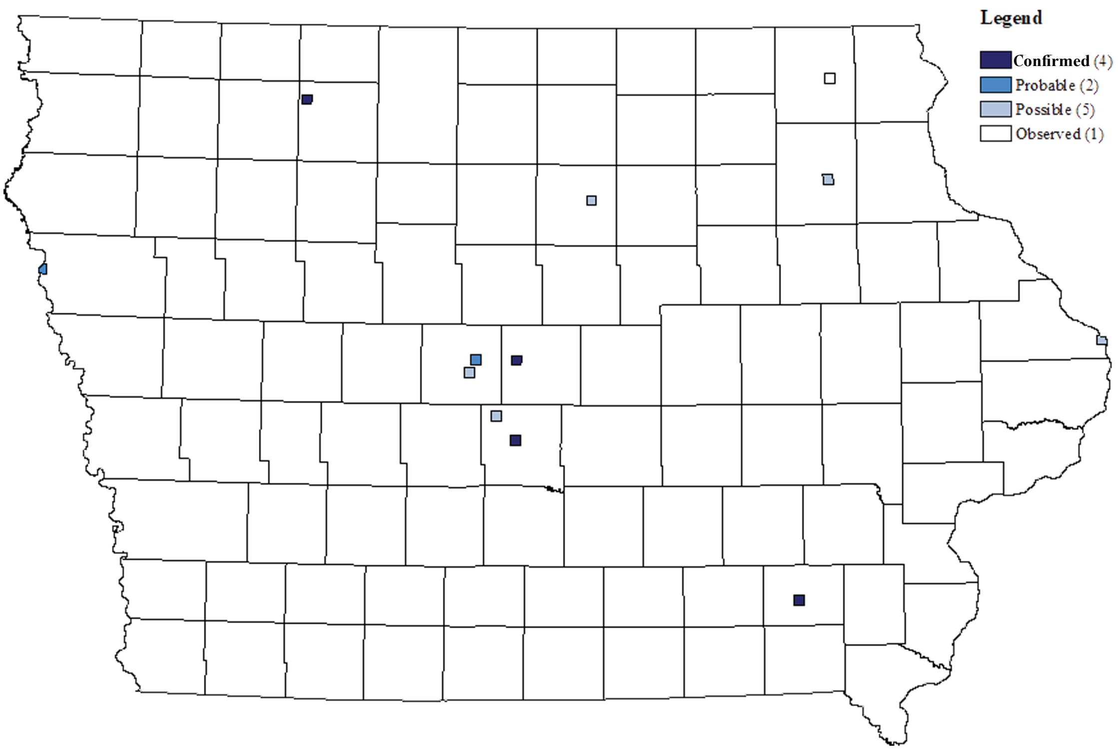
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	1	0	1
Possible	1	4	5
Probable	2	0	2
Confirmed	3	1	4
Conf & Prob	1.00%	0.30%	0.70%

BBA II



Sponsored by Paul Hertzel

American Goldfinch

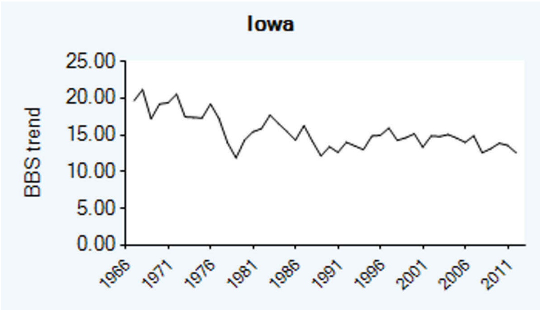
Spinus tristis

© Jeff Tisl

Habitat	Variety of habitats; favoring shrub-scrub, often near weedy fields
Breeding Dates	8 Apr (CO)–23 Sep (CO)
Nest Type	Well built cup-shaped nest placed in the crotch of a shrub or small tree and constructed of milkweed fibers, willow catkins, and grass and lined with thistle-down
Clutch Size	4–6 eggs; avg. = 5
Incubation	12–14 days
Fledging	11–17 days
Status	Common permanent resident
BBS Trend	Stable (trend = –0.7, 95% CI is –1.6, 0.1) [Iowa]

Patterns since BBA I

The colorful and musical American Goldfinch nests throughout the state wherever its preferred open field shrubby habitat occurs. The bright mustard-yellow coloration of the males, coupled with their chatty disposition, makes the goldfinch one of the easiest species to detect. While most goldfinches nest once per season, more experienced females often produce two broods if an early first nest is successful. Interestingly, the female abandons her first brood to her mate and then leaves to find a different mate for her second nest. Iowa's earliest nest confirmation was April 8 and the latest was September 23. There is a close relationship between the flowering of thistles (Cynareae), an important food plant, and when nest building begins. Goldfinches also routinely use thistle down to line the interior of their nests.



The American Goldfinch was detected in 676 (94%) blocks during the first atlas and 789 (99.7%) blocks during this second atlas. The BBA results from adjacent states are similar, and the American Goldfinch was detected in 89% of Illinois blocks (Kleen et al. 2004) and 91.4% of Missouri's blocks (Jacobs and Wilson 1997). While this species was confirmed nesting in only 21.4% of BBA I blocks, confirmation rates increased dramatically to 64.5% during the second atlas. One reason for this increased confirmation rate is probably because emphasis was placed during the second atlas on documenting used nests during the winter months, when the lack of vegetation made finding the nests much easier. The second most reported nesting category for goldfinch was probable (34.2%), with most of these records as paired birds.

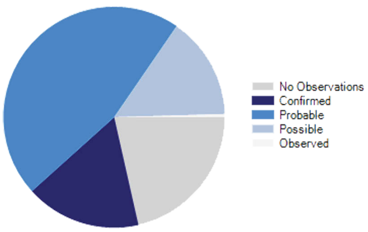
The distribution for American Goldfinch is similar for both atlases, and this species probably nests in every BBA block in the state. This widespread distribution seems to result from this finch's ability to nest in a wide variety of habitats including weedy fields, pastures, floodplain forests, forest edges, and suburban areas. While populations of this species have fluctuated over time, Iowa BBS data indicate the American Goldfinch population has remained stable (Sauer et al. 2012).

Because of the goldfinch's granivorous diet, the species appears to be little affected by pesticides (McGraw and Middleton 2009). Less emphasis on clean farming methods and creating "weed-free" environments, however, would result in more suitable food and habitat for this species, as would placing more emphasis on enhancing habitat in urban environments for the goldfinch, especially in urban parks and recreational areas. Continued conservation efforts to maintain areas of early succession habitats throughout the state will ensure that this species remains a common sight at backyard bird feeders far into the future.

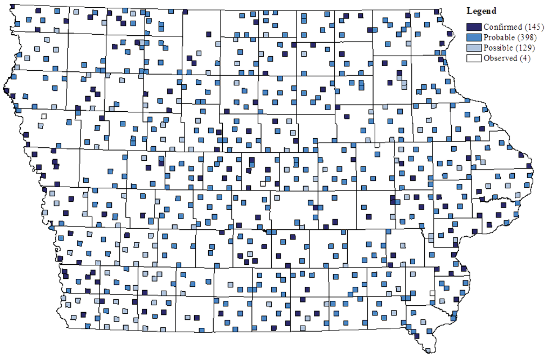
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	2	2	4
Possible	87	42	129
Probable	190	208	398
Confirmed	59	86	145
Conf & Prob	47.70%	73.70%	63.10%

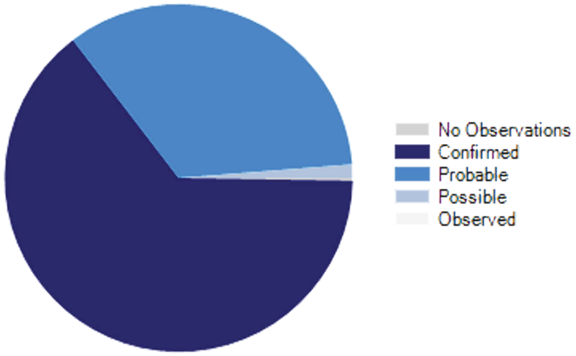
BBA I Results



BBA I



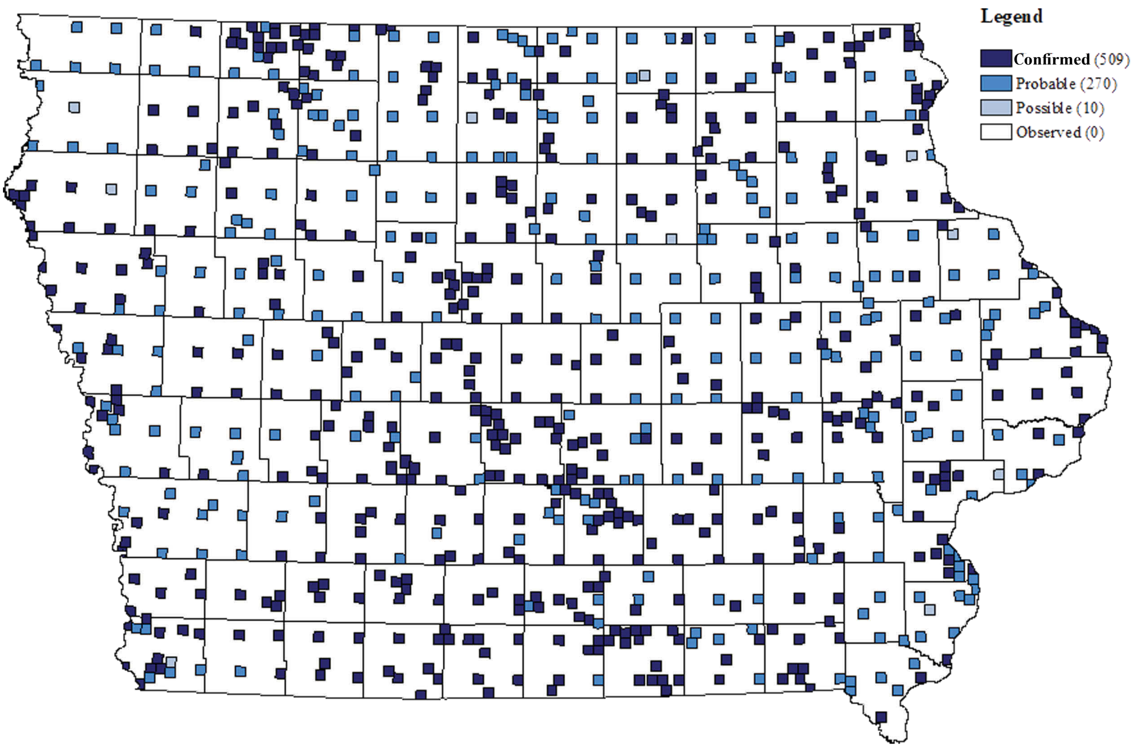
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	7	3	10
Probable	175	99	274
Confirmed	214	295	509
Conf & Prob	74.50%	98.70%	90.90%

BBA II

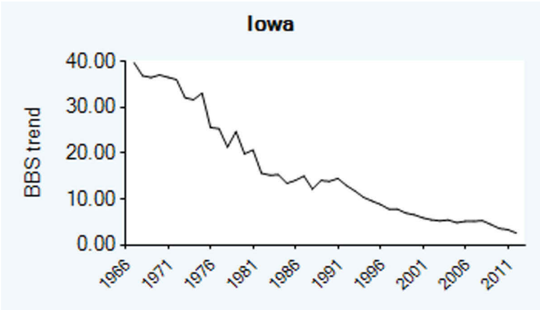


Sponsored by Liz and Dana Christiansen

© Adam Ciha

Habitat	Moderately open grasslands and prairies with patchy bare ground
Breeding Dates	22 Apr (PR)–26 Aug (PR)
Nest Type	Cup nest, placed on ground and constructed of grasses and sedges and lined with fine grasses and sometimes hair. Nest domed with overhanging grasses and side entrance
Clutch Size	3–6 eggs (usually 4–5)
Incubation	11–13 days
Fledging	6–9 days (usually 8–9)
Status	Common breeding bird in grasslands
BBS Trend	Decreasing (trend = −4.9, 95% CI is −6.0, −3.9) [Iowa]

Patterns since BBA I



The Grasshopper Sparrow is now an Iowa Species of Greatest Conservation Need. During the second atlas this diminutive sparrow was found in lightly grazed pastures where it could often be heard singing. The Grasshopper Sparrow was detected in 511 (59.3%) blocks during BBA I and in 533 (67.4%) blocks during BBA II. While a few more records were found during the second atlas than during the first, the BBS trend for Iowa indicates that the Grasshopper Sparrow is decreasing at an annual average rate of 4.9% (Sauer et al. 2012). A similar significant decreasing trend is reported for Illinois and for the upper Midwest (Kleen et al. 2004, Sauer et al. 2012). When comparing percentage of priority/habitat blocks versus percentage of grid blocks, results were similar during both atlases. During BBA I, 50.3% of records came from priority blocks, and 49.7% of records came from grid blocks. During BBA II, 55.7% of records came from habitat blocks, and 44.3% of records came from grid blocks. It appears that this sparrow was located almost equally in priority/habitat blocks and grid blocks in both atlases. This finding may reflect this sparrow's preference for grazed pasture habitat, which is much more prevalent on private land than in public land blocks (Ehresman pers. obs.).

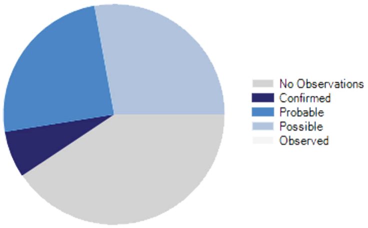
Low nesting confirmation rates were experienced during both atlas periods, probably especially because this is a secretive species and its nests are on the ground, well hidden in vegetation. During BBA I, there were 59 (11.5%) records of confirmed nesting, and during BBA II, confirmed nesting was documented in 84 (15.8%) blocks. There were far fewer records that involved an atlasser viewing the nest. Additionally, during BBA I, probable and confirmed records together made up 53% of all records for this species, and during BBA II, probable and confirmed records for this species made up 50.1% of all records. The category that held the most records during both atlas periods was possible nesting, with 47% of the records during BBA I and 50% of the records during BBA II. Less than seven singing males was the evidence most reported during both atlases (Jackson et al. 1996). The BBA data collected from Missouri showed a higher level of nest confirmation than did the results from Iowa. When probable and confirmed records were combined for Grasshopper Sparrow, they comprised 68.7% of that state's data, while 31.3% of that state's records were listed as possible (Jacobs and Wilson 1997).

Data from both atlases indicate a statewide distribution for Grasshopper Sparrow, and this species undoubtedly nests in every county. This sparrow was absent from blocks in regions that held few (if any) appropriate nesting habitats, such as the intensively row-cropped areas of western and north-central Iowa and the more forested regions in the northeast. The conversion of grasslands to row-crops, the loss of hayfields and pastures, and a lack of disturbance on tall-grass habitats (such as moderate grazing and prescribed fire) to maintain the vegetative structure that this sparrow prefers are main factors that continue to contribute to population declines of this species (Vickery 1996). One reason that this sparrow appears to be disappearing from roadside and grassy waterways may be related to the fact that it is area sensitive. Herkert (1994a,b) estimated that the minimum required area in which this species prefers to nest (in Illinois) is 75 acres, and he also documented that this sparrow has a strong preference for recently burned prairie habitats.

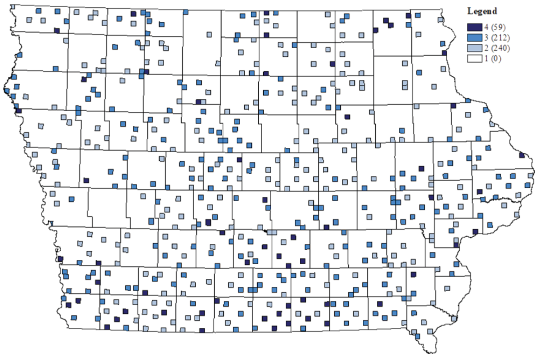
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	133	107	240
Probable	93	119	212
Confirmed	28	31	59
Conf & Prob	23.20%	37.60%	31.50%

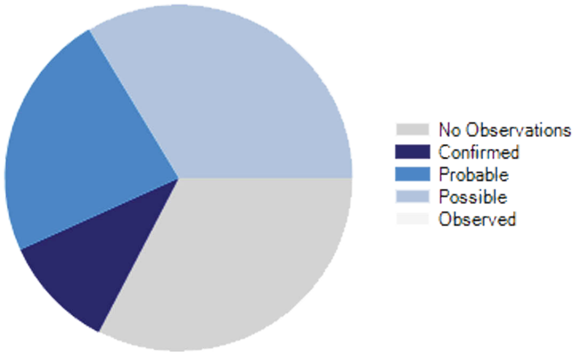
BBA I Results



BBA I



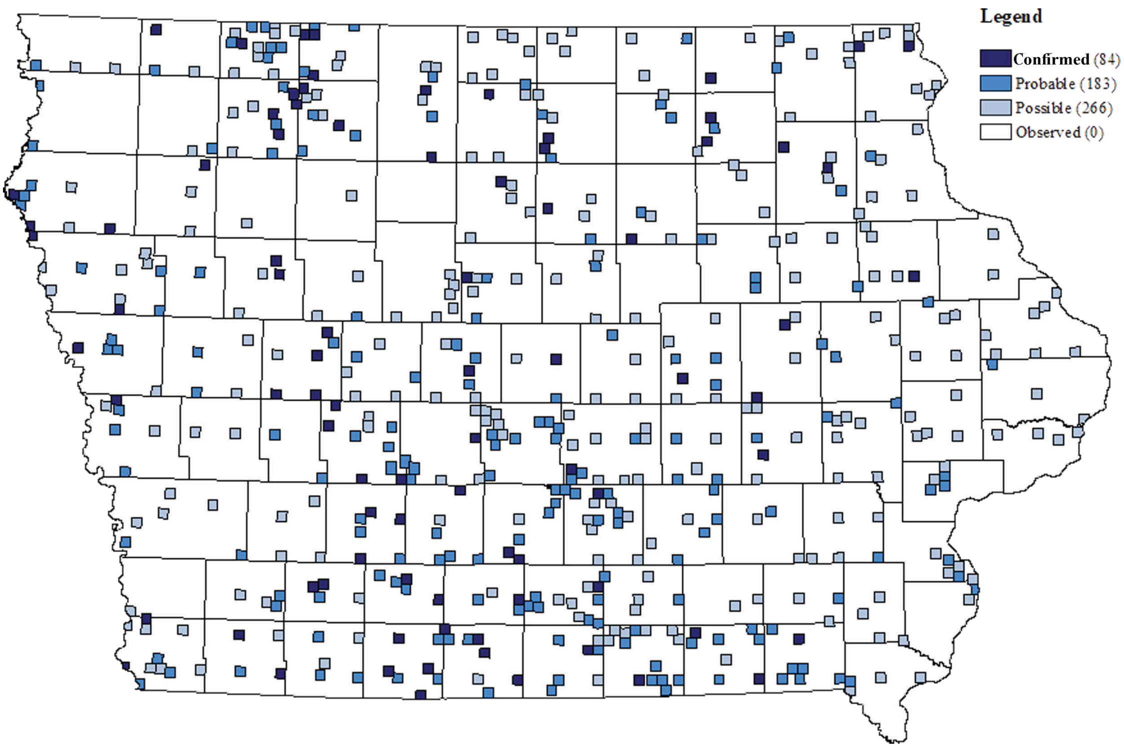
BBA II Results



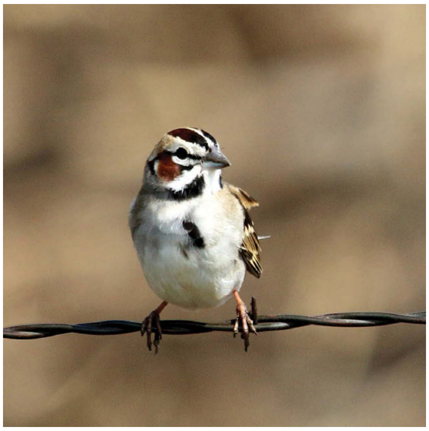
BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	130	136	266
Probable	71	112	183
Confirmed	35	49	84
Conf & Prob	20.30%	40.40%	31.00%

BBA II



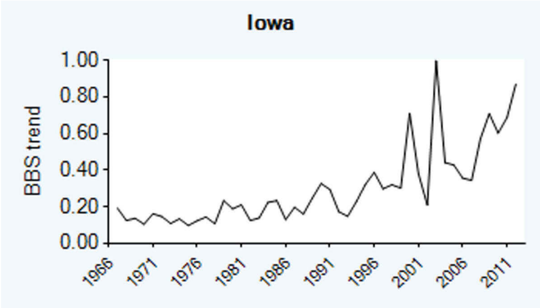
In Honor of Torre, Anne, & Avery Hovick
(Paul Skrade)



© Doug Harr

Habitat	Sparsely vegetated areas, often disturbed sites with exposed sandy soil or heavily grazed pastures or fallow fields
Breeding Dates	30 Apr (PR)–26 Aug (CO)
Nest Type	A substantial cup-shaped nest constructed of grass or weedy stems, bark fibers, or twigs; lined with finer grasses, leaves, rootlets, and hair and often placed on the ground
Clutch Size	4 eggs (range 3–6)
Incubation	11–12 days
Fledging	11–12 days
Status	Uncommon and local statewide nester
BBS Trend	Increasing (trend = 3.6, 95% CI is 0.6, 7.0) [Iowa]

Patterns since BBA I



In most of Iowa, the Lark Sparrow is often associated with disturbed sandy habitats along major riverways. This attractive sparrow was detected in 127 (14.8%) blocks during BBA I and in 403 (50.9%) blocks during BBA II. The three-fold increase in number of records found during the second atlas may indicate that there are more Lark Sparrows in Iowa now. The BBS trend for Iowa indicates that its population is increasing at an annual average rate of 3.6% (Sauer et al. 2012). Both atlases were almost identical for comparing percentage of priority/habitat block versus grid blocks. During BBA I, 60.6% of records came from priority blocks, and 39.4% of records came from grid blocks. During BBA II, 59.8% of records came from habitat blocks, and 40.2% of records came from grid blocks. This sparrow was located about 20% more often in priority/habitat blocks than grid blocks in both atlases. This species prefers habitat more likely to be found in public ownership. The largest difference between the data of the two atlases is the number of confirmed nesting records documented during the second atlas. During BBA I, there were 21 (16.5%) records of confirmed nesting, and during BBA II, confirmed nesting was documented in 123 (30.5%) of all blocks. Lark Sparrow was confirmed to nest in nearly six times as many blocks during BBA II. Further, during BBA I, probable and confirmed records together made up 48.8% of all records for this species. During BBA II, probable and confirmed records for this species made up 64.7% of all records. Perhaps these data suggest that BBA II atlassers were more experienced and better at confirming nests during the second atlas than they were during the first. Data collected from Missouri's BBA showed similar results to that from Iowa (during BBA II), with 61.6% of that state's data comprised of combined probable and confirmed records and Lark Sparrow records occurring in 44.8% of all blocks visited (Jacobs and Wilson 1997).

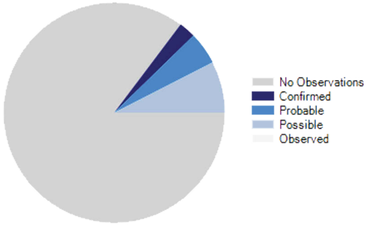
While BBA II data indicate that Iowa Lark Sparrow distribution is statewide, BBA I data indicated that the majority of those data were from the southern three tiers of counties and along several major river valleys, including Des Moines, Missouri, and Cedar rivers (Jackson et al. 1996). There were 34 counties with no records of Lark Sparrows during BBA I, and only a handful of counties, including Emmet, Winnebago, Grundy, and Clinton, where no records were documented during BBA II. While there is no doubt that coverage was more extensive during the second atlas, adding records for nearly 30 more counties during BBA II is an indication that this sparrow is moving its range northward.

Although the Lark Sparrow formerly bred as far east as the northern and central Atlantic states, its breeding range is now receding westward, as eastern lands historically cleared for agriculture return to forest or are urbanized (Martin and Parrish 2000). For instance, Illinois BBA data indicate this species is found throughout most of that state, although most records were documented in west-central Illinois (Kleen et al. 2004). While CRP grasslands may offer some habitat for this species, Bock and Webb (1984) documented that this sparrow of edge habitats prefers grazed grassland over ungrazed. Most importantly, if Iowa wishes to maintain healthy populations of Lark Sparrows into the future, there must be more effort to stop conversion of habitats bordering rivers and streams into row-crop agriculture and more effort expended to retain ecotones between wooded and grassland/shrub habitat types (Knopf 1996).

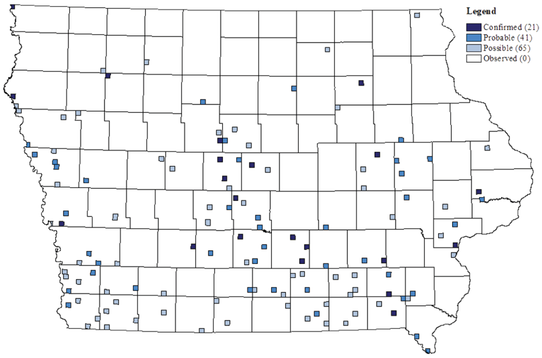
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	31	34	65
Probable	12	29	41
Confirmed	7	14	21
Conf & Prob	3.60%	10.80%	7.20%

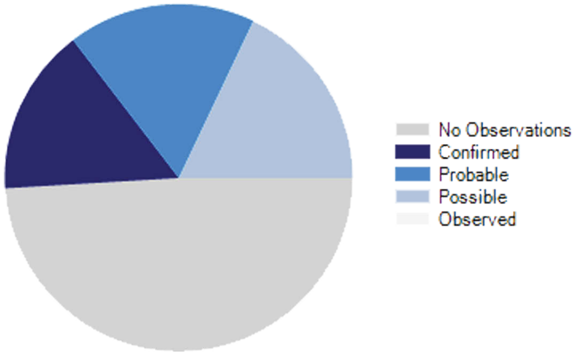
BBA I Results



BBA I



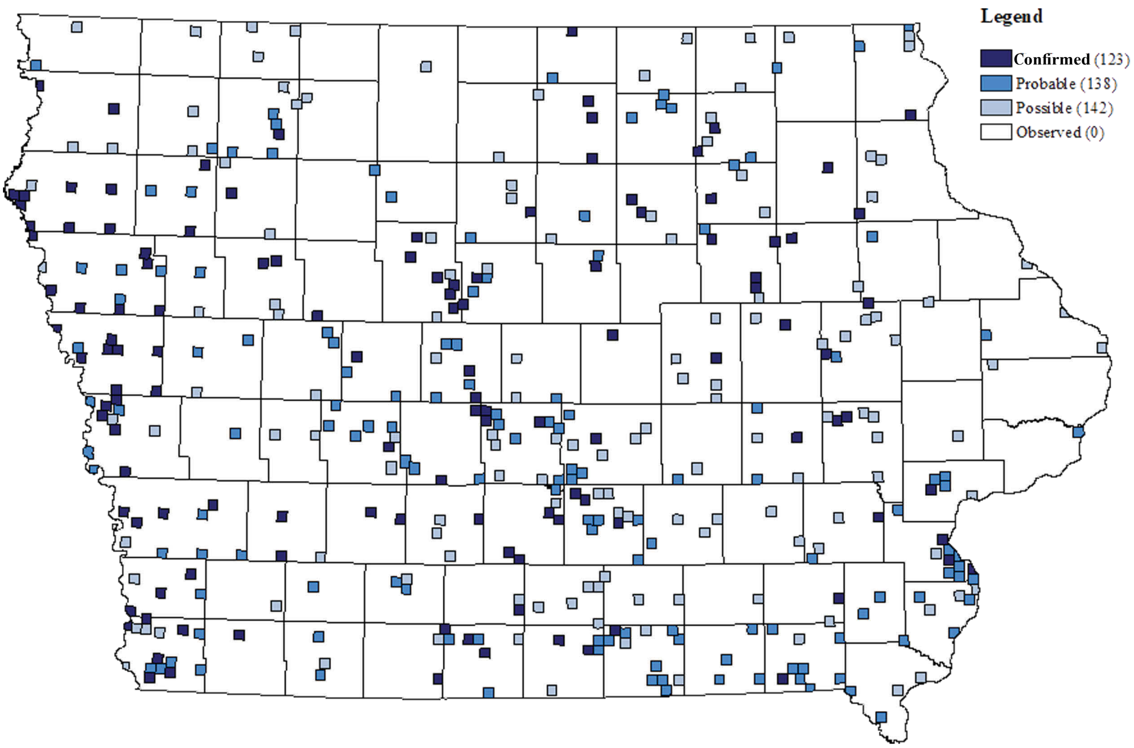
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	59	83	142
Probable	55	83	138
Confirmed	48	75	123
Conf & Prob	19.70%	39.60%	30.30%

BBA II



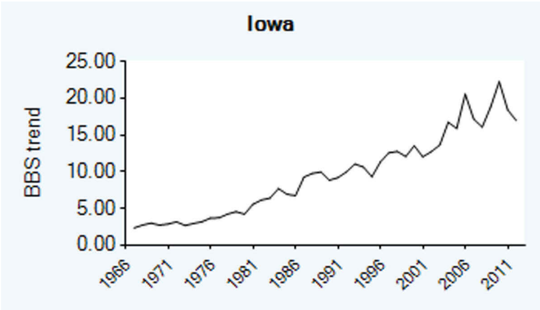
In Honor of Richard Winter (Kirsten Winter)

© Adam Ciha

Habitat	Favors wooded residential areas, especially yards with conifers and shrubs, farmyards, and cemeteries
Breeding Dates	16 Apr (PR)–31 Aug (PR)
Nest Type	A loosely woven cup of grasses, typically lined with hair or fine rootlets
Clutch Size	2–7 eggs; ave. = 4 eggs
Incubation	10–15 days; ave. = 10–12 days
Fledging	9–12 days
Status	Widespread, common nesting species
BBS Trend	Increasing (trend = 5.6, 95% CI is 4.6, 6.7) [Iowa]

Patterns since BBA I

The Chipping Sparrow is one of Iowa's, as well as North America's, most common and widely distributed migrant songbirds. It is a common summer resident of human-modified habitats in towns and country yards, alike, and nests in a wide variety of trees and shrubs, especially conifers (Middleton 1998). There were only seven other Iowa nesting species for which more atlas records were documented, and Iowa BBS records show this sparrow increasing at an average annual rate of 5.6% (Sauer et al. 2012).



Chipping Sparrow was documented to occur in 614 (71.3%) of BBA I blocks, while it occurred in 787 (99.5%) blocks during the second atlas. During the second atlas only four blocks lacked Chipping Sparrow records. Results were similar for both atlases regarding where this species was found, with 50.8% of records in priority blocks and 49.2% in grid blocks during BBA I and 50.2% of records in habitat blocks and 49.8% in grid blocks during BBA II. These results indicate that there was no difference whether a block held public land or not, and that this generalist species does indeed occur in blocks with minimal bird habitat. Further evidence that this sparrow is abundant and widespread is reflected by the fact that confirmed nesting was documented for it in 77.1% of all blocks. Adding the number of blocks with probable nesting to this, Chipping Sparrows were found as confirmed or probable nesters in 96.1% of all blocks. Essentially it is difficult to find any place in Iowa where this species does not nest. The number and percentage of confirmed nests documented in Iowa were significantly different between BBA I to BBA II, with 189 (30.8%) in BBA I and 607 (77.1%) in BBA II. The increase in nest documentation may be most related to having more experienced personnel involved during the second atlas, who focused more effort on confirming nesting for both this species and many others.

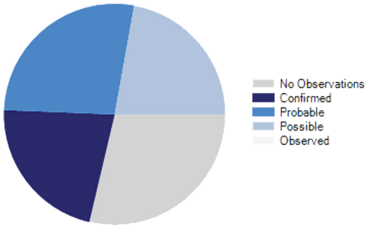
While data from both atlases indicate a statewide distribution for this species, there was much less documentation of this species in the western third of the state during BBA I (Jackson et al. 1996). Statewide distribution of this species was also documented in both Illinois and Missouri atlases, where it was located in 78.6% of all blocks sampled in Illinois (Kleen et al. 2004) and 67.8% of blocks in Missouri (Jacobs and Wilson 1997). Like Iowa, the Chipping Sparrow also was in every county in those two states. During the second Iowa atlas, no other native sparrow, except Song Sparrow, was found in more blocks, indicating that this adaptive sparrow has saturated almost every niche available where it can breed.

It is likely that the Chipping Sparrow was a rare resident throughout much of Iowa, prior to Euro-American settlement (Jackson et al. 1996). The clearing of forests, extensive introduction of agriculture, and establishment of landscaped urban and rural habitats with open grassy spaces and ornamental conifers have created good nesting habitat with plentiful food sources (Rising 1996). Considering this sparrow's close association with human-modified habitats, its future seems most secure in a state that is known as the most human-altered state in this country.

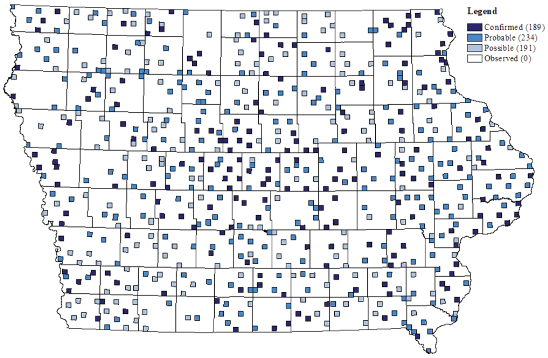
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	105	86	191
Probable	114	120	234
Confirmed	83	106	189
Conf & Prob	37.70%	56.60%	49.10%

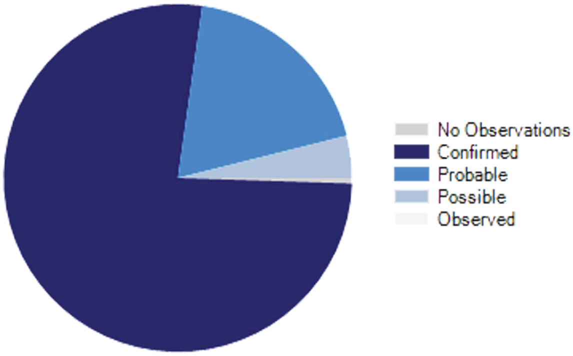
BBA I Results



BBA I



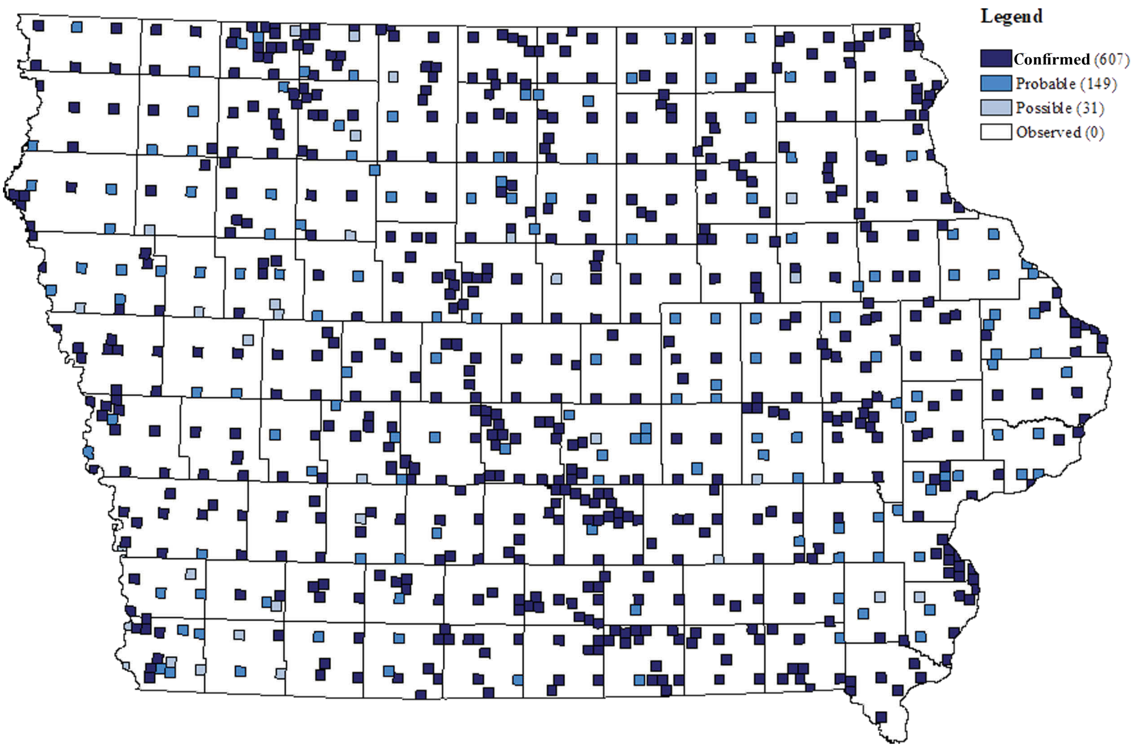
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	22	9	31
Probable	99	50	149
Confirmed	271	336	607
Conf & Prob	70.90%	96.70%	87.80%

BBA II

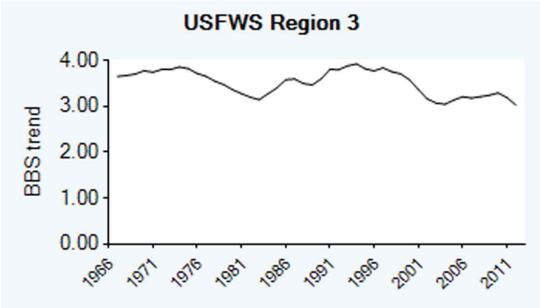


In Honor of Carol Winter (Kirsten Winter)

© Mark Brown

Habitat	Grasslands with sparsely scattered low shrubby vegetation; especially with short shrubs and cedars
Breeding Dates	17 May (PR)–9 Aug (PR)
Nest Type	Compact cup of dried grasses and weed stalks, typically lined with hair or fine rootlets
Clutch Size	4 eggs typically (range 3–5)
Incubation	10–14 days
Fledging	7–9 days
Status	Uncommon nester, mainly in northern part of the state
BBS Trend	Decreasing (trend = −0.9, 95% CI is −1.4, −0.4) [Central US]

Patterns since BBA I



About 20 years ago, the Clay-colored Sparrow was noted by Kent and Dinsmore (1996) to be a rare migrant and an occasional summer resident. Comparing data collected during BBA I with that collected during BBA II, it appears that summer status is changing. While only six records were documented for this species during BBA I, there was a ten-fold increase to 60 records documented during BBA II. Even with this apparent increase in number of records, this sparrow is not detected often enough during Iowa's BBS to predict population trends (Sauer et al. 2012). During BBA I, there were three records reported for grid blocks and three records reported in priority blocks. BBA II results indicated that 70% of records came from habitat blocks and 30% of the records were documented in grid blocks. Perhaps more significantly, 69.2% of the total confirmed and probable records from BBA II came from habitat blocks. There were seven confirmed nesting records during BBA II and none during BBA I. The atlasser who documented the majority of the confirmed and probable records for Clay-colored Sparrow experienced difficulty finding this species' nest. While there were seven total records of nesting confirmation, four of those were recently fledged young, and three of the confirmed records involved a nest being seen. The Clay-colored Sparrow typically builds its nest low to the ground, in dense vegetation, which is difficult to see. This species prefers to nest in either ungrazed or minimally grazed pastures; hence, most confirmed and probable nesting records were found in public land blocks.

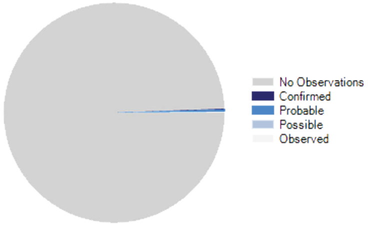
Statewide distribution for Clay-colored Sparrow changed significantly since the first atlas. This sparrow was documented to occur in just five counties during BBA I (Lyon, Woodbury, Kossuth, Franklin, and Fayette) (Jackson et al. 1996). During BBA II, it was documented to occur in 26 counties (with a range of possible records to confirmed records). Unlike BBA I, no records of this sparrow were found in blocks within Lyon County or Franklin County, although a territorial pair of Clay-colored Sparrows was observed (in 2012) just outside a block in Franklin County in a shrubby grassland along the Iowa River (Ehresman pers. obs.). Counties with confirmed nests included Dickinson, Emmet, Clay, Cerro Gordo, Chickasaw, and Fayette. With a probable nest record as far south as Audubon County and multiple possible records as far south as Marion County and as far southeast as Muscatine County, it seems that this northern species is moving its nesting range in a southerly direction. While it was noted by Jackson et al. (1996) that Clay-colored Sparrows had returned to nest in the southern two tiers of Minnesota during the 1980s, the Illinois BBA picked up only one record for this species (from 1986–1991) in one of its northern-most counties (Kleen et al. 2004).

While Clay-colored Sparrow is an obligate grassland species in the northern Great Plains, its range has expanded east and north, since about 1900, as suitable habitat was created by logging and farming, and more recently as agricultural ground has been converted into CRP grasslands. Certainly, many of the records documented in Iowa grid blocks (especially in several northern Iowa counties) were from CRP fields, especially those that held rows of planted conifers (Ehresman pers. obs.). Knapton (1979) documented that 76% of male Clay-colored Sparrows returned to the same territories in successive years, and if Iowa males of this species show this same trend, the future for this species should be quite secure.

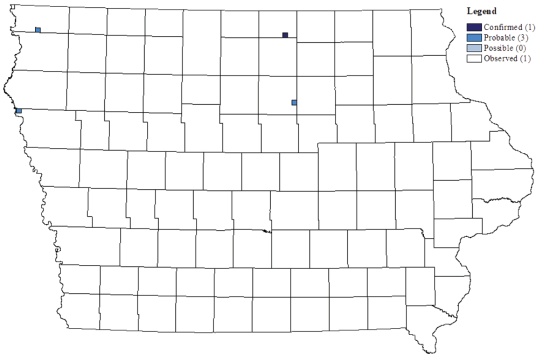
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	1	1
Possible	0	0	0
Probable	2	1	3
Confirmed	1	0	1
Conf & Prob	0.60%	0.30%	0.50%

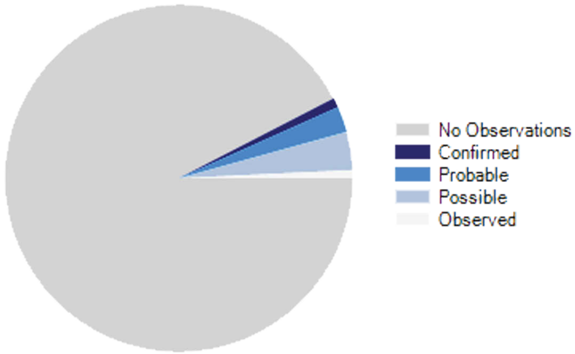
BBA I Results



BBA I



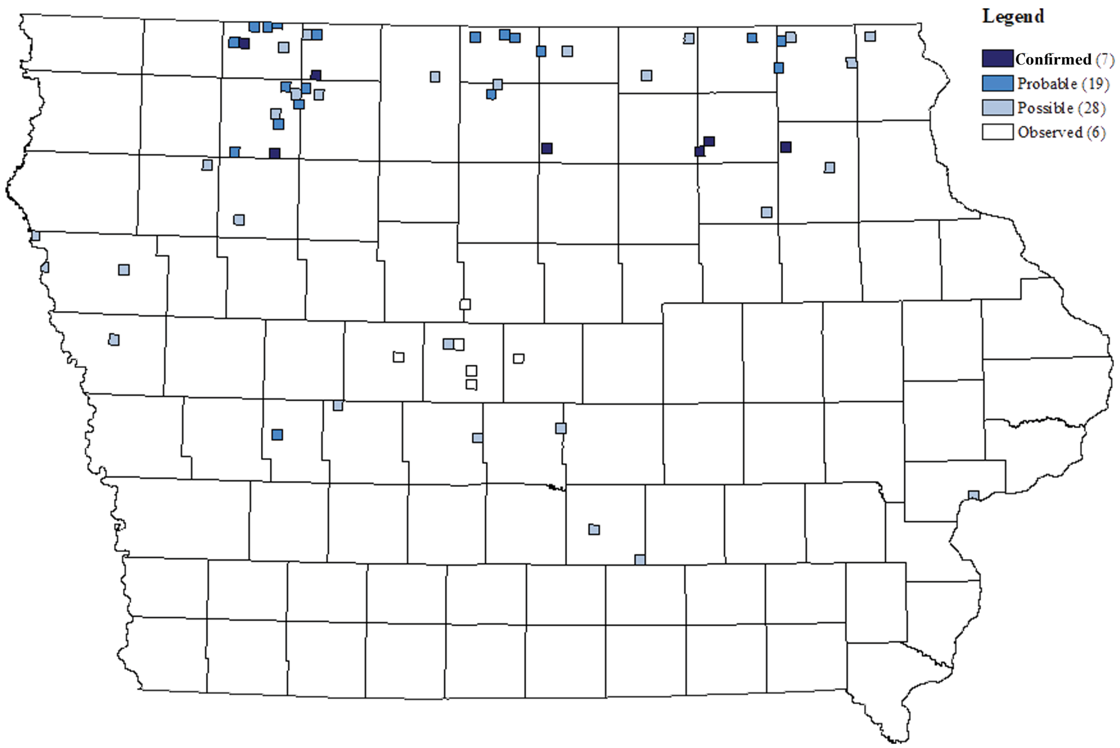
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	2	4	6
Possible	8	20	28
Probable	6	13	19
Confirmed	2	5	7
Conf & Prob	1.50%	4.50%	3.00%

BBA II



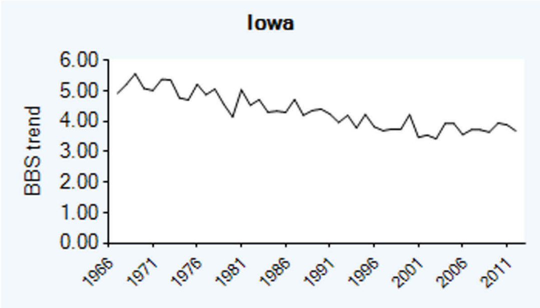
Sponsored by Paul Hertzel

© Stanley Buman

Habitat	Early successional old fields, brushy pastures, and shrubby grassland at woodland edge
Breeding Dates	16 Apr (CO)–2 Sep (CO)
Nest Type	An open cup made of large grass pieces interwoven with finer grasses and lined with fine grasses, rootlets, and hair
Clutch Size	4 eggs typical (range 3–5)
Incubation	11–12 days
Fledging	7–8 days
Status	Common statewide nester
BBS Trend	Stable (trend = −0.6, 95% CI is −1.5, 0.5) [Iowa]

Patterns since BBA I

The Field Sparrow is one of the easiest species to detect, because it is a persistent singer of a distinctive song throughout the breeding season. This sparrow was detected in 469 (54.5%) blocks during BBA I and in 604 (76.4%) blocks during BBA II. While the increased number of records found during the second atlas might suggest that there are more Field Sparrows in Iowa now than there were 20 years ago, the BBS trend for Iowa indicates that its population is stable (Sauer et al. 2012). When comparing percentage of grid blocks versus percentage of priority/habitat blocks in which this species was located, the results were almost identical during both atlases. During BBA I, 55.4% of records came from priority blocks, and during BBA II, 57.5% of records came from habitat blocks. Because this species is so vocal, it is not difficult to locate on private land or public. The big difference between private land blocks and public land blocks is seen in the much higher percentage of confirmations documented.



In both atlases, the number of blocks with nesting confirmation was more than double in the public land blocks, which is probably related to better access to public land than to private land. Another large difference in the data collected between the atlases was related to the number and percentage of nesting confirmations. Field Sparrow was confirmed to nest in 95 (20.3%) blocks during BBA I and 250 (41.4%) blocks in the second atlas. Undoubtedly, BBA II atlassers were more experienced and better at confirming nests during the second atlas than they were during the first. Similarly, atlassers in Missouri confirmed nesting in 33.2% of all BBA blocks (Jacobs and Wilson 1997), and Illinois reported a nest confirmation rate of 34.1% (Kleen et al. 2004). When all Iowa BBA II confirmed and probable records are added together that total comprises 77.2% of all records, a good indication that the Field Sparrow breeds in most blocks where it was documented.

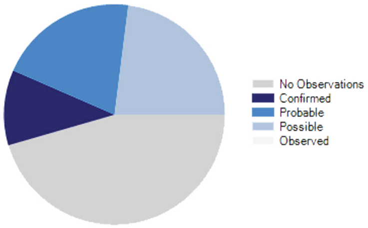
The Field Sparrow distribution is statewide, and that distribution was not significantly different between atlases. Counties lacking records during BBA I included Grundy, Calhoun, Pocahontas, Palo Alto, Emmet, Dickinson, and Osceola (Jackson et al. 1996). Only Grundy and Osceola counties lacked records in blocks during BBA II, and unlike the first atlas, there were multiple public land blocks in Dickinson, Emmet, and Palo Alto counties holding records during the second atlas. Certainly, a lack of records in intensely row-cropped blocks, especially those located within the northwestern and north-central part of the state, is to be expected for a species that requires shrubby grassland habitat.

Maintaining suitable nesting habitat is key to maintaining sustained local breeding populations of Field Sparrows. Since males of this species exhibit high breeding site fidelity, returning to virtually the same territory year after year (Walkinshaw 1978, Carey et al. 2008), it is particularly important to maintain existing prairie and successional habitats. Dechant et al. (1999) suggest management to maintain such habitats, while avoiding practices that completely remove woody vegetation and using burning to prevent the encroachment of woody vegetation, but not total removal. Best et al. (1997) encourage conserving grasslands through the Conservation Reserve Program to help increase local populations. Maintaining larger tracts of appropriate nesting habitat may also reduce cowbird parasitism of nests, especially in a state like Iowa where Crooks and Hendrickson (1953) found 80% of all Field Sparrow nests were parasitized.

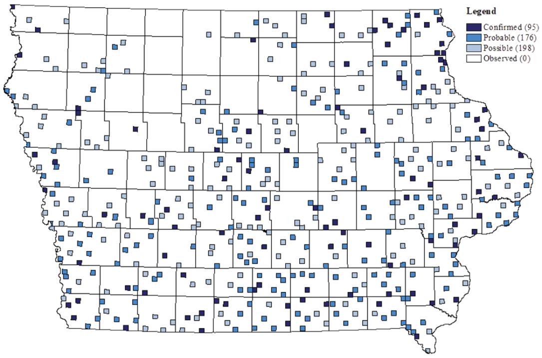
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	112	86	198
Probable	67	109	176
Confirmed	30	65	95
Conf & Prob	18.60%	43.60%	31.50%

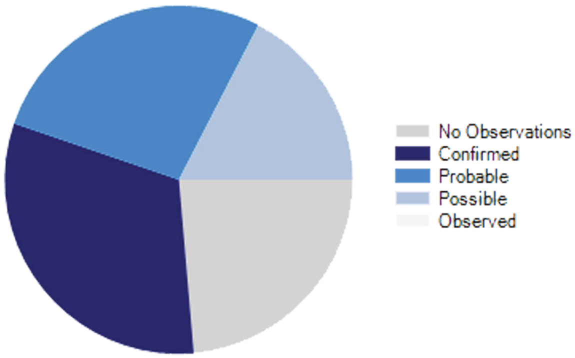
BBA I Results



BBA I



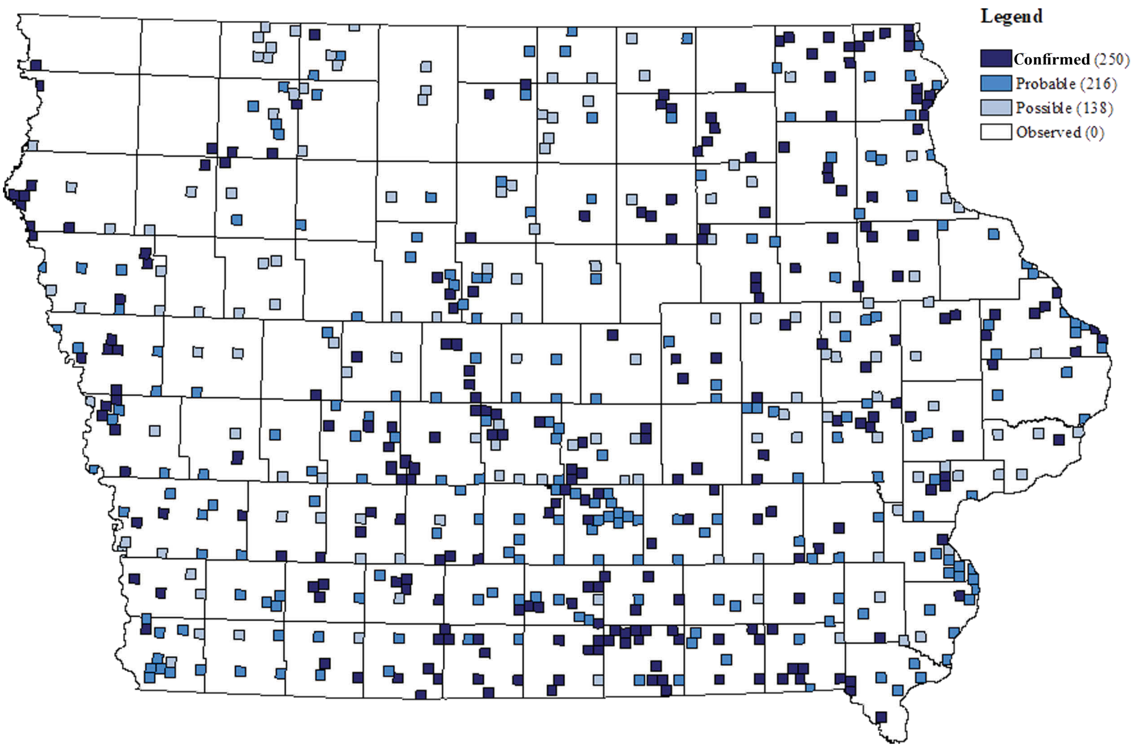
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	82	56	138
Probable	97	119	216
Confirmed	78	172	250
Conf & Prob	33.50%	72.90%	54.10%

BBA II



In Honor of Phil Unitt (Kirsten Winter)

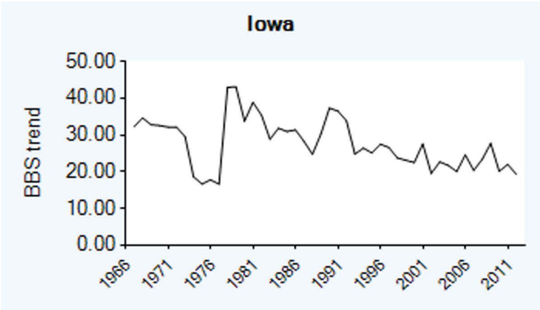
Vesper Sparrow *Pooecetes gramineus*

© Wolf Oesterreich

Habitat	Open grassy habitats with short, sparse, and patchy herbaceous vegetation; including old fields, roadsides, pastures, and edge habitats, such as fence rows and grassy waterways
Breeding Dates	27 Apr (PR)–27 Aug (CO)
Nest Type	Ground nest a woven shallow bowl of coarse and fine dry grasses, forbs, and sedges lined with fine grasses, hair, and rootlets
Clutch Size	4 eggs (range 2–6)
Incubation	12–13 days
Fledging	10 days (range 7–14)
Status	Common statewide nester
BBS Trend	Stable (trend = −0.2, 95% CI is −1.7, 1.4) [Iowa]

Patterns since BBA I

The Vesper Sparrow is a generalist species of open country and appears to be the one bird species that is consistently found breeding in the most intensely farmed landscapes in Iowa. This little brown bird was detected in 529 (61.4%) blocks during BBA I and in 690 (87.2%) blocks during BBA II. While the increased number of records found during the second atlas might seem to indicate that there are more Vesper Sparrows in Iowa now than there were 20 years ago, the BBS trend for Iowa indicates that its population is stable (Sauer et al. 2012). When comparing percentage of grid blocks versus percentage of priority/habitat blocks in which this species was located, the results were almost identical during both atlases. During BBA I, 49% of records came from priority blocks, and 51% of records came from grid blocks. During BBA II, 48.6% of records came from habitat blocks, and 51.4% of records came from grid blocks. Basically, this common species was located equally well on both privately owned and public land, with a few more records found on private land. One of the largest differences between the data of the two atlases is the number of confirmed nesting records documented during the second atlas. During BBA I, there were 45 (8.5%) records of confirmed nesting, and during BBA II, confirmed nesting was documented in 255 (37%) of all blocks. Vesper sparrow was confirmed to nest in more than five times as many blocks during BBA II. Further, during BBA I, probable and confirmed records together made up 46.7% of all records for this species. During BBA II, probable and confirmed records for this species made up 71.3% of all records. These data suggest that BBA II atlassers were more experienced and better at confirming nests during the second atlas than they were during the first. This high percentage of nesting confirmation also is a good indication that the Vesper Sparrow breeds in most blocks where it was documented.



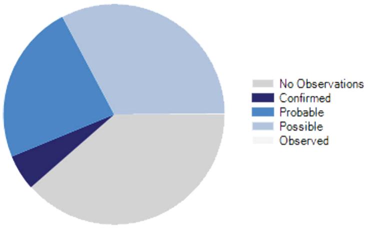
Iowa Vesper Sparrow distribution is statewide, and that distribution was not significantly different between atlases. Records were found in blocks in all counties during both atlases. While this sparrow's primary nesting range is much of the northern two-thirds of this country, BBA records from Missouri show this species regularly nesting as far south as the Missouri River (Jacobs and Wilson 1997), and Illinois BBA records indicate nesting into the third tier of counties north from the southern edge of that state (Kleen et al. 2004). Block records were most sparce from southeastern Iowa during both atlases, and Jackson et al. (1996) reported this species slightly more often in the northern two-thirds of the state during BBA I.

Changes in farming practices have been implicated in declines of this species throughout its range (Rising 1987), and breeding success in cultivated and no-tillage row-crop fields and croplands has typically not been sufficient to maintain populations (Stallman and Best 1996). While this sparrow shows no preference for native prairie over nonnative grassland vegetation, Herkert (1994a) found abundance higher, in Illinois, on recently burned (first growing season post-fire) grasslands than on later post-fire plots, and he found that abundance within burned prairie/grassland was not affected by the size of field. Maintaining suitable nesting habitat is key to sustaining local breeding populations of Vesper Sparrows, and this species will benefit from grassland easements and other management programs to preserve and restore grasslands (Jones and Cornely 2002).

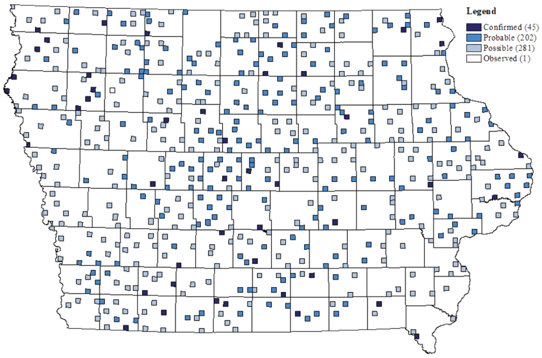
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	1	0	1
Possible	153	128	281
Probable	104	98	202
Confirmed	12	33	45
Conf & Prob	22.20%	32.80%	28.70%

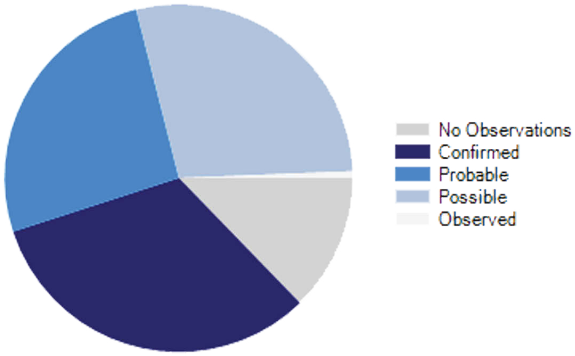
BBA I Results



BBA I



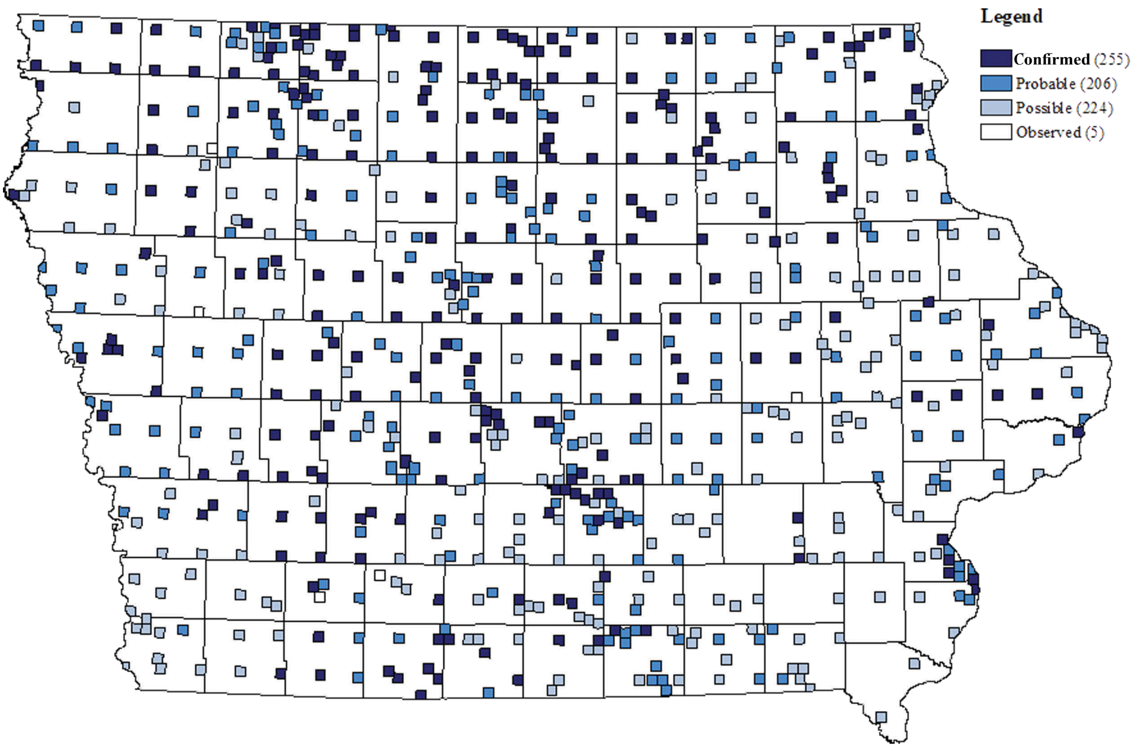
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	3	2	5
Possible	101	123	224
Probable	107	99	206
Confirmed	139	117	256
Conf & Prob	47.10%	54.10%	53.70%

BBA II

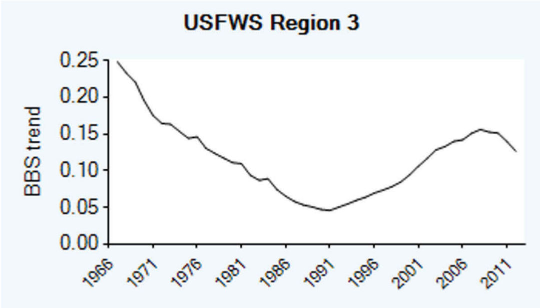


Sponsored by Karen Viste-Sparkman

© Mark Brown

Habitat	Large grasslands consisting of tall, dense grass, a well-developed litter layer, standing dead vegetation, and sparse or no woody vegetation
Breeding Dates	4 May (PR)–23 Aug (PR)
Nest Type	Cup shaped nest, placed on or near the ground and constructed of grasses and lined with fine grasses
Clutch Size	2–5 eggs
Incubation	10–12 days
Fledging	9–10 days
Status	Rare breeding bird in grasslands
BBS Trend	Increasing (trend = 7.4, 95% CI is 5.2, 11.2) [Central US]

Patterns since BBA I



Henslow's Sparrows prefer large grassland habitats with tall, dense vegetation and thick litter, with little or no woody vegetation present (Wiens 1969, Herkert et al. 2002). This is a declining habitat type throughout this sparrow's range in the Midwest, and activities contributing to breeding habitat loss for Henslow's Sparrow include increasing woody vegetation due to fire suppression, conversion of pasture and hayfields to row crops, earlier and more frequent cutting of hayfields, wetland drainage, and urbanization (Pruitt 1996). While the number of records from BBA I (seven [0.8%]) increased dramatically during BBA II for this species (222 [28.1%]), the explanation for this increase may be best explained by the increase in planted CRP grassland acres. Since 1990, local population increases appear to be associated with the creation of undisturbed CRP grassland habitat (Herkert et al. 2002). Unfortunately, these local increases were not sufficient to offset overall population declines (Sauer et al. 2001). While Iowa lacks enough Henslow's Sparrow BBS records to indicate a trend (Sauer et al. 2012), continued overall population decline is estimated to be 7.5% annually from 1966–2000, which is the steepest decline for any species of grassland bird in North America (Sauer et al. 2001).

There were no confirmed nesting records during BBA I, and there were 16 (7.2%) confirmed records during BBA II. Probable records made up 38.3% of all BBA II records, and 54.5% of all records were recorded as possible. The main record of nest confirmation was adults attending young, with few nests recorded, probably because this secretive sparrow nests on or close to the ground in thick vegetation. During BBA II, habitat blocks contributed 64.9% of all records, while grid blocks contributed 35.1%. Fourteen of the sixteen confirmed nesting records also came from habitat blocks. Habitat created by prairie restoration efforts on public land blocks and CRP grassland plantings on private land blocks supplied the best habitat in which to document this species. As many as 25 singing Henslow's Sparrows were documented in a block within Lake Sugema Wildlife Management Area in Van Buren County, and at least 35 of these singing sparrows were documented in a 1.5 mile stretch within a block in Kellerton BCA in Ringgold County (Bruce Ehresman pers. obs.).

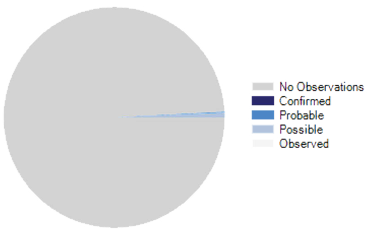
Distribution of Henslow's Sparrow changed dramatically from BBA I to BBA II. During BBA I, the only record from the northern two-thirds of the state came from Fayette County, and the other records came from extreme southern Iowa from Taylor, Ringgold, Decatur, Davis, and Wapello counties. BBA II records came from throughout the eastern two-thirds of Iowa, with most records from southeastern and south-central counties. Of note are the apparent growing populations in blocks on public lands in north-central Iowa. As an example of the abundance of this species in particular areas, in the summer of 2015, Ehresman (pers. obs.) documented with a GPS unit, 309 Henslow's Sparrow territories in the Kellerton BCA, and Ehresman and Bill Ohde documented 180 Henslow's Sparrow territories in Lake Sugema-Lacey-Keosauqua BCA in Van Buren County.

To create/maintain Henslow's Sparrow habitat, Herkert et al. (1993, 1996) recommended that grassland restoration areas should be at least 125 acres and preferably larger than 250 acres in size. The goal is to provide dense and moderately tall (>12 in.) grassy vegetation (Smith 1992) and to remove woody vegetation when it becomes taller than the fully developed herbaceous vegetation (Smith 1992, Herkert et al. 1993).

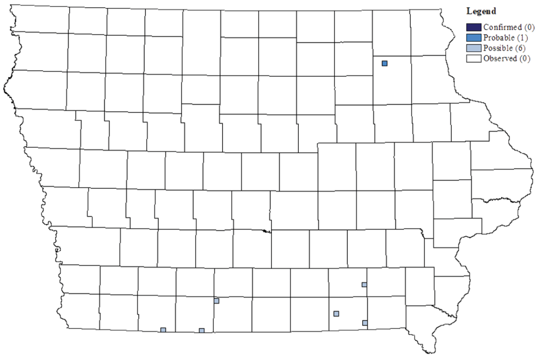
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	5	1	6
Probable	0	1	1
Confirmed	0	0	0
Conf & Prob	0.00%	0.30%	0.10%

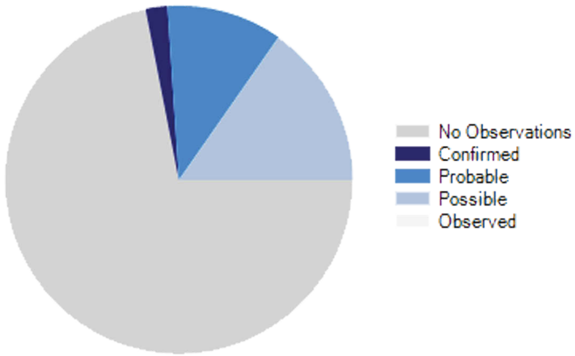
BBA I Results



BBA I



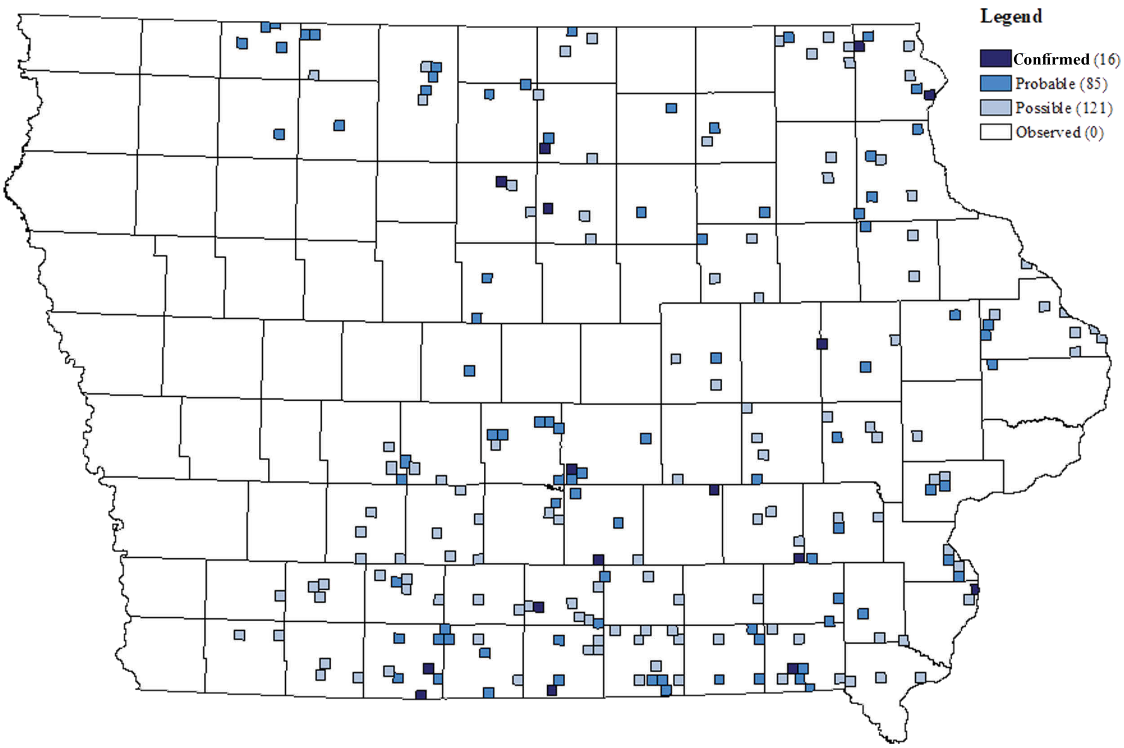
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	53	69	122
Probable	24	61	85
Confirmed	2	14	16
Conf & Prob	5.00%	18.80%	11.70%

BBA II



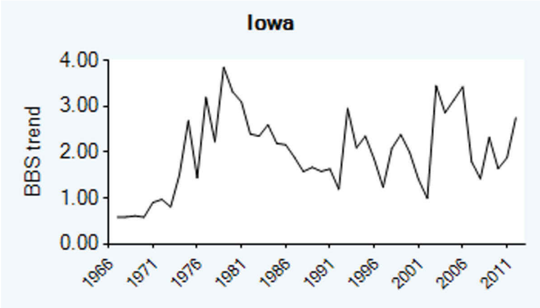
Sponsored by Stephen J. Dinsmore

© Reid Allen

Habitat	Grassy fields with some herbaceous plants, lightly grazed pastures, and roadsides
Breeding Dates	2 May (PR)–15 Aug (CO)
Nest Type	Nest consists of an exterior form of coarse grasses with an internal cup of woven fine grasses; typically on ground in tall vegetation
Clutch Size	4 eggs (range 3–6)
Incubation	10–13 days
Fledging	8–11 days
Status	Common breeding bird in northern Iowa
BBS Trend	Increasing (trend = 2.9, 95% CI is 0.5, 5.4) [Iowa]

Patterns since BBA I

The Savannah Sparrow is a grassland bird of northern United States and Canada. This secretive sparrow was detected in 240 (27.9%) blocks during BBA I and in 328 (41.5%) blocks during BBA II. There was an increase in number of records found during the second atlas, and the BBS trend for Iowa indicates that its Savannah Sparrow population is increasing at an annual average increase of 2.9% (Sauer et al. 2012). When comparing percentages of priority/habitat blocks versus grid blocks in which this species was located, the results were similar during both atlases. During BBA I, 47.5% of records came from priority blocks, and 52.5% of records came from grid blocks. During BBA II, 50.6% of records came from habitat blocks, and 49.4% of records came from grid blocks. It appears that this sparrow was located almost equally in priority/habitat blocks and grid blocks in both atlases. This finding may reflect this sparrow's preference for grazed pasture habitat, which is much more prevalent on private land than in public land blocks (Ehresman pers. obs.). Perhaps especially because this is such a secretive species and its nests are well hidden at the base of clumps of tall vegetation, low nesting confirmation rates were experienced during both atlas periods.



During BBA I, there were 26 (10.8%) records of confirmed nesting, and during BBA II, confirmed nesting was documented in only 23 (7%) blocks. Further, during BBA I, probable and confirmed records together made up just 41.7% of all records for this species, and during BBA II, probable and confirmed records for this species made up only 37.5% of all records. The category that held the most records during both atlas periods was possible nesting, with 57.5% of the records during BBA I and 61.3% of the records during BBA II. Data collected from Illinois BBA showed quite different results to that from Iowa, with combined probable and confirmed Savannah Sparrow records making up 67.4% of that state's data, while 32.6% of that state's records were listed as possible (Kleen et al. 2004).

While BBA II data indicate that Iowa Savannah Sparrow distribution is nearly statewide, BBA I data indicated that most of these data came from the northeastern and east-central Iowa counties (Jackson et al. 1996). There were 22 (chiefly southern) counties with no records of Savannah Sparrows during BBA I. The main change in distribution for this sparrow was an increase in number of records in southeastern and south-central Iowa during BBA II, with nesting confirmed in Louisa and Jefferson counties. Loess Hills counties of Harrison, Pottawattamie, Mills, and Fremont reported no Savannah Sparrow records in blocks during either atlas period.

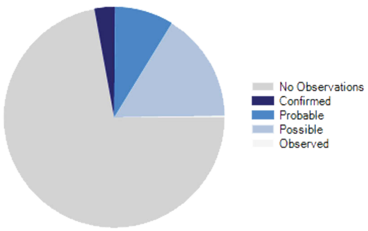
Savannah Sparrows inhabit a wide variety of grassland habitats and avoid treed areas (Wheelwright and Rising 2008). Wiens (1973) found that in Wisconsin, territories established early in the nesting season were comprised of significantly greater grass cover, increased litter, higher vegetation density, and lower forb density than late-season territories. A study by Davis (2004) found that the presence or absence of breeding Savannah Sparrows in different-sized tallgrass pastures varied among years, which suggests that this species is relatively area-insensitive; while Watts (1996) discovered that landscape factors at a scale larger than field size may determine the abundance of breeding birds in a given area. Early mowing of grassland habitats is especially detrimental to grassland birds, and mowing has been implicated as a major cause of population declines in Savannah Sparrows (Dale et al. 1997).

Savannah Sparrow

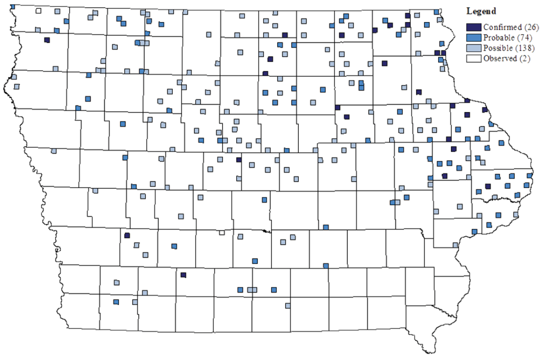
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	1	1	2
Possible	74	64	138
Probable	38	36	74
Confirmed	13	13	26
Conf & Prob	9.80%	12.30%	11.60%

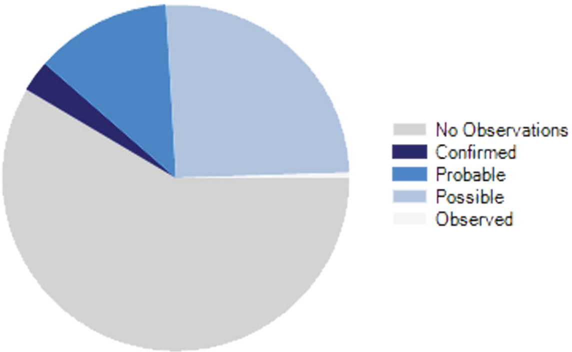
BBA I Results



BBA I



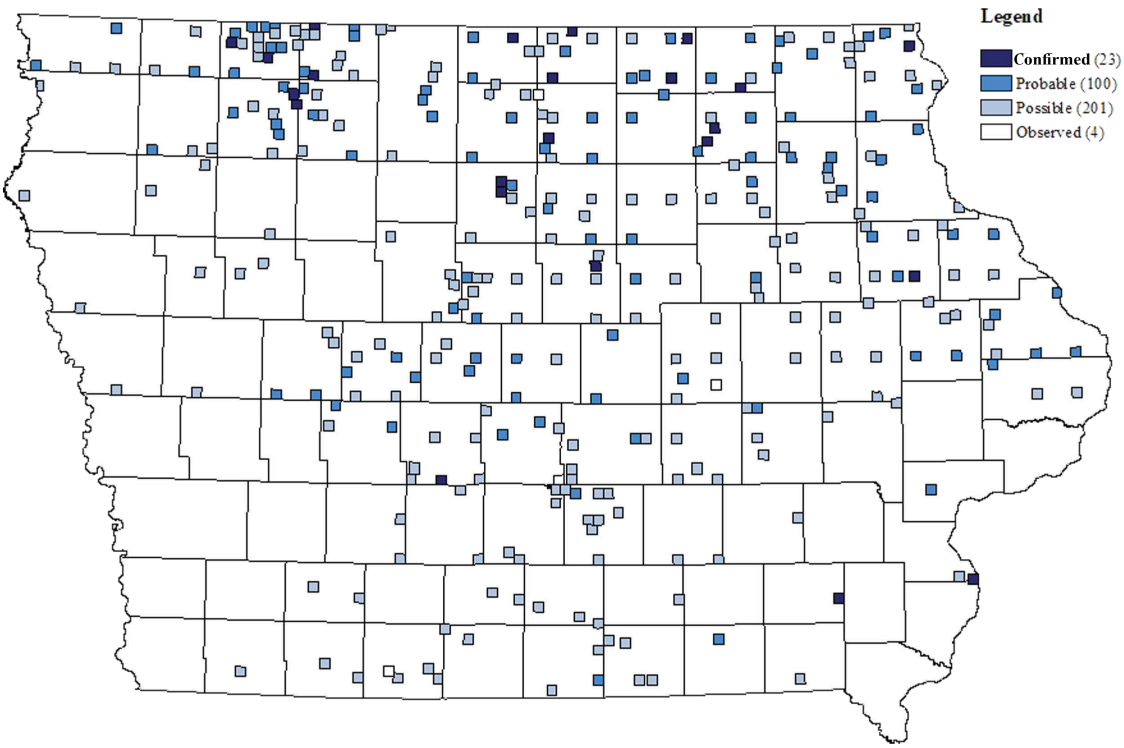
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	1	3	4
Possible	101	100	201
Probable	53	47	100
Confirmed	7	16	23
Conf & Prob	11.50%	15.80%	14.30%

BBA II



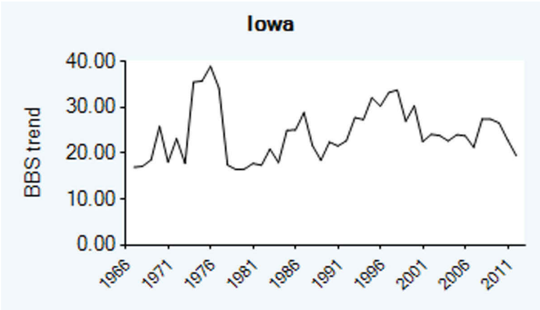
Song Sparrow *Melospiza melodia*

© Wolf Oesterreich

Habitat	Wide range of forest edge, shrub, and riparian habitats
Breeding Dates	28 Mar (CO)–4 Sep (CO)
Nest Type	Open cup of dried grasses, plant stems, leaves, and bark, lined with finer grass and hair
Clutch Size	3–5 eggs
Incubation	12–15 days
Fledging	10 days (range 8–12 days)
Status	Common, widespread nesting species
BBS Trend	Increasing (trend = 0.9, 95% CI is 0.1, 1.6) [Iowa]

Patterns since BBA I

The Song Sparrow is one of Iowa's, as well as North America's, most common and widely distributed breeding birds. It is a most plentiful summer resident of a large variety of shrubby habitats. There were only four other Iowa nesting species for which more atlas records were documented, and Iowa BBS records show this sparrow increasing at an average annual rate of 0.9% (Sauer et al. 2012). Song Sparrow was documented to occur in 659 (76.5%) of BBA I blocks, while it occurred in 790 (99.9%) blocks during the second atlas. During the second atlas only one block lacked Song Sparrow records. Results were similar for both atlases, regarding where this species was found, with nearly identical number of records in priority blocks and in grid blocks during both atlases These results indicate that there was no difference whether a block held public land or not, and that this generalist species does indeed occur in blocks with minimal bird habitat. Further evidence that this sparrow is abundant and widespread is reflected by the fact that confirmed nesting was documented for it in 68.2% of all BBA II blocks. Adding the number of blocks with probable nesting to this, Song Sparrows were found as confirmed or probable nesters in 96.1% of all blocks. Essentially it is difficult to find any locale in Iowa where this species does not nest, and shrubs in Iowa roadsides (in virtually every block) offered the easiest location in which to document nests (Ehresman pers. obs.). The number and percentage of confirmed nests documented in Iowa was significantly different between BBA I to BBA II, with 183 (27.8%) in BBA I and 539 (68.2%) in BBA II. The increase in nest documentation may be most related to having more experienced personnel involved during the second atlas, who focused more effort on confirming nesting for both this species and many others.



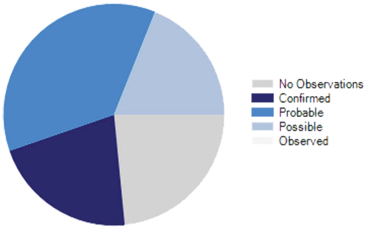
While data from both atlases indicates a statewide distribution for this species, there was somewhat less documentation of this species in the western third of the state during BBA I (Jackson et al. 1996). Statewide distribution of this species was also documented in Illinois, where it was in 88% of all blocks sampled (Kleen et al. 2004). Like Iowa, the Song Sparrow was in every county in Illinois. During the second Iowa atlas, no other native sparrow was found in more blocks, indicating that this adaptive bird has saturated almost every niche available where it can breed.

It appears that the Song Sparrow was a common resident throughout all areas except southeastern Iowa, by the early 1900s (Anderson 1907), and human activities have created more places for this species to nest since that time. The clearing of forests, the allowance of woody growth in pastures, and the planting of shrubs and trees along highways and freeways, are all human-related activities that create good nesting habitat for Song Sparrows (Arcese et al. 2002). Considering this sparrow's close association with human-modified habitats, its future seems most secure in this most highly human-altered state.

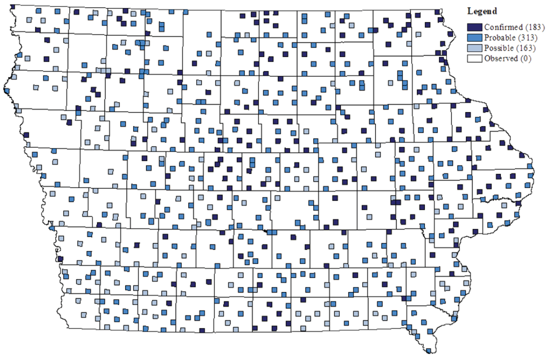
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	106	57	163
Probable	140	173	313
Confirmed	89	94	183
Conf & Prob	43.90%	66.90%	57.60%

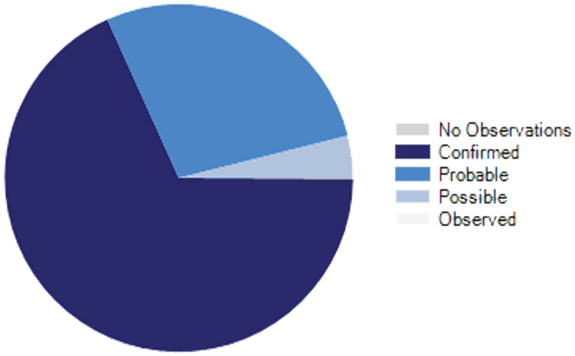
BBA I Results



BBA I



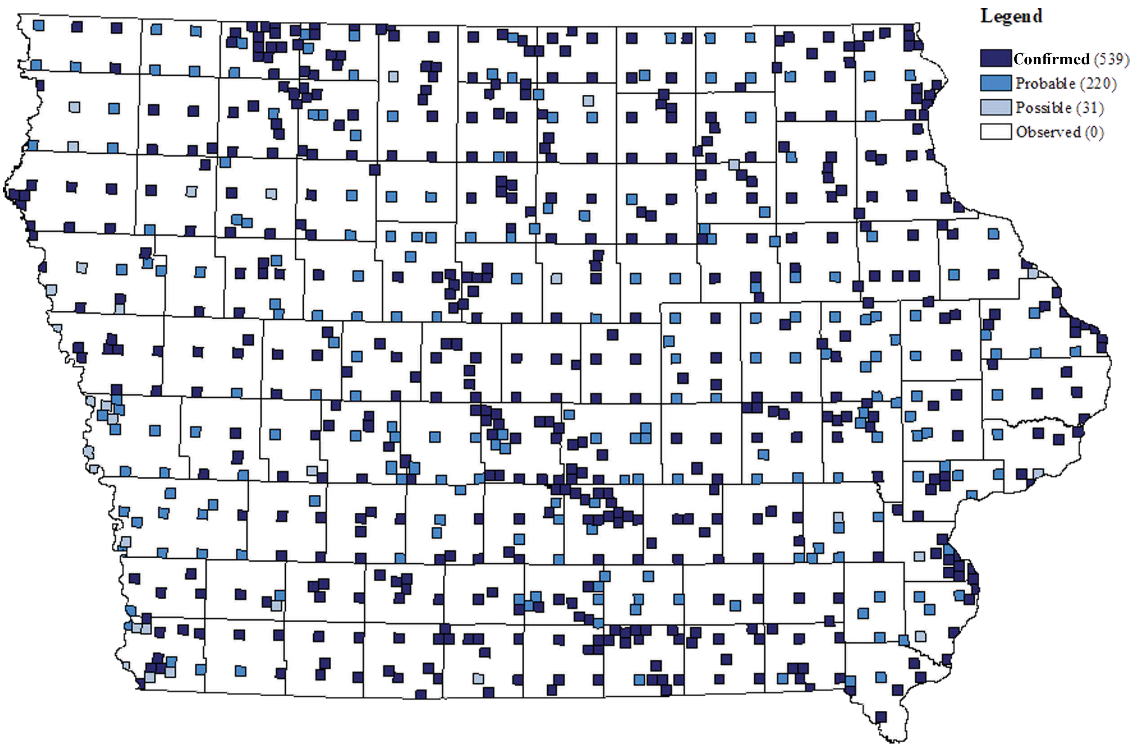
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	15	17	32
Probable	140	82	222
Confirmed	243	297	540
Conf & Prob	73.40%	95.00%	88.50%

BBA II



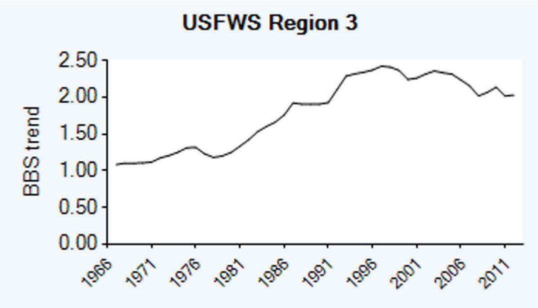
In Honor of Carol Winter (Kirsten Winter)

© Mark Brown

Habitat	Emergent vegetation around wetlands; especially marshes and sedge meadows
Breeding Dates	23 Apr (PR)–20 Aug (PR)
Nest Type	Bulky cup nest made of coarse grasses, cattails, sedges, and other plant material; usually in cattails or shrub slightly above water or ground
Clutch Size	4 eggs (range 3–6)
Incubation	12–15 days
Fledging	9–11 days
Status	Uncommon breeding bird in northern Iowa
BBS Trend	Increasing (trend = 2.9, 95% CI is 1.2, 4.8) [Central US]

Patterns since BBA I

The Swamp Sparrow is tied most closely to wetland cattail marshes and sedge meadows in northern Iowa. While there is not adequate BBS data for this species to detect a trend in Iowa (Sauer et al. 2012), there was a substantial increase in BBA records when comparing results of Iowa's two atlases. Detection records more than doubled from 96 (11.1%) blocks during BBA I to 196 (24.8%) blocks during BBA II. During BBA I, 81.3% of records came from priority blocks, while only 18.7% of records were reported for grid blocks. Similarly, BBA II results indicated that 71.9% of records came from habitat blocks and 28.1% of the records were documented in grid blocks. Perhaps more significantly, 76.4% of the total confirmed and probable records from BBA II came from habitat blocks, and 79.3% of confirmed and probable records came from priority blocks during BBA I. In addition, the number of confirmed nests more than quadrupled, going from 12 confirmed during BBA I to 55 during BBA II. The fact that the vast majority of records came from priority/habitat blocks may be attributable to a higher incidence of quality wetland habitat on public properties, and the overall increase in records for Swamp Sparrow may reflect an increase in total wetlands, resulting from increased wetland restoration efforts—especially within the Prairie Pothole Region of Iowa. This secretive sparrow is most often detected while it is singing and is otherwise seldom seen because of the wet dense vegetation it inhabits. Less than seven singing males was the leading code used for 43.2% of BBA I possible records (Jackson et al. 1996) and 34.2% of BBA II possible records.



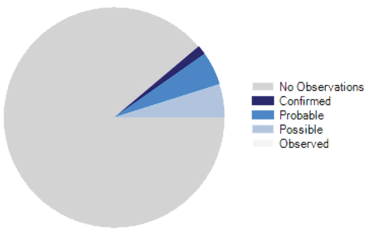
Statewide distribution for Swamp Sparrow did not significantly change since the first atlas, with most records derived from blocks in the northern two-thirds of the state during both atlases. Most confirmed nest records came from the Des Moines Lobe, which is excellent evidence of where the heart of this sparrow's range occurs in Iowa. The furthest south that Swamp Sparrow was confirmed nesting was in two blocks at Chichaqua Bottoms in Polk County, where adults were observed feeding young. An observation of an adult singing in mid-June at Lake of Three Fires Park in Taylor County was the most southwestern record. Probable records documented in four blocks within large public wetlands in Louisa County indicate that this species may be building a nesting population in backwaters areas of the Mississippi and Iowa rivers in southeastern Iowa. After the first atlas, Jackson et al. (1996) suggested that "swampy riparian wetlands, particularly along the Mississippi, may harbor more birds than were reported." While no Swamp Sparrow nesting was confirmed along the Mississippi River during BBA I, confirmation of nesting (during BBA II) along the Mississippi River, within three blocks in Allamakee County and one block in Jackson County, verified that astute observation. The BBA records from Illinois reflect a similar distribution for that state. While most records are from northern-most counties, confirmed nesting of Swamp Sparrows was also documented in at least two southeastern Illinois counties (Kleen et al. 2004).

The future for Swamp Sparrow in Iowa is dependent on maintaining and restoring quality wetlands, and habitat preservation of expansive wetlands on breeding grounds should be the primary management strategy (Erskine 1992, Mowbray 1997). While this species has shown adaptability by nesting in habitats such as farm ponds, fishing lakes, beaver ponds, and reservoirs, more extensive wetlands are critical to maintain long-term population stability (Erskine 1992).

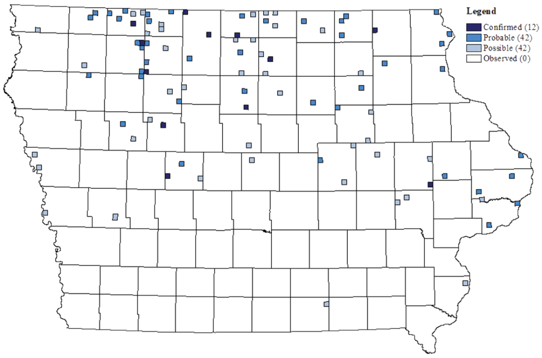
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	10	32	42
Probable	5	37	42
Confirmed	3	9	12
Conf & Prob	1.50%	11.50%	6.30%

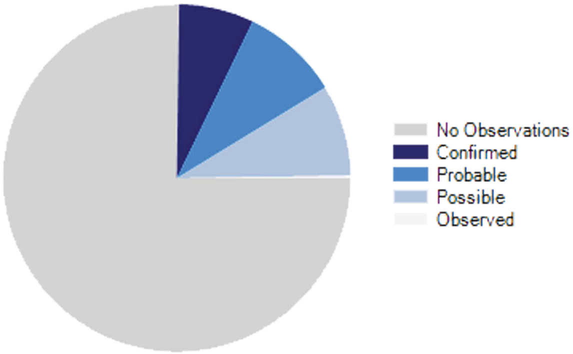
BBA I Results



BBA I



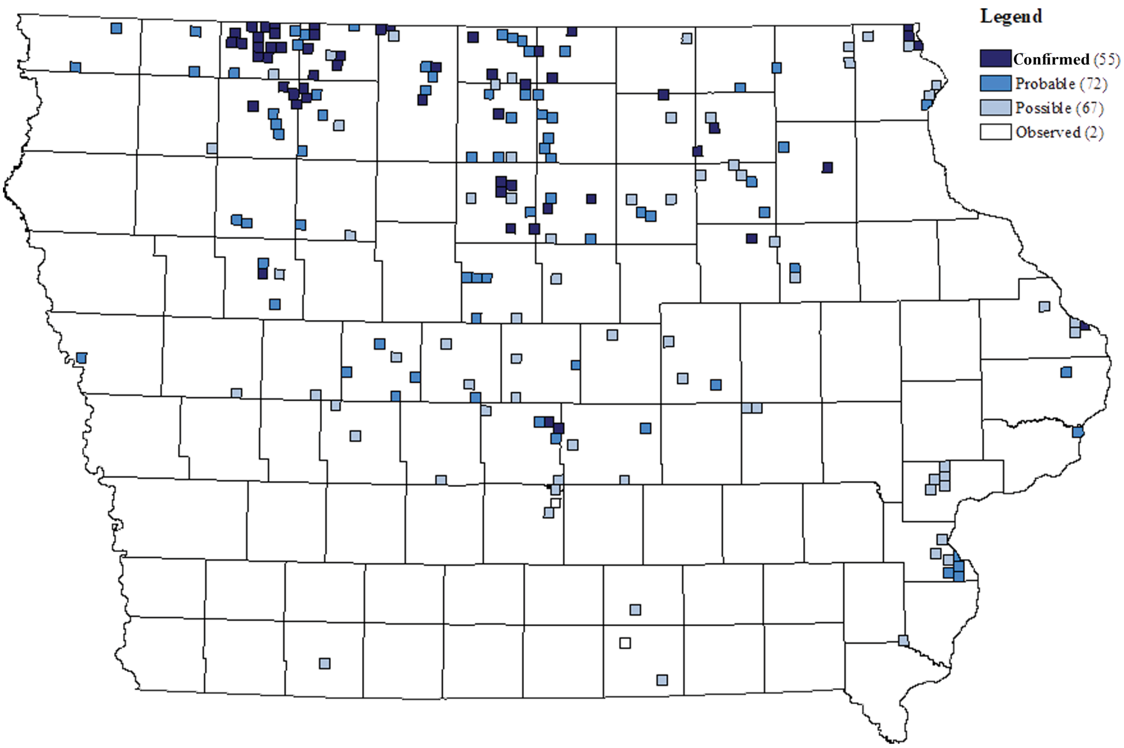
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	2	2
Possible	25	42	67
Probable	21	51	72
Confirmed	9	46	55
Conf & Prob	5.70%	24.30%	14.80%

BBA II

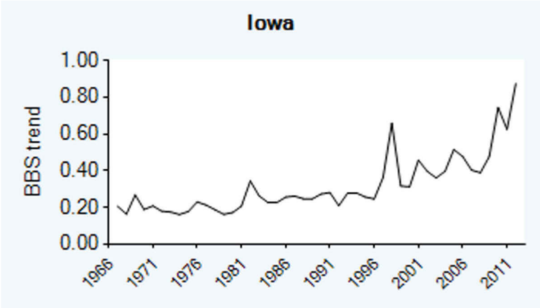


Sponsored by Cathy Nowak

© Doug Harr

Habitat	Shrubby thickets on forest edge, early successional forest, and shrubby openings in larger forests
Breeding Dates	16 Apr (PR)–26 Aug (CO)
Nest Type	Cup shaped, built of leaves, grass, and bark strips lined with fine grass and usually on the ground
Clutch Size	3–5 eggs, typically
Incubation	12–13 days
Fledging	10–11 days
Status	Fairly common breeding bird of forest edge
BBS Trend	Increasing (trend = 2.6, 95% CI is 0.4, 4.7) [Iowa]

Patterns since BBA I



Eastern Towhee is an edge-associated generalist that occupies a variety of moist to dry habitats characterized by dense shrub to small tree cover near ground and a well-developed litter layer (Greenlaw 2015). Just ten years ago, this towhee was listed as an Iowa Species of Greatest Conservation Need (Zohrer 2005). It no longer holds that designation. The BBS analysis, from 1966 to 2012, indicates that 22 states and provinces have shown significant population declines, and Iowa is one of three states, along with Kansas and Louisiana, which have shown significant increases (Sauer et al. 2012). Further, there was a significant increase in the number of records for this species from BBA I to BBA II. For instance, Eastern Towhee was documented to occur in 300 (34.8%) of BBA I blocks, while it occurred in 530 (67%) blocks during the second atlas. In BBA I 67.7% of records were in priority blocks and 32.3% in grid blocks and in BBA II 60.9% of records in habitat blocks and 39.1% in grid blocks. These results may be an indication that the habitat this species prefers is more often found in priority and habitat blocks, along with the fact that public land was more accessible for atlassing than privately owned land in grid blocks. Further evidence that access matters is evidenced by the facts that 80.8% of confirmed nesting during BBA I and 74.4% of confirmed nesting during BBA II was documented in public land blocks.

Iowa confirmed nests documented was significantly different between BBA I to BBA II, with 26 (8.7%) in BBA I and 121 (22.8%) in BBA II. Data from Iowa's first atlas are most comparable to that of Illinois and Missouri. Illinois confirmed nesting was documented in 11.6% of its sampled blocks (Kleen et al. 2004), while Missouri BBA confirmed nesting in just 10.1% of its blocks (Jacobs and Wilson 1997). Probable nesting data (40.9% of all records for Iowa during BBA II and 32.3% of all records for BBA I) are lower than the probable nesting BBA data (49.8%) in Missouri (Jacobs and Wilson 1997), while the probable nesting BBA data (26.2%) for Illinois (Kleen et al. 2004) were lowest of the three states. When probable and confirmed records are combined, they comprise 63.8% of all Iowa BBA II nesting records, indicating a high probability that this species nested in most of the blocks where it was detected.

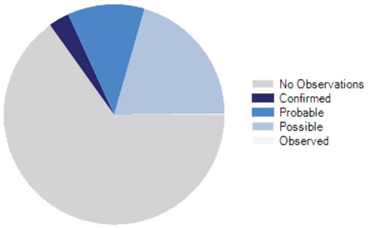
Kent and Dinsmore (1996) stated this towhee was found throughout Iowa, more commonly in wooded areas of eastern and southern Iowa and in wooded river valleys elsewhere. Data from both atlases indicate a statewide distribution for this species with most records in areas of the state where the shrubby woodland habitat exists. Eastern Towhee was found especially in association with major forested river valleys, as it was during BBA I (Jackson et al. 1996). Additionally, there were many more records of higher levels of nest confirmation during BBA II within the upper reaches of the Des Moines River and Little Sioux River, as well as along the Big Sioux River in extreme northwestern Iowa. Records from BBA II indicate a stronger presence of Eastern Towhee in northwestern Iowa and throughout the northern half of the state, in general, than previously documented.

The Eastern Towhee future in Iowa depends on woodland habitat land-use practices. According to Greenlaw (2015), management for this species should seek to maintain habitat diversity, specifically including a range of woody plant communities in early to intermediate successional stages.

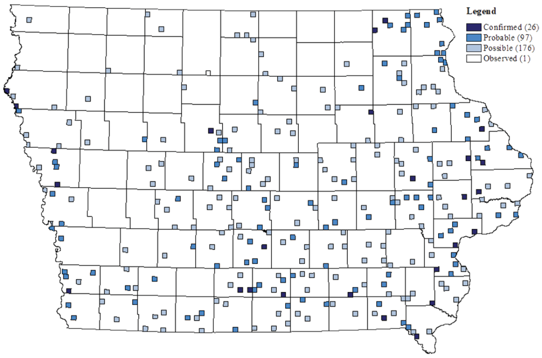
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	1	0	1
Possible	63	113	176
Probable	28	69	97
Confirmed	5	21	26
Conf & Prob	6.30%	22.60%	14.30%

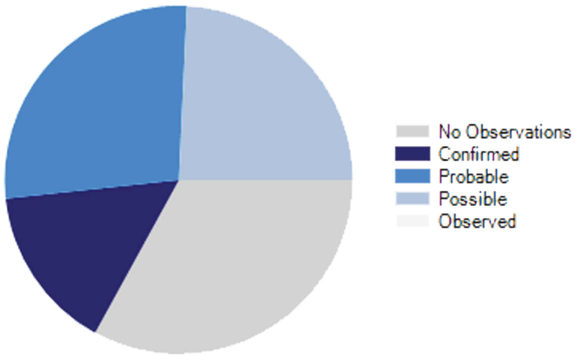
BBA I Results



BBA I



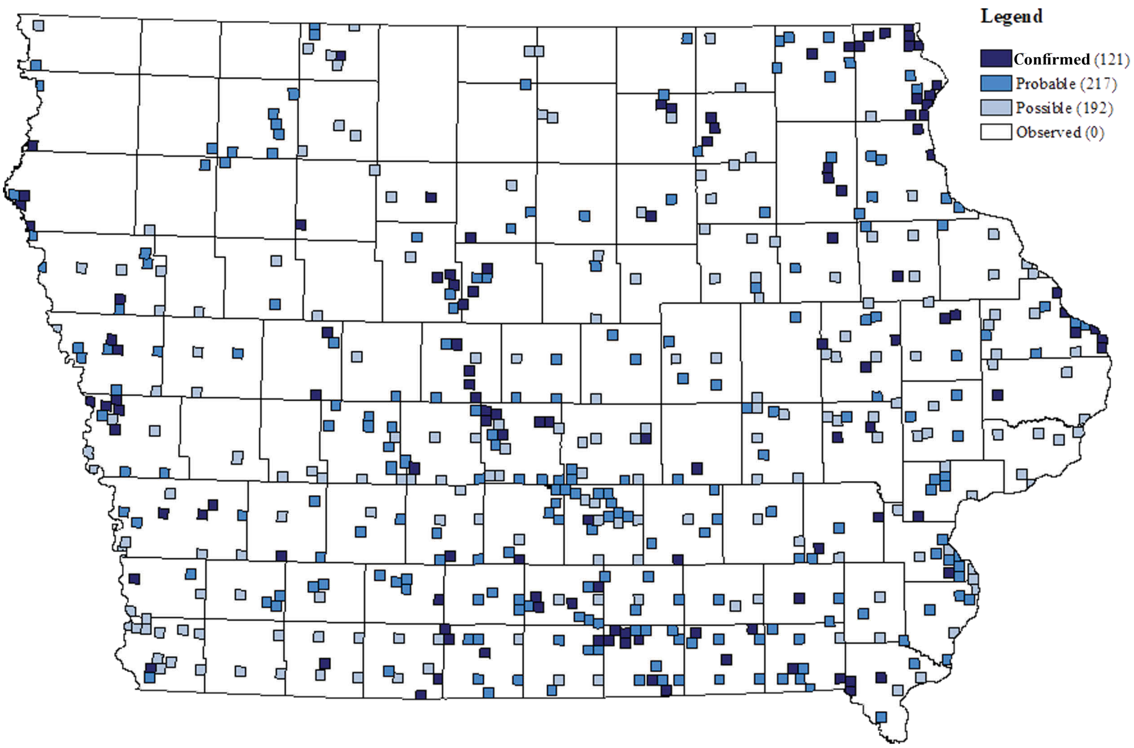
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	106	86	192
Probable	70	147	217
Confirmed	31	90	121
Conf & Prob	19.30%	59.40%	39.30%

BBA II



Sponsored by Carolyn Fischer

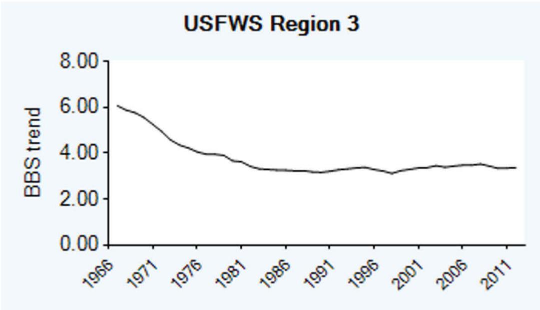
Yellow-breasted Chat *Icteria virens*

© Reid Allen

Habitat	Dense overgrown pastures, shrubby old-fields and savannas, shrubby edges of woodlands, briar patches, and thickets
Breeding Dates	18 Jun (PR)–7 Aug (PR)
Nest Type	Large cup-shaped nest typically in a shrub constructed of dead leaves, dead grass, weeds, and strips of grapevine bark lined with fine grass and fine weed stems
Clutch Size	3–6 eggs, ave. = 4 eggs
Incubation	11 days
Fledging	8–10 days
Status	Regular and rare nesting species
BBS Trend	Stable (trend = 0.2, 95% CI is –0.2, 0.6) [Central US]

Patterns since BBA I

The Yellow-breasted Chat is no longer considered a warbler, and in 2017 it was elevated to its own family, *Icteriidae* (Chesser et al. 2017). This species is a skulking, elusive bird that is more likely to be heard than seen. By late July chats are often silent and secretive (Thompson and Nolan 1973), making them very difficult to locate. Their preferred nesting habitats of overgrown pastures, briar patches, and shrubby edges of woodlands are difficult areas to search for nests, especially because the nests tend to be well hidden on or near the ground in dense vegetation. This species was reported in 29 (3.4%) BBA I blocks and 40 (5.1%) BBA II blocks. The chat is not detected often enough on Iowa's BBS to show a trend. Throughout its U.S. breeding range, the BBS data indicate that populations have undergone an average annual decrease from 1966–2015 of 0.62% (Sauer et al. 2017).



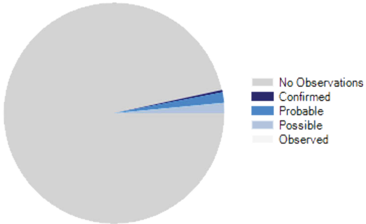
Yellow-breasted Chats can be considered moderately area sensitive, and Annand and Thompson (1997) suggest that habitat management efforts should be directed toward maintaining or creating shrubby patches that are at least 5 ha (12.5 acres) in size. It is likely that smaller shrubby patches will be used by chats if there is additional similar habitat nearby. Kroodsma (1982) found that chats preferred brushy patches with high densities of blackberry vines and tree saplings. Chats' affinity for dense blackberry patches was confirmed in other studies in Missouri (Burhans and Thompson 1999). Like many other Iowa area-sensitive birds, 86% of BBA I records and 93% of BBA II records for Yellow-breasted Chat came from public land blocks, where more suitable habitat exists for them. During the first atlas there were three (10%) records of confirmed nesting, with only one (2.5%) confirmed record during BBA II. Locating chat nests is difficult, and even though chats are more common nesters in Illinois and Missouri, just 9% of records from Missouri BBA were confirmed (Jacobs and Wilson 1997) and only 6% were confirmed in Illinois (Kleen et al. 2004). The highest percentage (75%) of records found during BBA II was in the possible category (mostly singing males), and 20% of records were in the probable category (primarily territorial males). During BBA I, 45% of records were listed as possible, and 45% were listed as probable. Like results of BBA II, most probable records were of territorial males. No chat nests were found during BBA I (Jackson et al. 1996), and the only confirmed record during BBA II was a nest found with young in Wayne County at Medicine Creek Wildlife Area near the Missouri border.

The biggest change in distribution of Yellow-breasted Chat between atlases was an increase in records (from four in BBA I to 15 during BBA II) found in the northern half of the state, and there were more records from western Iowa. During the first atlas, this species was found in 20 counties (Jackson et al. 1996), and during the second atlas it was found in 33 counties. Chats are adapted to exploiting patchy, short-lived habitats, and it has a strong ability to colonize new habitats as they become available (Eckerle and Thompson 2001). Thompson and Nolan (1973) discovered that male chats have extremely low breeding-site fidelity and that they are frequently moving to new breeding sites. The chat is at the edge of its breeding range in Iowa and is not likely to become a common nesting species.

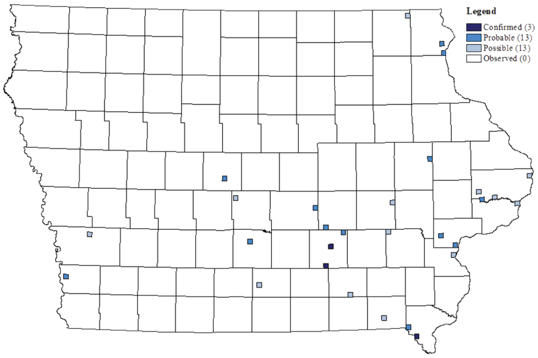
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	1	12	13
Probable	2	11	13
Confirmed	1	2	3
Conf & Prob	0.60%	3.30%	1.90%

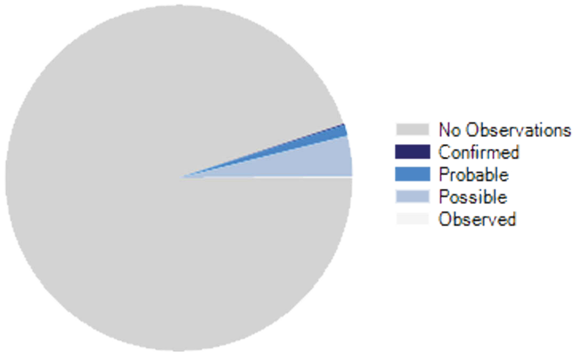
BBA I Results



BBA I



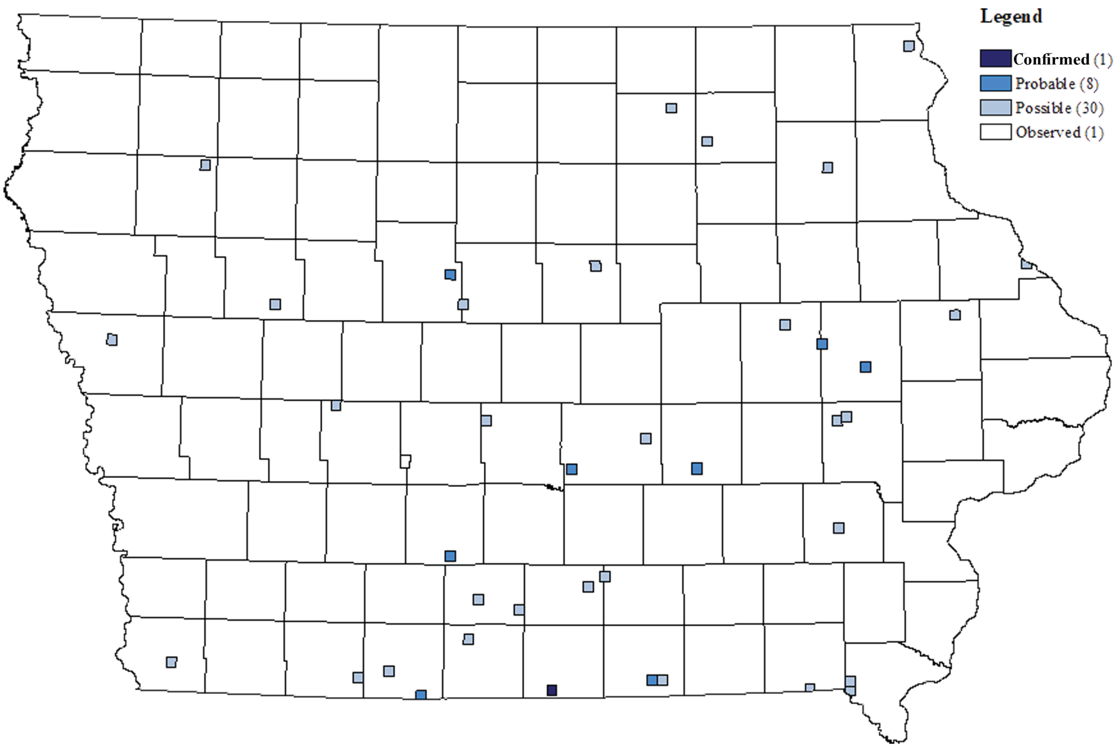
BBA II Results



BBA II (2008–2012) Breeding Evidence

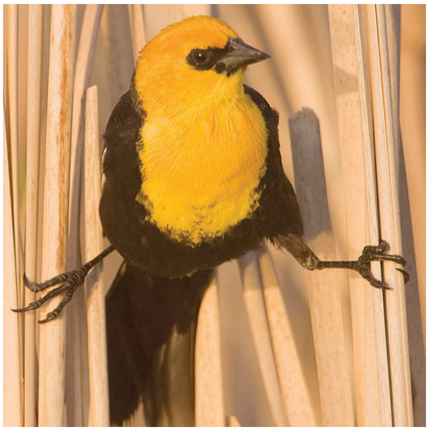
Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	1	1
Possible	3	27	30
Probable	0	8	8
Confirmed	0	1	1
Conf & Prob	0.00%	2.30%	1.00%

BBA II



Sponsored by Drew Ehresman

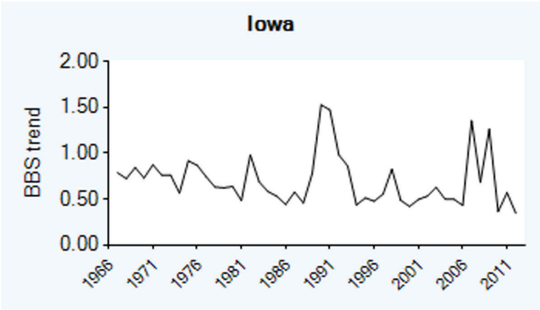
Yellow-headed Blackbird *Xanthocephalus xanthocephalus*



© Stanley Buman

Habitat	Cattail and bulrush marshes and lakes with permanent standing water
Breeding Dates	23 Apr (PR)–19 Aug (CO)
Nest Type	Bulky cup-nest structure of tightly woven cattails, rushes, and grasses, lined with finer grasses and securely attached to emergent vegetation over water
Clutch Size	4 eggs (range 2–5)
Incubation	10–13 days
Fledging	9–12 days
Status	Uncommon summer resident
BBS Trend	Stable (trend = 1.2, 95% CI is –3.7, 5.8) [Iowa]

Patterns since BBA I



The Yellow-headed Blackbird is a colonial nester of deep-water cattail and bulrush marshes, especially within the Des Moines Lobe region of north-central and northwestern Iowa. Its nesting status has changed little over the decades, and Iowa BBS records indicate its population is stable (Sauer et al. 2012). Atlas data reflect that stable trend. This blackbird was detected in 125 (14.5%) of BBA I blocks and in 112 (14.2%) blocks during the second atlas. Both atlases indicated that habitat in public property blocks was of major importance to this species, with 75.2% of BBA I records in priority blocks and 81.3% of BBA II records documented in BBA II blocks. Similarly, priority blocks held 79.7% of BBA I confirmed nesting records and habitat blocks held 93.8% of all confirmed nesting records in the second atlas. The hemi-marsh conditions that many public land marshes are managed for appear to provide excellent nesting habitat for this species. During both atlases, confirmed nesting was the dominant record category, comprising 55.2% of BBA I records and 57.1% of BBA II records. When confirmed and probable records are combined, they made up 85.2 % of all BBA I records and 80.3% of all BBA II records. Only ~18% of records during each atlas were of possible nesting. The high rate of nesting confirmation is undoubtedly related to the fact that this is a colonial nester; plus, this colorful blackbird is easy to see and hear. While the large bulky nests (even though over water) are often easy to spot with binoculars or spotting scopes from shoreline, many atlassers used canoes or kayaks to look for nesting evidence in wetlands, making confirmation of nesting much easier.

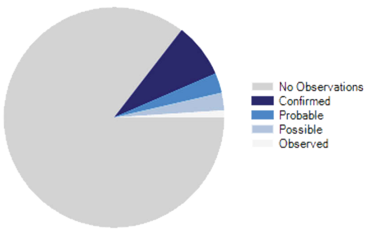
The overall distribution of Yellow-headed Blackbird was similar for both atlases. As was seen during the first atlas, most records came from the Des Moines Lobe region of northern Iowa, where the majority of Iowa's marsh habitat remains. The main difference between the two time periods is that there were far fewer records documented outside the Des Moines Lobe region during the second atlas. Jackson et al. (1996) pointed out that Yellow-headed Blackbird was detected in 57 counties during BBA I. There were many fewer records during BBA II along the Mississippi River, particularly in Allamakee and Jackson counties, where suitable nesting habitat exists for this species. During the second atlas, nesting evidence was gone for Lyon, Sioux, and Cherokee counties in extreme northwestern Iowa, and there were less than half the number of nesting confirmations along the Missouri River. Also missing, during the second atlas, was the probable nesting at Red Rock and Rathbun Reservoirs.

Male Yellow-headed Blackbirds exhibit high nesting area fidelity, often returning to the same marsh and territory in subsequent years (Twedt and Crawford 1995). As connectivity of wetlands is reduced, the migration corridor is compromised and recruitment to the population is likely reduced (Ward 2005). To maintain Yellow-headed Blackbird populations in Iowa, management efforts should focus on conserving existing emergent deep-water wetlands, especially those that hold breeding colonies. At colony sites, managers should maintain water depth at 30 cm or more (Minock and Watson 1983) and promote the growth of significant stands of emergent vegetation, such as cattail and hard-stem bulrush. Of particular importance is the continued restoration of permanent wetlands, especially at a large landscape scale within the Des Moines Lobe region, where most of Iowa's remaining Yellow-headed Blackbird colonies exist.

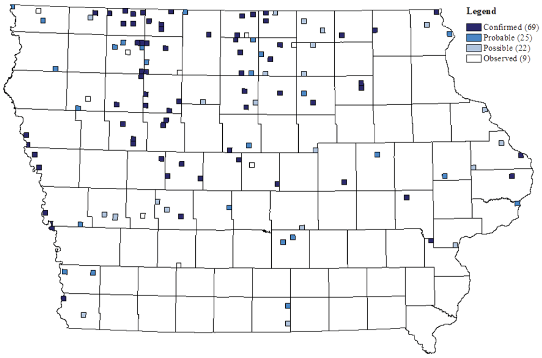
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	4	5	9
Possible	7	15	22
Probable	6	19	25
Confirmed	14	55	69
Conf & Prob	3.80%	18.50%	10.90%

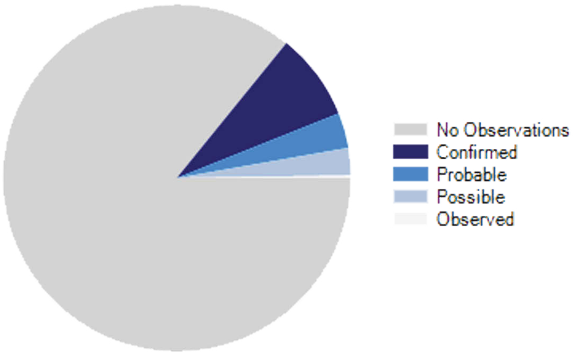
BBA I Results



BBA I



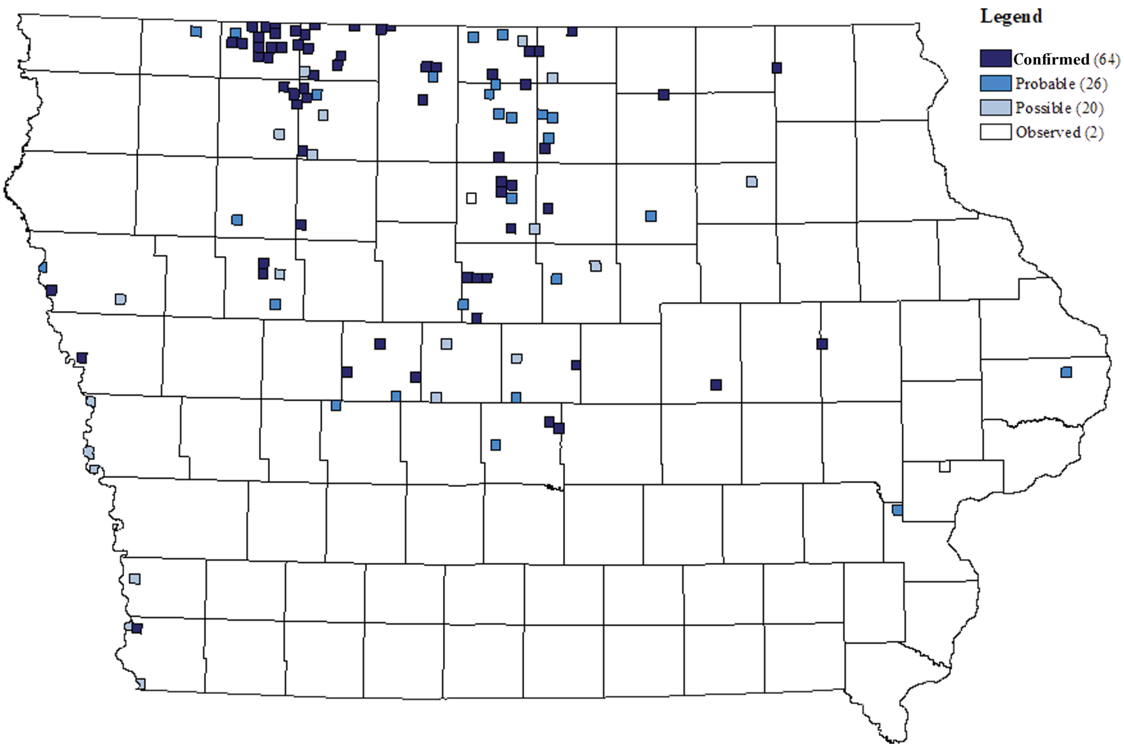
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	1	1	2
Possible	5	15	20
Probable	11	15	26
Confirmed	4	60	64
Conf & Prob	2.90%	18.80%	10.50%

BBA II

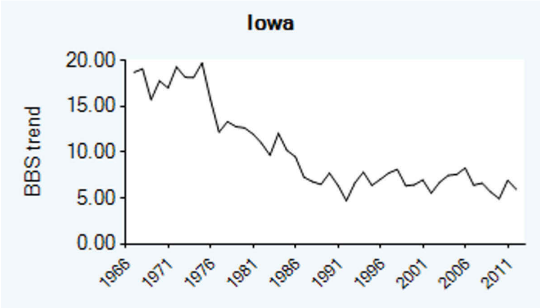


Sponsored by David Voigts

© Paul Roisen

Habitat	Larger fields of mid-successional grasslands with moderate litter layer with little to no woody vegetation
Breeding Dates	6 May (PR)–11 Aug (CO)
Nest Type	Shallow hollow on the ground containing loosely constructed cup of coarse grasses, weed stems, and sedges and thinly lined with finer grasses
Clutch Size	5 eggs (range 3–7)
Incubation	11–13 days
Fledging	10–14 days
Status	Common summer resident
BBS Trend	Decreasing (trend = −2.5, 95% CI is −3.7, −1.2) [Iowa]

Patterns since BBA I



While Bobolink remains a common Iowa nester, the continuing conversion of its grassland habitat to row crop agriculture (throughout its range) remains its largest threat (Martin and Gavin 1995). The amount of Iowa grassland habitat converted to row-crop agriculture from 2006–2011, alone, was about 376,000 acres (Wright and Wimberly 2013). That loss of habitat may be reflected by the Iowa BBS data, which indicate an average annual decline of 2.5% (Sauer et al. 2012). However, Iowa atlas data did not reflect that declining trend. During BBA I, this grassland songbird was found in 443 (51.5%) of all blocks, while it was in 531 (67.1%) of the blocks during BBA II.

While BBA I data showed a more equal distribution between priority (53%) and grid (47%) blocks (Jackson et al. 1996), BBA II data showed a pronounced increase in records within public ground blocks, with records in 54.8% of habitat blocks and 45.2% of grid blocks. Access to public lands, during both atlases, may have mattered more for confirming nests, as well, since 65% of confirmed nests were in priority/habitat blocks. There was an increase in confirmed nests from BBA I, with 47 (10.6%) records more than doubling to 111 (20.9%) confirmed nesting records during BBA II. This significant increase in documentation was likely related to an increase in effort and expertise of atlassers during BBA II. Probable records comprised 47.9% of BBA I records and 49.2% of BBA II records. During the first atlas, 41.5% of all records were listed as possible, while only 28.8% of records during the second atlas were listed as possible. During BBA II, as has been noted for other ground nesting grassland birds, attending young and recently fledged young appear to be the most used codes for confirmed nesting. There were few reports of nests seen, probably because most nests are on the ground in dense vegetation.

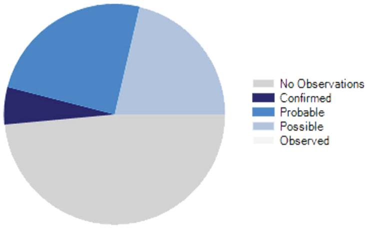
The statewide distribution of Bobolink was similar for both atlases. It was found in every county, except Van Buren and Lee, during BBA I (Jackson et al. 1996). During the second atlas the only two counties lacking records were Ida and Humboldt. There was a significant increase in the total number of records in extreme southern Iowa, and there was a substantial increase of total records in the south-central part of the state—where a high percentage of Iowa's grassland remains. Bobolink records were most lacking in extreme western Iowa and other areas where row crop agriculture is most intense. Bobolinks are known to be moderately area sensitive (Dechant et al. 2003b), and they nest most successfully in grassland patches greater than ten hectares (25 acres) (Sample and Mossman 1997, Knutson et al. 2001). Herkert (1991) reported that the minimum area on which Bobolinks were found was 10–30 ha (25–75 acres) in Illinois tallgrass prairie fragments.

Adult Bobolinks of both sexes show high fidelity to breeding sites, and previous reproductive success appears to be a principal factor influencing fidelity, particularly for females (Gavin and Bollinger 1988). The keys to Bobolink conservation are restoring and managing large grassland landscapes with suitable habitat (native and tame grasslands of moderate height and density, with adequate litter), controlling succession, and protecting nesting habitat from disturbance during the breeding season (Bollinger and Gavin 1992, Dechant et al. 2003b, Renfrew et al. 2015), which is from early May to early August in Iowa.

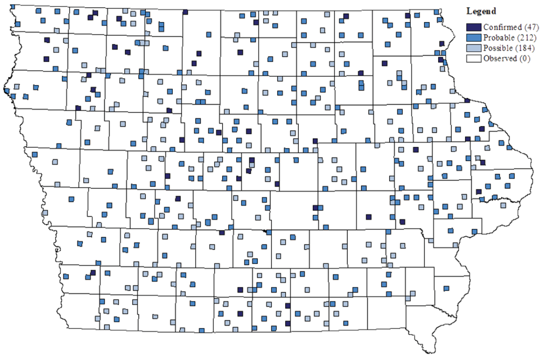
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	98	86	184
Probable	96	116	212
Confirmed	15	32	47
Conf & Prob	21.30%	37.10%	30.10%

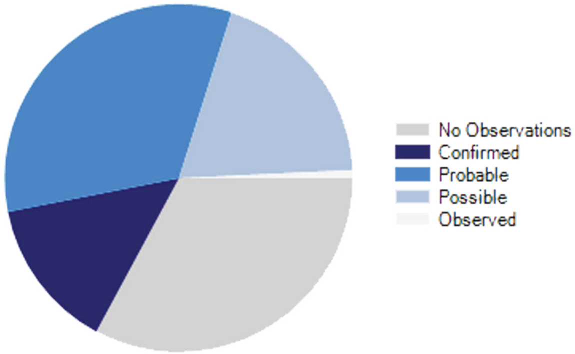
BBA I Results



BBA I



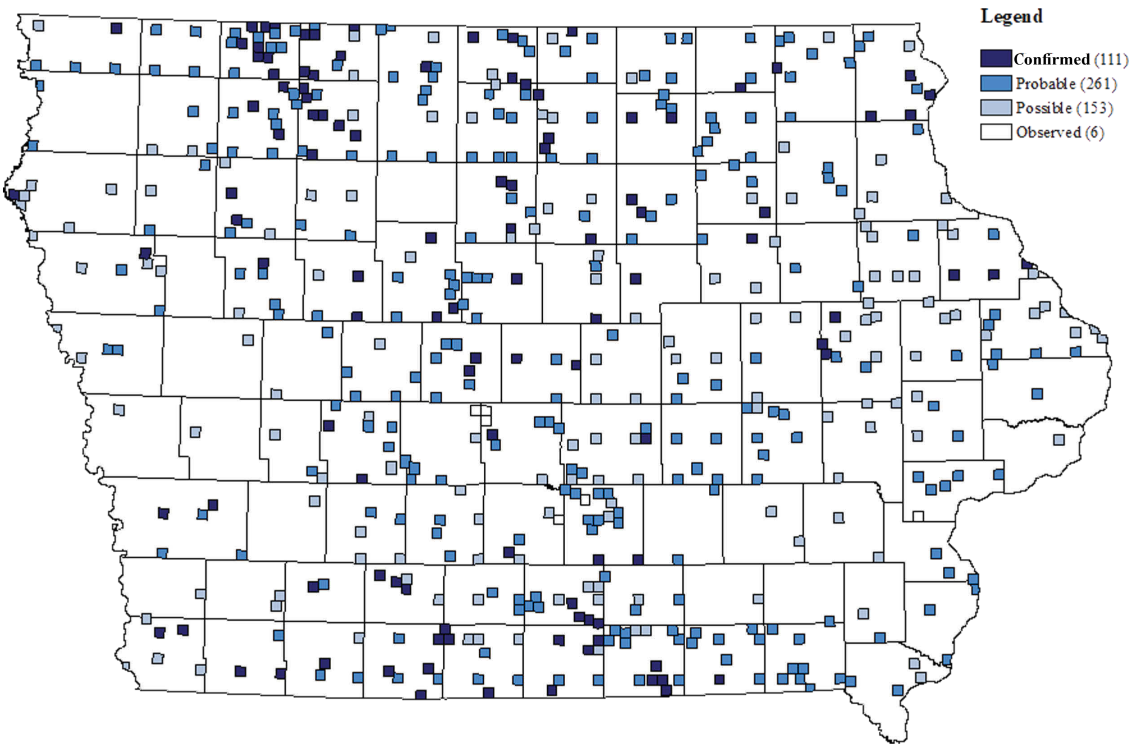
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	2	4	6
Possible	82	71	153
Probable	115	146	261
Confirmed	41	70	111
Conf & Prob	29.90%	54.10%	43.20%

BBA II

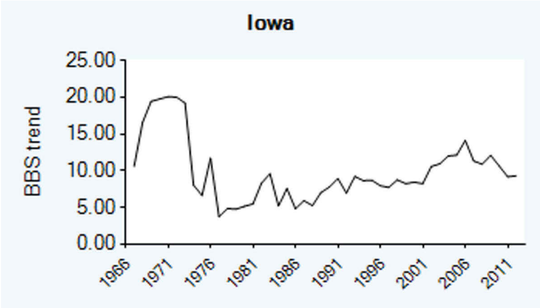


© James Scheib

Habitat	Grasslands, savannas, prairies, meadows, permanent pastures, larger grass waterways
Breeding Dates	30 Mar (PR)–24 Aug (PR)
Nest Type	Cup-shaped nest built on ground and lined with grass; with a partial dome canopy of grass woven into surrounding vegetation and sometimes a runway entrance
Clutch Size	4 eggs (range 2–6)
Incubation	13–14 days
Fledging	10–12 days
Status	Common summer resident in eastern and southern Iowa
BBS Trend	Stable (trend = −0.3, 95% CI is −1.3, 0.7) [Iowa]

Patterns since BBA I

For those of us who grew up on farms in eastern Iowa, no bird is more representative of this rolling grassland country than Eastern Meadowlark. Especially in early spring, it was a delight to be wakened at sunrise each morning by its melodic spirited song. Even though Iowa BBS data indicate a stable population for Eastern Meadowlark (Sauer et al. 2012), this songster continues to be listed as an Iowa Species of Greatest Conservation Need. As has been seen for other species whose population appears to be stable, BBA II data might provide the illusion that this species is increasing. During BBA I, this meadowlark was detected in 441 (51.2%) of blocks, with an increase to 606 (76.6%) of BBA II blocks. Of equal significance, the number of confirmed nesting block records went from 67 (15.2%) during BBA I to 247 (40.8%) of BBA II blocks, more than a three-fold increase. Undoubtedly both increases result mostly from better coverage and increased and more uniform effort from BBA II atlassers.



Regarding where Eastern Meadowlark was found on the Iowa landscape, results were identical for both atlases. Priority and habitat blocks held 54% of the records and grid blocks held the remaining 46%. Perhaps public land blocks provided a bit more of the appropriate habitat for this species. A larger difference between public land and private land blocks is seen in the rate of confirmation, with 57% of BBA I and 61% of BBA II confirmed nesting records coming from public land blocks, which may be related to more access to public land. Probable records comprised 43.3% of BBA I records and 37.1% of BBA II records. Possible nesting records made up 41% of BBA I records and only 22% of records for BBA II.

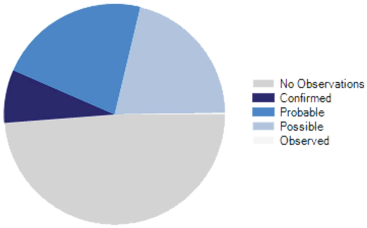
The distribution of Eastern Meadowlark remained much the same for both atlases. Biggest differences were a significant increase in the number of records found in north-central Iowa during the second atlas and no records were found in Osceola and Lyon counties, while they were during BBA I. Eastern and southern Iowa continue to be the stronghold for this species, while extreme northwestern Iowa is lacking any records. According to Jackson et al. (1996), records were documented in 88 counties during BBA I, and records were found in 93 counties during BBA II. The six counties with no Eastern Meadowlark records all are in the northwestern part of the state where intense row crop agriculture dominates. Intensive agriculture is likely a major contributor to population declines of this species (Jaster et al. 2012). A high concentration of records was documented in south-central Iowa, where a high percentage of Iowa's larger blocks of grassland and savanna occurs.

To maintain healthy populations of Eastern Meadowlarks, it is important to maintain and restore large patches of grassland habitat with a variety of successional stages and types (Hull 2003, Jaster et al. 2012). Native prairie and idle fields, like CRP grasslands, can provide excellent nesting habitat. Moderate grazing levels are compatible with this and other grassland bird species (Hull 2003, Sample and Mossman 1997), and a rotational system of grazing is advocated to maintain a diversity of cover height and density (Skinner 1975). Eastern Meadowlarks are very susceptible to human disturbance at the nest, and a female flushed from her nest during incubation invariably abandons the nest (Lanyon 1995, Jaster et al. 2012). Delaying mowing until mid-to-late July minimizes nest destruction (Sample and Mossman 1997).

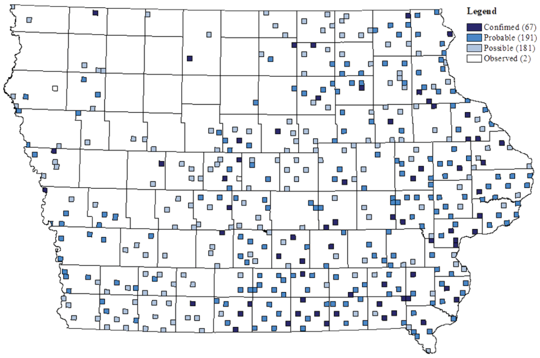
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	2	0	2
Possible	97	84	181
Probable	75	116	191
Confirmed	29	38	67
Conf & Prob	19.90%	38.60%	30.00%

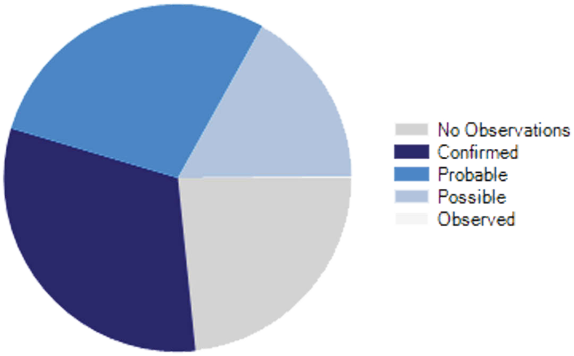
BBA I Results



BBA I



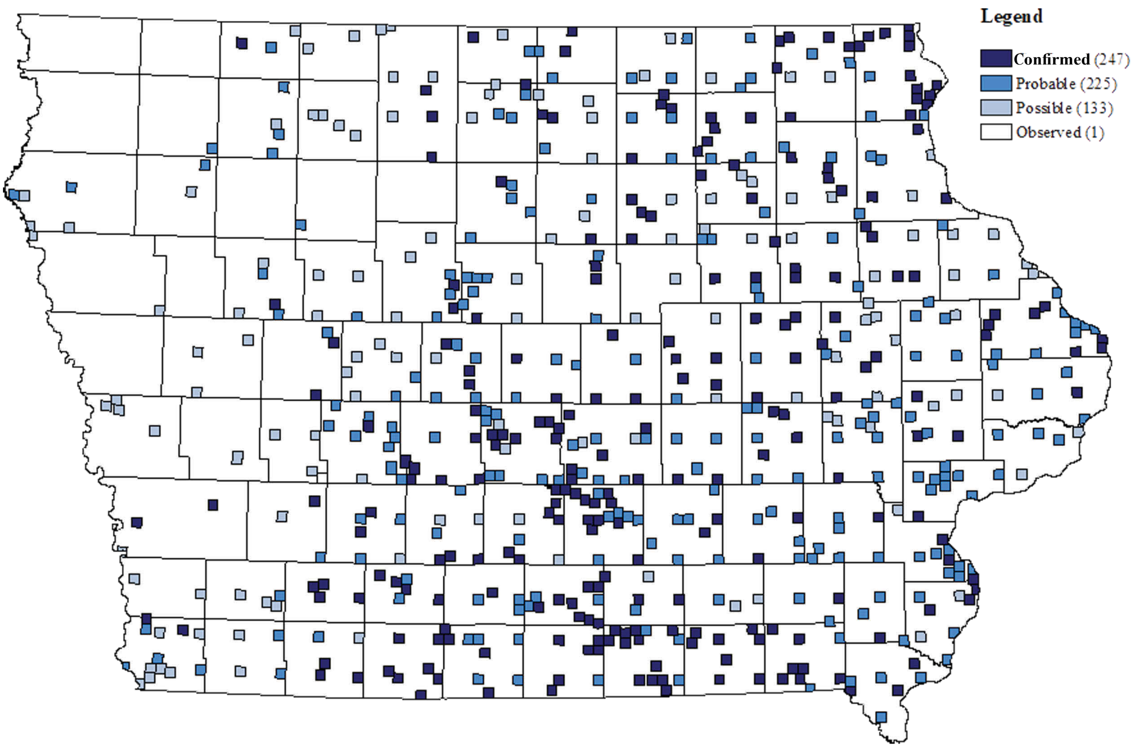
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	1	0	1
Possible	83	54	137
Probable	102	123	225
Confirmed	97	151	248
Conf & Prob	38.10%	68.70%	54.90%

BBA II

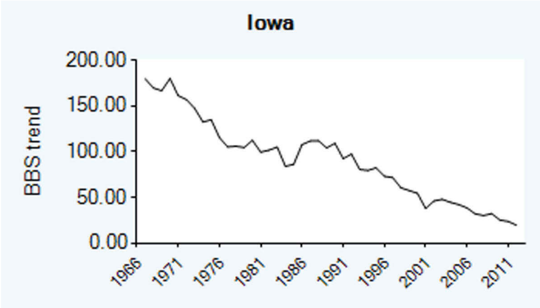


Sponsored by Carol Winter

© Doug Harr

Habitat	Open drier, upland grasslands of prairies, pastures, and cultivated areas
Breeding Dates	2 Apr (PR)–27 Aug (PR)
Nest Type	Cup-shaped nest built on ground of coarse grass and lined with fine grass; usually with a partial dome grass canopy and sometimes a runway entrance
Clutch Size	5 eggs (range 2–6)
Incubation	13–15 days
Fledging	10–12 days
Status	Common summer resident
BBS Trend	Decreasing (trend = −4.1, 95% CI is −4.8, −3.3) [Iowa]

Patterns since BBA I



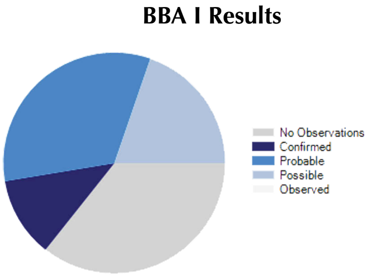
The Western Meadowlark, as its name implies is a western species that prefers more open and dry grassland habitat than its eastern more tree tolerant counterpart. While the BBS indicated no significant changes in Iowa's population from 1966 to 1991 (Jackson et al. 1996), more current Iowa BBS trends indicate an average annual decrease of 4.1% (Sauer et al. 2012). This decreasing population trend is observed somewhat in Iowa's atlas data. For instance, this meadowlark was detected in 554 (64.3%) of BBA I blocks and only 517 (65.4%) of blocks during BBA II. While this decrease in total number of records might not look significant, in light of the fact that there was increased uniform coverage of all blocks (especially grid blocks) during the second atlas, it might be expected that more records would have been documented (as was the case for other species whose populations appear to be declining). The increased effort during BBA II shows results in the increased number of nesting confirmations documented, which was 101 (18.2%) blocks in BBA I and 150 (29%) blocks in the second atlas. On the other hand, the total percentage of records in grid blocks and priority/habitat blocks was nearly identical for both atlases, with ~55% of records from grid blocks and ~45% of records from priority/habitat blocks. The importance of habitat on private land over public land is also reflected by the fact that 59% of all confirmed records came from grid blocks. Jackson et al. (1996) pointed out that the reason for this lower percentage of records in public land blocks might be related to the fact that most public lands hold woodland habitat, and the Western Meadowlark is not as tolerant of grassland habitat that contains trees as is the Eastern Meadowlark (Davis and Lanyon 2008). Another statistic of interest is that confirmed and probable records (combined) made up 69% of all Western Meadowlark's records, the same for both atlases. Possible records (chiefly less than seven singing males) comprised 31% of all BBA I and BBA II records.

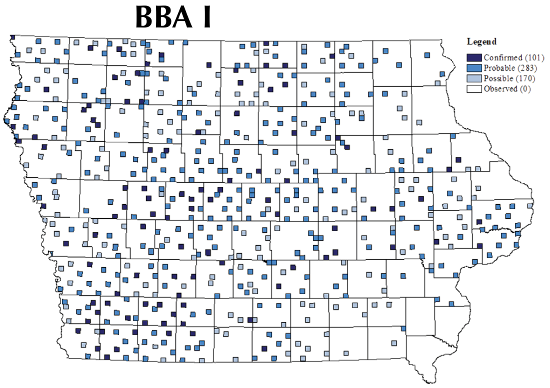
The distribution of Western Meadowlark remained largely the same for both atlases. While this species nests throughout the state, most confirmed nests occurred in the western two-thirds of the state; this meadowlark is much less prevalent in more wooded areas of eastern Iowa. During BBA I, records were detected for 96 counties. The three counties lacking records were Des Moines, Lee, and Henry. During BBA II, this meadowlark was documented in only 93 counties, with no reports from blocks in Allamakee, Henry, Lee, Jefferson, Van Buren, and Davis. The lack of records found in extreme southeastern Iowa compares well with Missouri's BBA data. There were no records of Western Meadowlark in several northeastern counties (Jacobs and Wilson 1997), which lie directly below the area of Iowa that is lacking records. While Jackson et al. (1996) noted this meadowlark "is less common in the northeast and southeast," it appears that it is becoming especially uncommon in extreme southeastern Iowa.

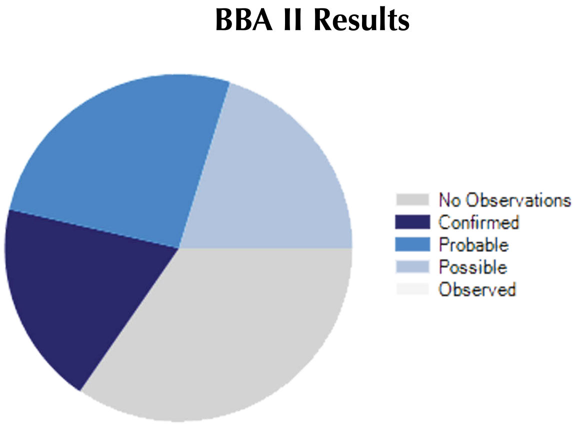
The Western Meadowlark tends to have large territories, compared to other grassland songbirds (Davis and Lanyon 2008), and it prefers habitats with less woody cover and shorter vegetation height-density than Eastern Meadowlark (Sample and Mossman 1997). To reverse the current declining trend for this species, it is important to maintain and restore grassland habitat that is intermediate height and with an intermediate density of grasses and forbs (Madden et al. 2000).

BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	98	72	170
Probable	148	135	283
Confirmed	60	41	101
Conf & Prob	39.80%	44.10%	44.60%

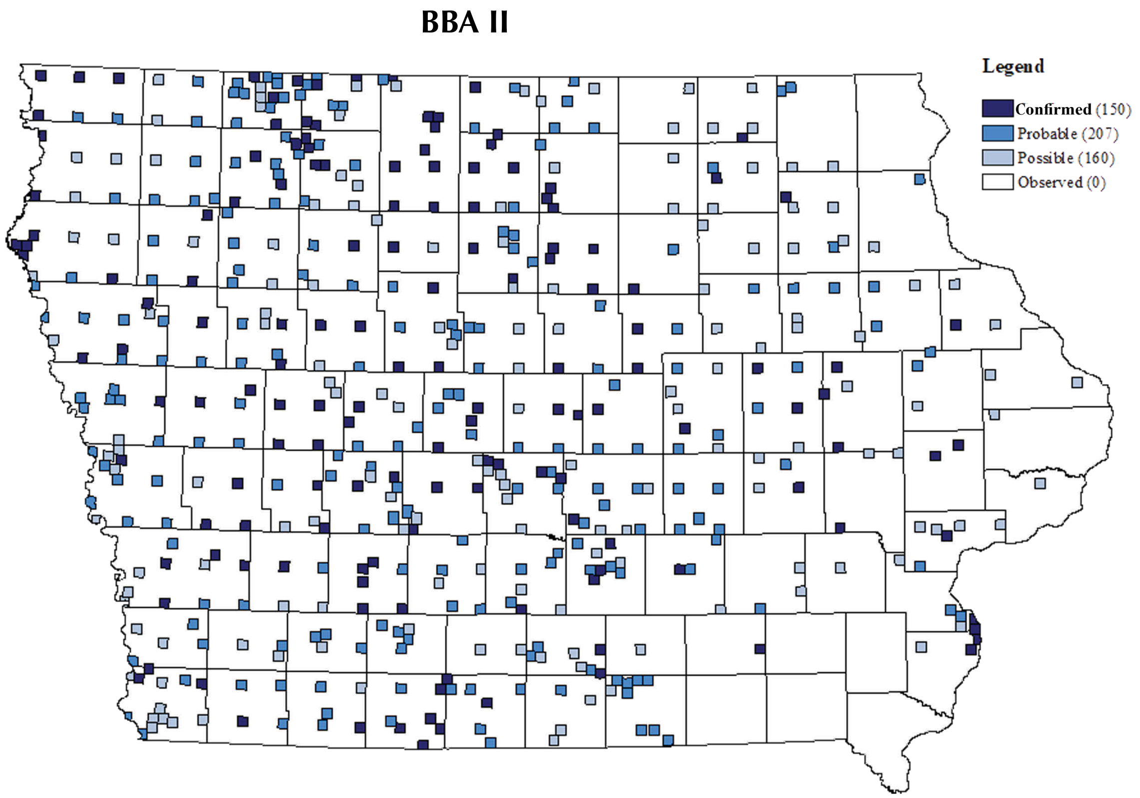






BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	86	76	162
Probable	111	97	208
Confirmed	87	63	150
Conf & Prob	37.90%	40.10%	41.60%



In Honor of Crystal Stratton (Candace Havely)

© Paul Roisen

Habitat Nests in tree belts and riparian woodland, in orchards, in shade trees around farms, or in scattered trees around cultivated areas

Breeding Dates 5 May (PR)–6 Sep (CO)

Nest Type A suspended, rounded cup of long fine stems and fibers woven to form a thick cup lined with some plant down

Clutch Size 3–7 eggs; usually 4–5

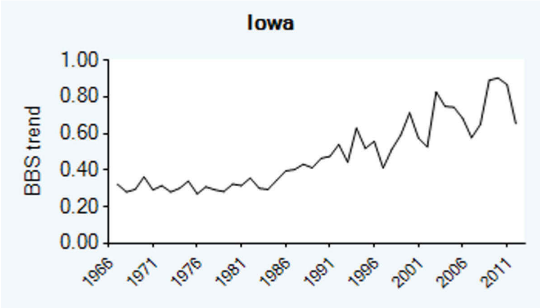
Incubation 12–15 days

Fledging 11–14 days

Status Regular summer resident

BBS Trend Increasing (trend = 3.2, 95% CI is 1.1, 5.0) [Iowa]

Patterns since BBA I



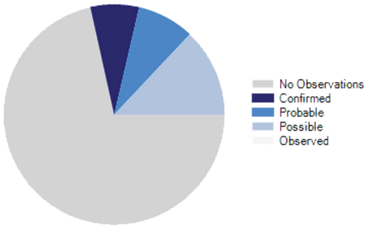
The Orchard Oriole is loosely territorial, and, in areas of prime habitat, it is a "semi colonial" nesting species (Scharf and Kren 2010). Multiple nests per tree can be observed in areas of optimum habitat, where nesting density can be as high as 16 nests per acre (Dennis 1948). As is indicated by Iowa BBS data of an increasing trend of 3.2% annually (Sauer et al. 2012), the status of this species appears to have changed since the first atlas project. For instance, Orchard Oriole was documented to occur in 245 (28.5%) of BBA I blocks, while it occurred in 560 (70%) blocks during the second atlas. Results were similar for both atlases regarding where this species was found, with 64% of records in priority blocks and 36% in grid blocks during BBA I, and 59% of records in habitat blocks and 41% in grid blocks during BBA II. The largest difference between habitat and grid blocks, for the second atlas, was evident in the confirmed nesting category—where 61% of nesting confirmations were in habitat versus 39% of those records in grid blocks. Like the results seen with Baltimore Oriole, the higher nesting confirmation rate for Orchard Oriole in habitat blocks may be related to easier access to nest sites on public land. Overall, 54.5% of all records in BBA II were at the confirmed level, while 24.9% of BBA I records were confirmed nesting. This much higher confirmation rate during the second atlas probably was related to effort, and more emphasis was placed on recording used nests during the second atlas than during the first. Additionally, the Orchard Oriole's propensity to nest near water appears to be reflected by the high rate of nest confirmation in areas of the state containing reservoirs, as well as along the Missouri River.

The statewide distribution of Orchard Oriole probably is reflected well by BBA II data. This distribution has changed over time. Historically, the Orchard Oriole was probably most associated with prairie savanna habitat, and the reason for population declines of this species in the early 1900s was likely due to the removal and alteration of savannas (Jackson et al. 1996). DuMont (1933) observed this species to be an uncommon resident in the western half of the state (except common in the Sioux City area) and fairly rare and unevenly distributed in northern and eastern Iowa. About 60 years later, Kent and Dinsmore (1996), considered the Orchard Oriole common in western Iowa, particularly near the Missouri River, and it was considered rare and widely scattered in the remainder of the state. During BBA I, this species was located in 88 counties, and it was found in all counties except Grundy, Ida, and Osceola during BBA II. Of these three counties, only Grundy had no records for this oriole during both atlases. While most records for Orchard Oriole were documented in the southern half of the state, this species almost certainly nests in every Iowa county. In western Iowa, where the predominant landcover is row crops, this oriole was often found nesting in farmstead woodlots, especially when there was a stream or pond located nearby. With this kind of minimal habitat in mind, the continuous razing of farmstead woodlots to make room for more row crops may have negative effects on the Orchard Oriole. Of larger concern is continued loss and degradation of riparian habitat, which is considered key habitat for this oriole (Scharf and Kren 2010).

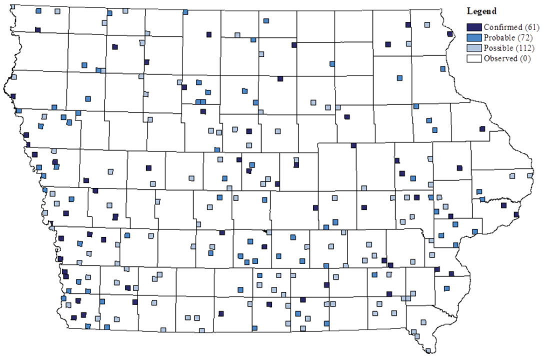
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	44	68	112
Probable	28	44	72
Confirmed	17	44	61
Conf & Prob	8.60%	22.10%	15.40%

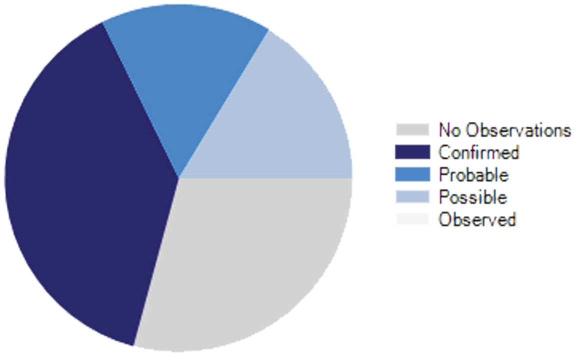
BBA I Results



BBA I



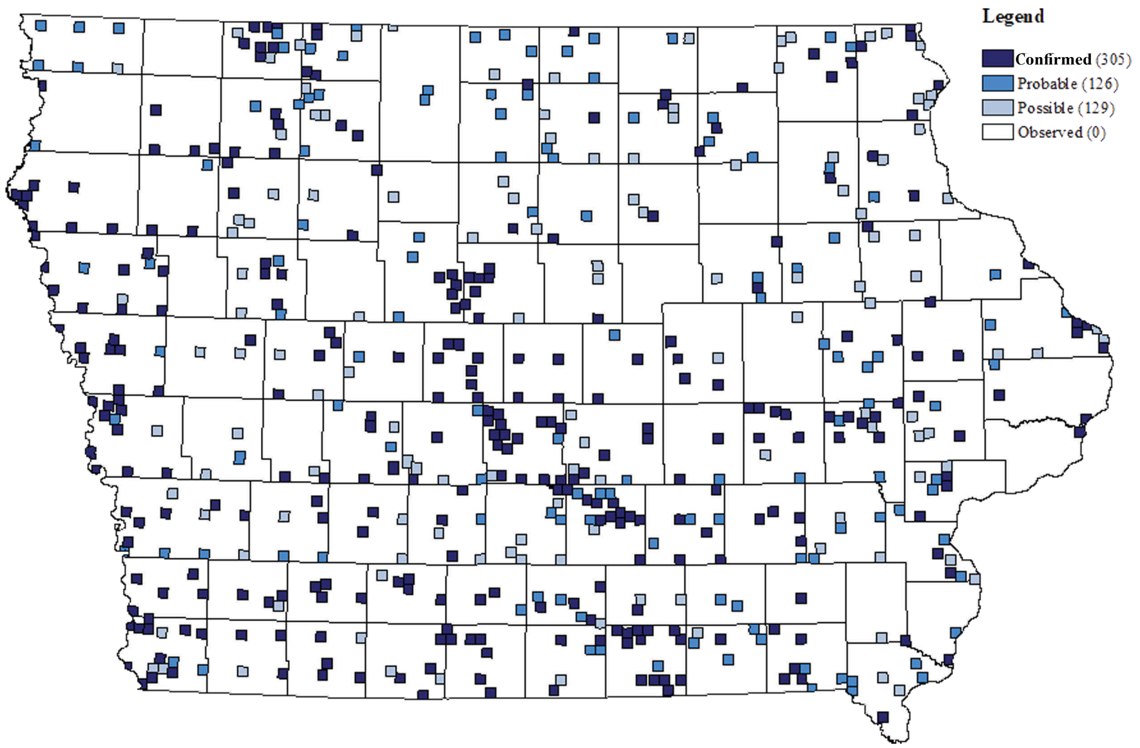
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	63	66	129
Probable	48	78	126
Confirmed	119	186	305
Conf & Prob	32.00%	66.20%	50.10%

BBA II



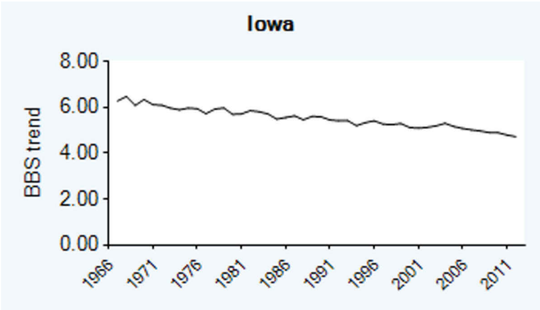
Sponsored by Jerry Von Ehwegen

Baltimore Oriole *Icterus galbula*

© Linda Petersen

Habitat	Open woodlands and woodland edge (especially riparian), shade trees, orchards, wooded residential areas, and typically favors open areas with large scattered trees
Breeding Dates	2 Mar (CO)–27 Aug (PR)
Nest Type	A deep suspended cup, about 6 in. long, of long plant fibers, vine bark, hair, string, yarn, and other human-made products
Clutch Size	3–7 eggs; usually 4–5
Incubation	12–14 days
Fledging	12–14 days
Status	Common summer resident
BBS Trend	Stable (trend = 0.1, 95% CI is −0.6, 0.8) [Iowa]

Patterns since BBA I



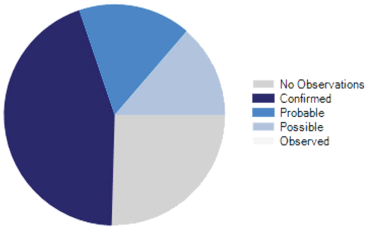
Each spring, thousands of Iowans welcome to their yards the arrival of the brightly colored Baltimore Oriole. With its clear, flute-like song, its propensity to eat orange slices and grape jelly, and its ability to build a unique pendant nest from a low-hanging branch, this species is a well-known summer resident. As an example of this, the Baltimore Oriole was documented in 762 (96.3%) blocks and confirmed nesting in 71.9% of these blocks. Similarly, during the first atlas this species was found in 642 (90%) blocks and confirmed nesting in 60% of those (Jackson et al. 1996). Also similar in both atlases, this species was found almost equally in habitat and grid blocks, an indication that habitat exists for this species on private and public land alike. The higher nesting confirmation rate in habitat blocks (59%) versus grid blocks (41%) is probably related more to easier access to nest sites on public land. Iowa BBS data indicate that the Iowa trend for this species is stable (Sauer et al. 2012). Similar to what was observed in Iowa, the BBA results from Illinois (1986–1991) indicated the Baltimore Oriole was one of the most frequently reported and widespread species, and it was documented in 73.7% and confirmed nesting in 45.8% of Illinois blocks (Kleen et al. 2004). Missouri's atlas (1986–1992) results indicated this species to be found statewide, as well, with records from 66% of all blocks and confirmed nesting in 44.9% of those blocks (Jacobs and Wilson 1997).

Iowa distribution for the Baltimore Oriole was similar for both atlases, and this species was confirmed nesting in every county of the state during the second atlas. While this oriole was historically known as a bird of woodland edge and open riparian woods, it is now well-adapted to nest near humans. Consequently, it was easily found inhabiting yards in town and country alike, and its used nests were particularly conspicuous for nearly six months of the year when trees were without leaves. This species has benefitted from the fragmenting of forests into smaller patches that it prefers to inhabit (Rising and Flood 1998). The adaptable nature of this species also serves it well on its wintering grounds, where it is found inhabiting a wide variety of habitats from Mexico to Venezuela (Rising and Flood 1998). Greenberg et al. (1997) suggest that Baltimore Orioles and many other species that inhabit coffee plantations during winter months will especially benefit from increased plantings of leguminous and other suitable shade trees on coffee plantations.

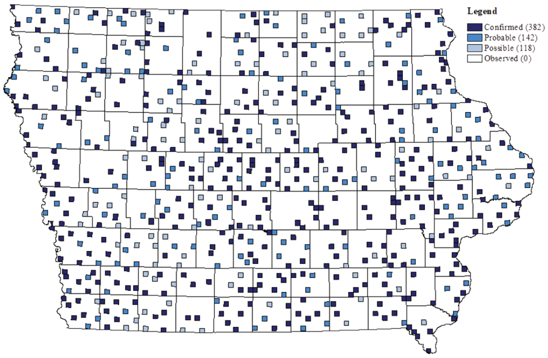
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	90	28	118
Probable	63	79	142
Confirmed	157	225	382
Conf & Prob	42.10%	76.20%	60.90%

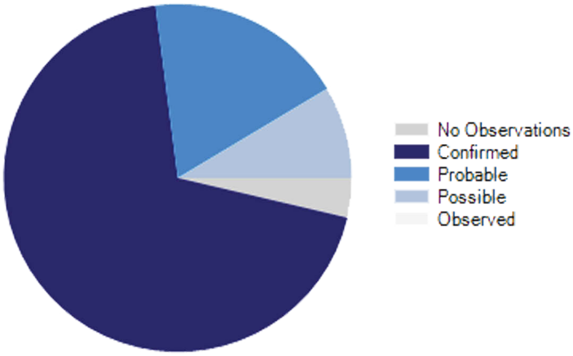
BBA I Results



BBA I



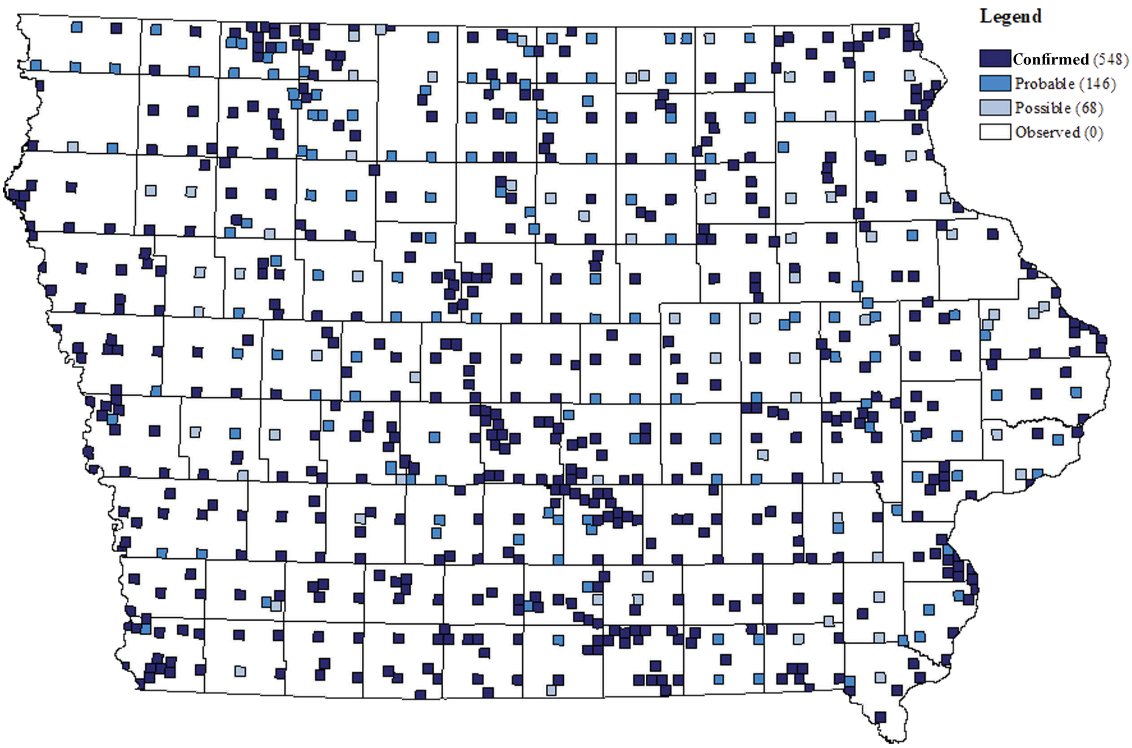
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	52	16	68
Probable	96	50	146
Confirmed	225	323	548
Conf & Prob	61.50%	93.50%	80.60%

BBA II

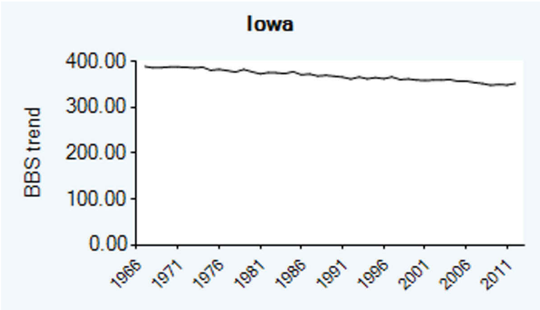


In Memory of Robert E. Shepherd, Jr.
(Stephanie Shepherd)

© Paul Roisen

Habitat	Large variety of wetland and upland habitats, including marshes, wet meadows, roadside ditches, and fields
Breeding Dates	22 Mar (PR)–31 Aug (CO)
Nest Type	Deep cup of long grasses, reeds, and stems woven tightly around upright supports; firmly shaped and lined with fine dry grasses or thin rushes
Clutch Size	4 eggs (range 3–5)
Incubation	11–13 days
Fledging	9–11 days
Status	Abundant statewide summer resident
BBS Trend	Stable (trend = −0.1, 95% CI is −0.6, 0.4) [Iowa]

Patterns since BBA I



The Red-winged Blackbird may be the most abundant and most studied bird of North America (Yasukawa and Searcy 1995). It inhabits a wide variety of wetland and upland habitats, including marshes, wet meadows, roadside ditches, both fallow and cultivated fields, and even small-town parks and suburbia. The Red-winged Blackbird is the most abundant species detected during the North American BBS, and Iowa BBS data indicate the status of this species is basically stable (Sauer et al. 2012). The BBA II data might provide the illusion that this species is increasing, however. During BBA I, this blackbird was detected in 698 (81.1%) of blocks, with an increase to 791 (100%) of BBA II blocks. Only Mourning Dove, American Robin, and House Sparrow were also documented in all 791 blocks. Equally significantly, the number of confirmed nesting block records went from 552 (79.1%) during BBA I to 769 (97.2%) of BBA II blocks. During the first atlas, this bird's confirmation rate was noted by Jackson et al. (1996) to be the second highest of any of Iowa's regular nesting species, and only American Robin had a higher nesting confirmation rate than Red-winged Blackbird during BBA II. This well-known species almost certainly nested in every BBA II block, and it was detected equally well in priority/habitat (public land) blocks as it was in grid (private land) blocks. The fact that this species is a ubiquitous nester in wet roadside ditches, builds a substantial nest that is easily visible, and exhibits especially defensive behavior near the nest site—made documentation of nesting particularly easy for this species.

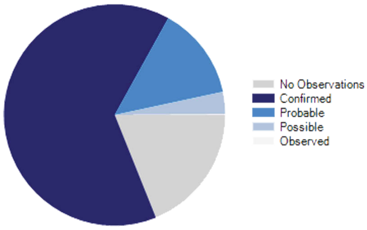
The statewide distribution of Red-winged Blackbird remained the same for both atlases, since it was detected in every county during both time periods. During the second atlas, there was an increase in detection in more blocks, especially in northwestern Iowa, although it appears that this is the result of more adequate coverage of blocks during the second atlas. Red-winged Blackbird atlas data from nearby states are quite comparable to Iowa's. Missouri documented this species in 97.9% of its blocks and confirmed it nesting in 68.4% (Jacobs and Wilson 1997). Illinois detected it in 91.4% of its sampled blocks and confirmed it nesting in 80.8% (Kleen et al. 2004), and Indiana documented it in 99% of all blocks and confirmed it nesting in 69% (Castrale et al. 1998).

The adaptability of Red-winged Blackbird to land-use changes and to nest in a variety of habitats has led to its abundance. As humans have converted marsh habitat, as well as prairies, savannas, and woodland to other uses, this blackbird's ability to adapt from marsh nesting to nesting in upland pastures, hay fields, and grain fields has resulted in remarkable population increases in some agricultural areas (Graber and Graber 1963, Weatherhead and Bider 1979). Other factors that affects its abundance is its ability to nest up to three times per year and its polygynous nature, where as many as fifteen females breed within the territory of one male (Yasukawa and Searcy 1995).

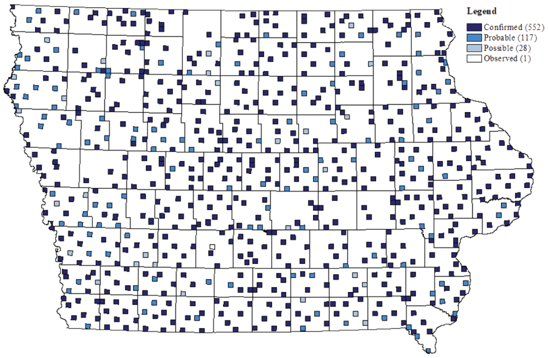
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	1	0	1
Possible	24	4	28
Probable	81	36	117
Confirmed	254	298	552
Conf & Prob	64.20%	83.70%	77.70%

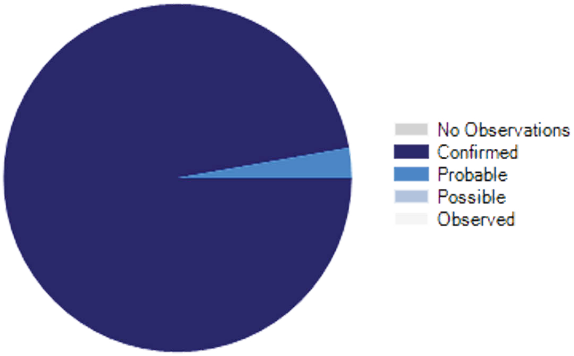
BBA I Results



BBA I



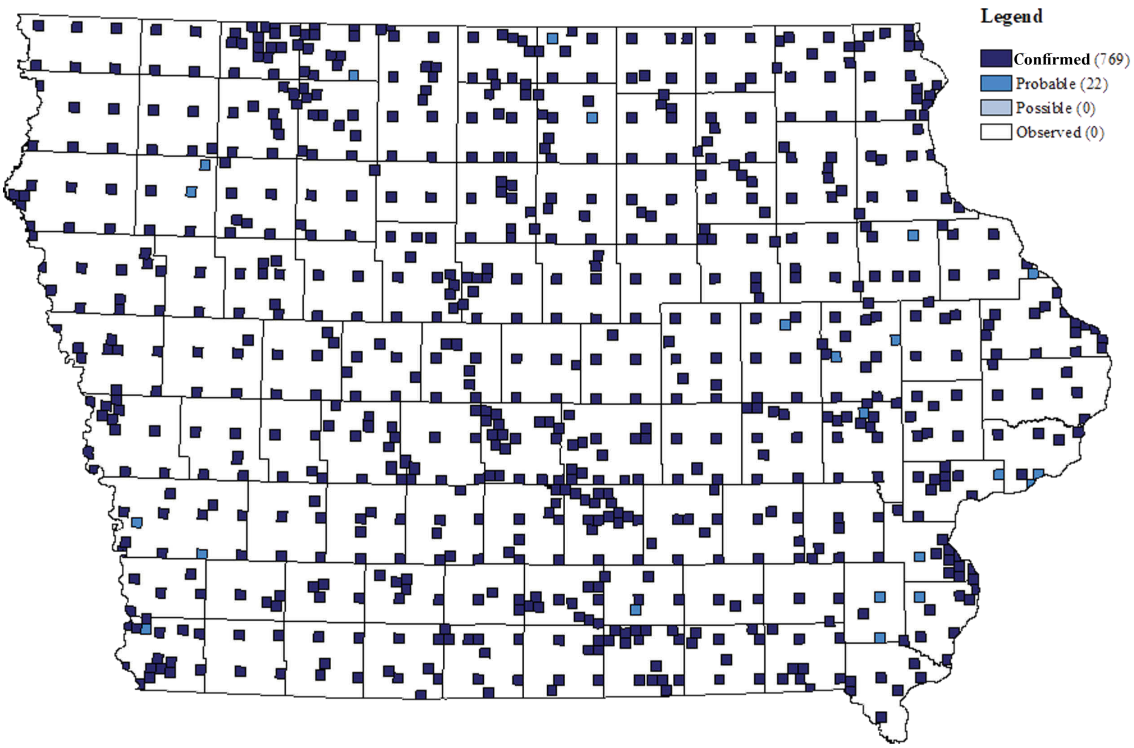
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	0	0	0
Probable	14	8	22
Confirmed	383	388	771
Conf & Prob	76.10%	99.20%	92.10%

BBA II

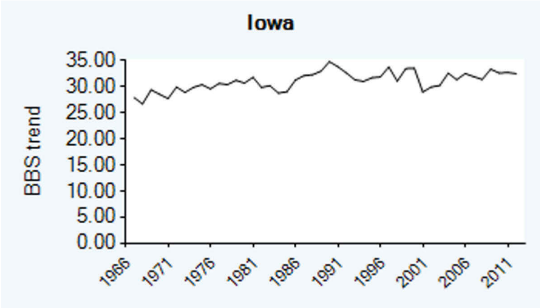


Sponsored by Aaron Winter

© Paul Roisen

Habitat	Breeds over a wide range on and around grasslands, farmland, brushy thickets, forest edge, and suburban areas
Breeding Dates	24 Mar (PR)–4 Sep (PR)
Nest Type	A brood parasite that lays its eggs in nests of other bird species, especially finches, vireos, warblers, and flycatchers
Clutch Size	Typically 1, several eggs may be laid by different females
Incubation	11–12 days
Fledging	10 days
Status	Regular summer resident
BBS Trend	Stable (trend = 0.1, 95% CI is −0.7, 0.9) [Iowa]

Patterns since BBA I



The Brown-headed Cowbird is this country's most well-known brood parasite. It builds no nest of its own and lays its eggs in the nests of a large number of other bird species. It appears that this bird evolved to follow mobile bison herds, feeding on insects stirred up by the bison's movement, and laying eggs in nests of other birds along the way (Lowther 1993a). It has since adapted quite well to a human altered landscape, and there virtually is no area of the state where the cowbird does not frequent. As evidence that Brown-headed Cowbirds exist pretty much everywhere, this species was documented to occur in 690 (96%) of BBA I blocks, while it occurred in 788 (99.6%) blocks during the second atlas. Results were almost identical for both atlases, regarding where this species was found, with 49% of records in priority blocks and 51% in grid blocks during BBA I (Jackson et al. 1996), and 50.3% of records in habitat blocks and 49.7% in grid blocks during BBA II. While a slightly higher percentage of cowbirds were confirmed nesting in the second atlas (40.9%) versus (31.4%) in the first atlas, there was little difference in any of the data collected for this species between the atlases. Iowa's BBS data show a stable trend in its cowbird population (Sauer et al. 2012), and the status of this species appears to have little changed since the first atlas project.

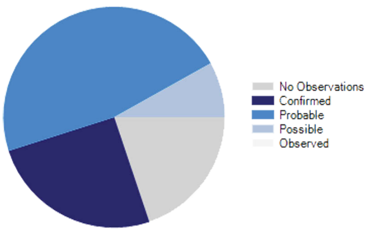
The statewide distribution of Brown-headed Cowbird is reflected well by the data collected during both atlases. Before European settlement of Iowa, the cowbird would have been primarily limited to the grassland and savanna habitats of Iowa, and as forest habitats (especially in north-eastern Iowa) were cleared and fragmented, cowbirds expanded into the more fragmented woodlands that remained (Mayfield 1965). Studies of parasitized nests indicate a cowbird preference for wood-field ecotones as breeding habitats, rather than extensive woods or grassland areas (Brittingham and Temple 1983, Johnson and Temple 1990). Forest interior bird species that were not previously exposed to cowbird parasitism became exposed as forest fragmentation increased the amount of edge, which then provided more openings and more access to cowbirds (Brittingham and Temple 1983). The collective pool of cowbird hosts has increased as this species has expanded its range into new areas, and impacts of this parasitism has been especially noted on some wood warblers, vireos, and flycatchers—with highest concerns posed by nest parasitism of host species having small populations (e.g., Kirtland's Warbler) (Walkinshaw 1983). While brood parasitism does impose additional mortality on some host populations, impacts are not unsustainable if parasitism rates remain below some critical level (this critical level is computed by a model that includes adult and juvenile mortality rates of hosts and mean number of offspring produced in parasitized and unparasitized nests) (May and Robinson 1985).

Brown-headed Cowbird

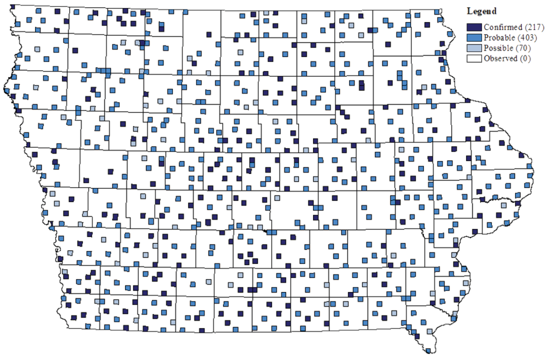
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	48	22	70
Probable	207	196	403
Confirmed	97	120	217
Conf & Prob	58.20%	79.20%	72.00%

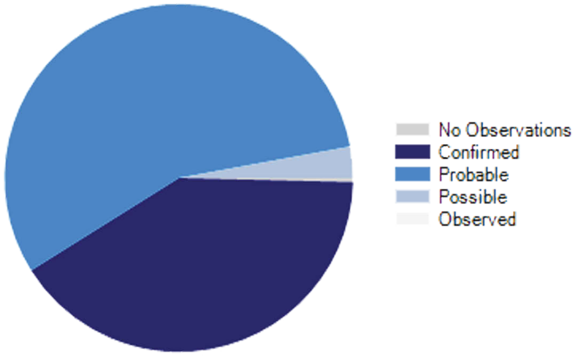
BBA I Results



BBA I



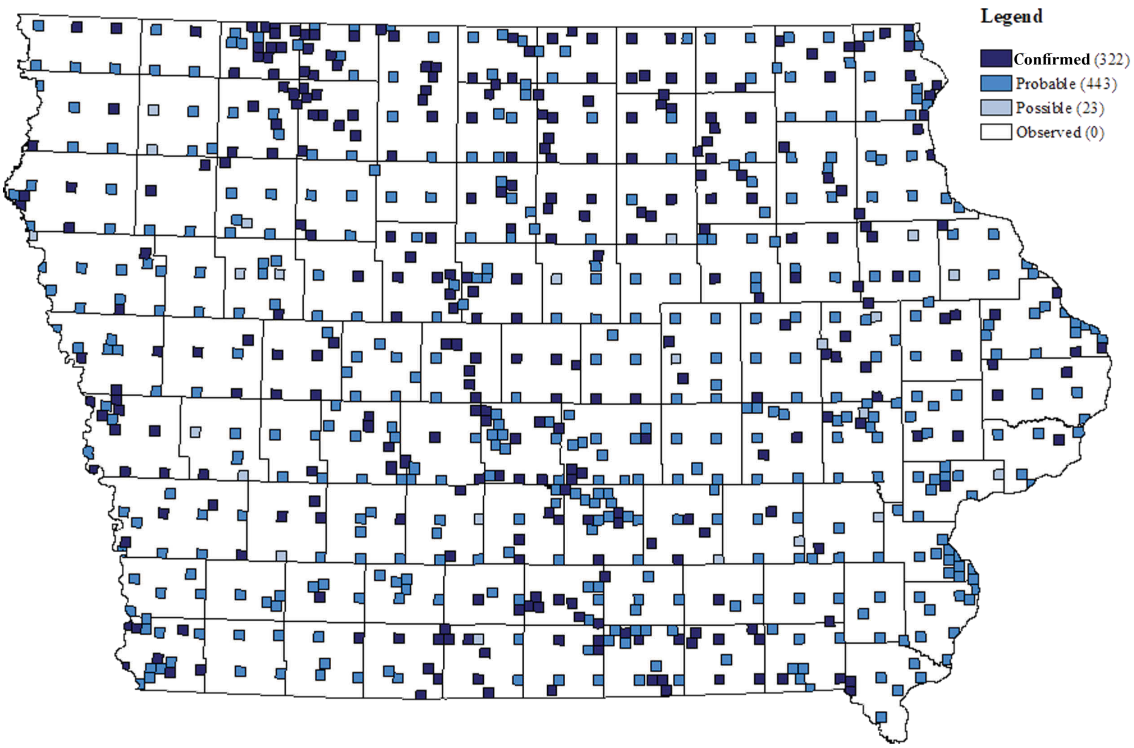
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	18	5	23
Probable	242	202	444
Confirmed	133	189	322
Conf & Prob	71.80%	98.00%	89.00%

BBA II



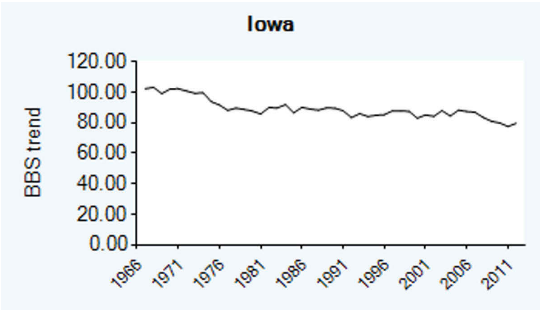
Sponsored by Jeff Wells

© Doug Harr

Habitat	Open and cultivated country, especially in wetter areas; nests in trees, low shrubs, and bushes
Breeding Dates	26 Mar (PR)–27 Aug (CO)
Nest Type	Bulky, loose cup of twigs, weed stems, and coarse grasses
Clutch Size	4–5 eggs, sometimes 6, rarely 7
Incubation	12–14 days
Fledging	10–17 days
Status	Regular summer resident
BBS Trend	Stable (trend = −0.3, 95% CI is −1.1, 0.5) [Iowa]

Patterns since BBA I

The Common Grackle is one of the most widespread and successful breeding species in North America (Peer and Bollinger 1997). In terms of total number of birds counted in BBS routes across North America in 1992–1993, it ranked eleventh (Peterjohn et al. 1994). It was the seventh most common species documented during Iowa's first atlas (Jackson et al. 1996), and eighth most common species during the second atlas. This grackle was documented to occur in 681 (95%) of BBA I blocks worked in, while it occurred in 788 (99.6%) blocks during the second atlas. As an indication of how successfully the Common Grackle has adapted to a greatly human-altered landscape, this generalist species was found in an equal number of grid blocks and habitat blocks during the second atlas and in nearly identical numbers in grid blocks and priority blocks during the first atlas, as well. While a higher percentage of Common Grackles was confirmed nesting in the second atlas (90.1%) versus (65.2%) in the first atlas, this difference is most likely attributed to a greater effort expended during the second atlas to confirm nesting. The status of this species appears to have not changed since the first atlas project, and Iowa's BBS data show a stable trend in its population (Sauer et al. 2012).

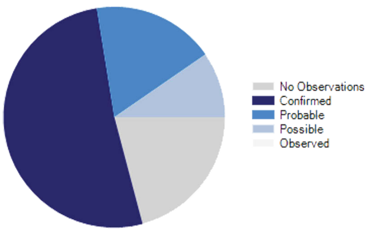


The statewide distribution of Common Grackle is reflected well by the data collected during both atlases, where this bird essentially nests in all BBA blocks in all regions of the state. Before European settlement of Iowa, this icterid likely nested especially in cottonwoods (*Populus deltoides*) and sycamores (*Platanus occidentalis*), as well as in other trees located along rivers and streams (Mumford and Keller 1984). This species is now well-adapted to use human-made habitats, particularly within open areas like cemeteries, city parks, and residential areas that contain multiple conifer trees (Peer and Bollinger 1997). This bird's propensity to inhabit a variety of habitats is well documented in Illinois bird surveys during the 2000s, where Common Grackle was the fourth most abundant species found in both shrubland and linear woodlands, and it was the third most abundant species documented in savanna habitat (Walk et al. 2010b). Suffice it to say, the future of this cosmopolitan species appears secure.

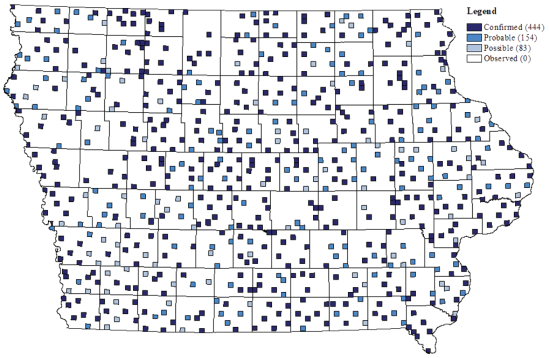
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	60	23	83
Probable	97	57	154
Confirmed	186	258	444
Conf & Prob	54.20%	78.90%	69.50%

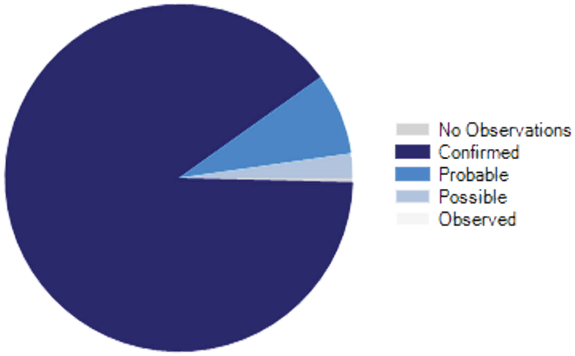
BBA I Results



BBA I



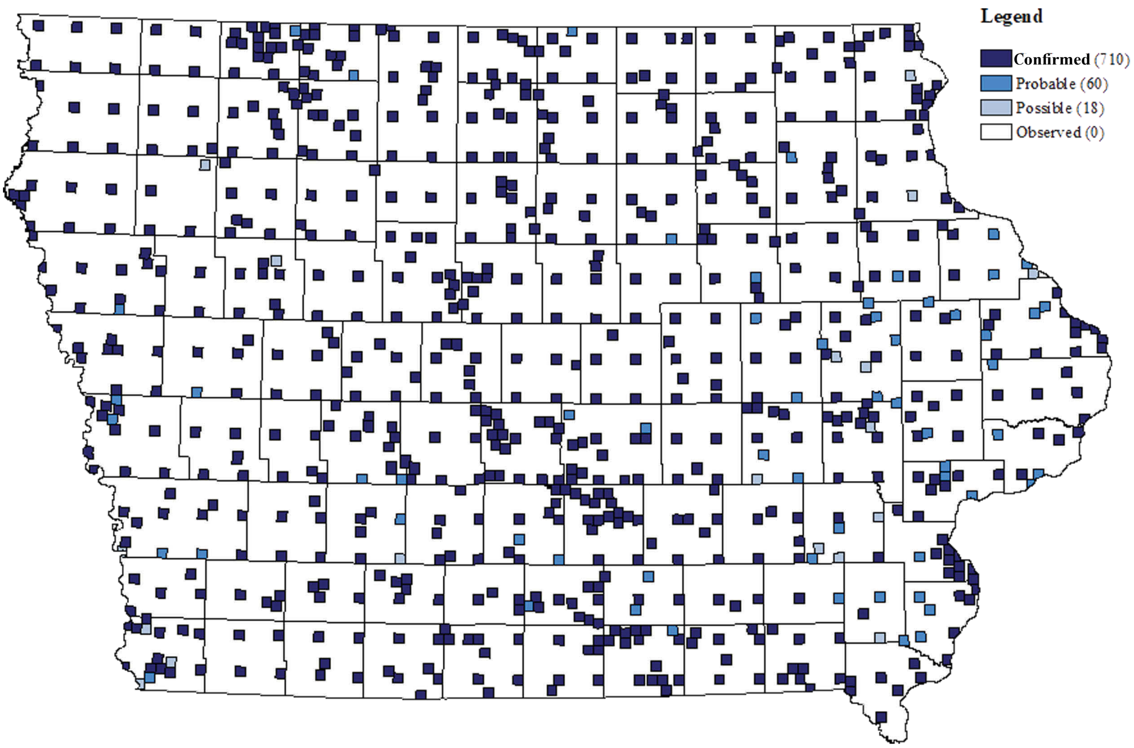
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	10	8	18
Probable	28	32	60
Confirmed	356	356	712
Conf & Prob	73.60%	97.20%	89.70%

BBA II



In Honor of Beth Brown and Gladys Black
(Pat Schlarbaum)


© Doug Harr

Habitat Frequently nests in vegetation by or over open water, in rushes and reeds; also in shrubs and trees

Breeding Dates 2 May (CO)–15 Aug (CO)

Nest Type A bulky cup of weed stems, coarse grasses, other plant fibers lined with mud or cow dung to form a firm structure with an inner lining of fine grasses and rootlets

Clutch Size 3–4 eggs, sometimes 5

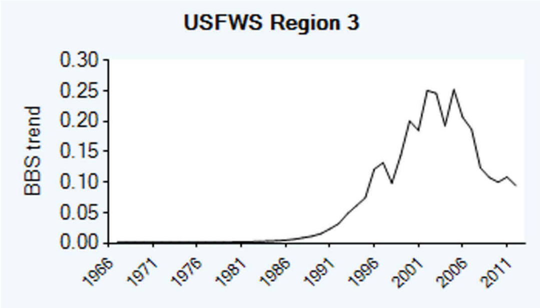
Incubation 13–14 days

Fledging 20–23 days

Status Regular summer resident

BBS Trend Increasing (trend = 2.1, 95% CI is 0.8, 3.5) [Central US]

Patterns since BBA I



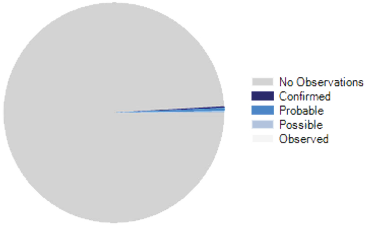
The Great-tailed Grackle was first documented nesting in Iowa in Fremont County in 1983 (Jackson et al. 1996), and it quite quickly expanded its range to include most of western Iowa by 1996, nesting in wetlands within twelve counties by that time (Kent and Dinsmore 1996). During the first atlas, this grackle was documented to occur in just 9 (1.2%) blocks, while it occurred in 37 (4.7%) blocks during the second atlas. A greater percentage of Great-tailed Grackles were confirmed nesting in the first atlas (66.7%) versus the second atlas (21.5%), and this difference may be related to the fact that there were fewer locations at which to monitor this species during the first atlas. While this grackle was confirmed nesting in five of the six counties in which it was located during the first atlas, it was confirmed nesting in only five of twenty-three counties in which it was documented during the second atlas. A larger difference between the two atlases is the number of probable nestings, with only one (11.1%) record during BBA I and eleven (29.7%) during BBA II. Perhaps as a reflection of this species' preferred habitat primarily located on public owned land, all nine (100%) records came from priority blocks during BBA I, and 27 (73%) of BBA II records came from habitat blocks. While BBA data indicate that Iowa's Great-tailed Grackle population is expanding, there are still too few records of this species recorded during Iowa's BBS to indicate a population trend.

Distribution of Great-tailed Grackle did change some between atlases, most notably with northerly expansion of this bird's nesting range, especially into Dickinson County. The five counties with confirmed nesting in blocks during the second atlas included Dickinson, Hamilton, Greene, Tama, and Page. Of these, only Greene County held a block with confirmed nesting in the first atlas. While the Great-tailed Grackle inhabited wetlands in two counties bordering the Mississippi River by 1996 (Kent and Dinsmore 1996), Buchanan County held the easternmost block record during the second atlas. Perhaps unexpectedly, no records were found in BBA II blocks in the eastern two tiers of counties. While there may be no other native North American bird that has expanded its range north so dramatically since the 1960s (Johnson and Peer 2001), it will be interesting to see if Jackson et al. (1996) were correct when they suggested that "The finite amount of marsh habitat in Iowa may eventually limit this species' distribution."

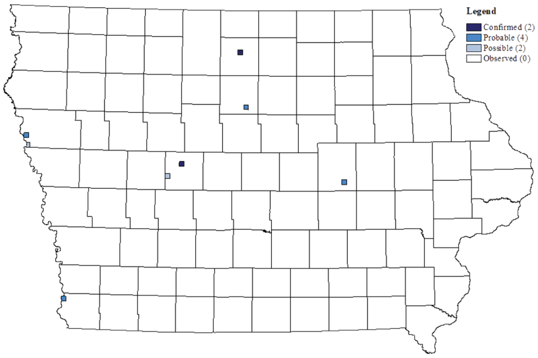
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	0	2	2
Probable	0	4	4
Confirmed	0	2	2
Conf & Prob	0.00%	1.50%	0.70%

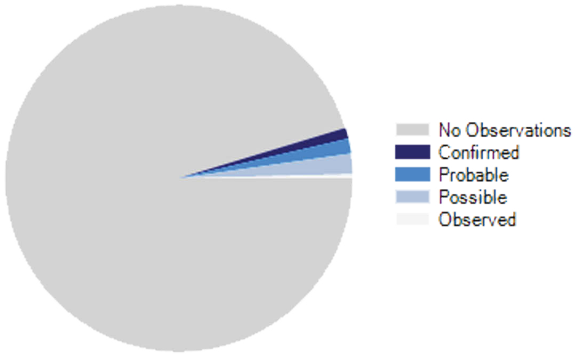
BBA I Results



BBA I



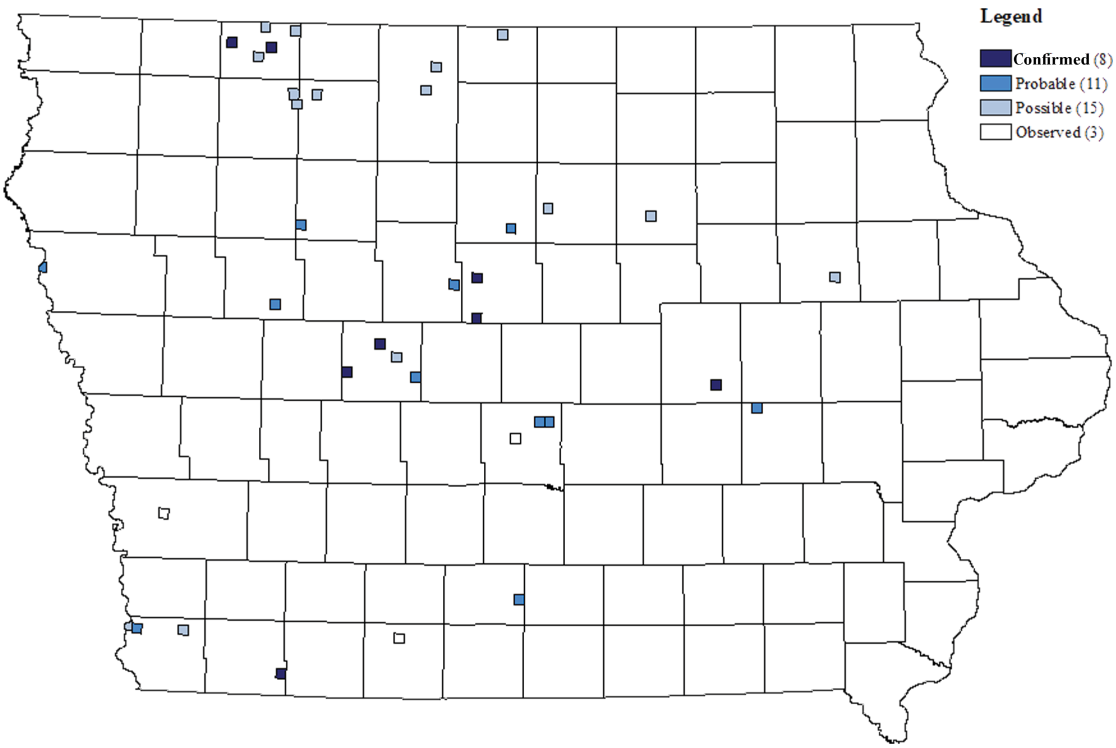
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	3	0	3
Possible	2	13	15
Probable	2	9	11
Confirmed	3	5	8
Conf & Prob	1.00%	3.50%	2.20%

BBA II

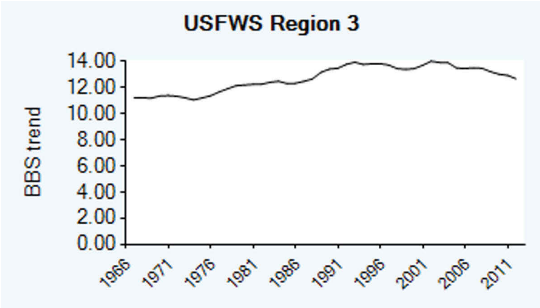


© Tom Schilke

Habitat	Large, mature deciduous forests; sometimes mixed forests
Breeding Dates	5 May (PR)–9 Aug (CO)
Nest Type	Dome-shaped nest built on ground with a side entrance; constructed of dead leaves, plant fibers, grasses, moss, and fibrous bark and lined with fine rootlets and hair
Clutch Size	3–6 eggs, ave. = 4 eggs
Incubation	11–13 days
Fledging	8–10 days
Status	Regular and common nesting species
BBS Trend	Decreasing (trend = –2.0, 95% CI is –2.9, –1.1) [Central US]

Patterns since BBA I

The Ovenbird is a cryptic colored forest floor bird that usually is heard singing long before it is seen. It spends much time foraging on the forest floor for leaf-litter arthropods. This bird's nest is placed on the ground, where it is well-concealed and most difficult for the field observer to find. The Ovenbird was reported in 166 (19.3%) blocks in BBA I, significantly increasing to 251 (31.7%) block records in BBA II. This species is not found often enough on Iowa's BBS to show a trend; however, throughout its U.S. breeding range, populations have undergone an average annual increase from 1966–2015 of 0.37% (Sauer et al. 2017).



Ovenbirds exhibit a high level of forest area sensitivity on breeding grounds (Robbins et al. 1989), and they may require forest tracts larger than 500 ha (1,250 acres) to achieve maximum nesting densities (Burke and Nol 2000). Populations have been negatively affected by fragmentation in numerous states and provinces (Porneluzi et al. 2011), and fragmentation has been associated with decreased nest success and increased brood parasitism in Wisconsin and Missouri (Donovan and Stanley 1995). In Missouri, nesting density was lower in forests that were 300 ha (750 acres) or less (Wenny et al. 1993), and a greater percentage of males were paired in large forests than in small forests (Gibbs and Faaborg 1990, Van Horn et al. 1995).

As evidenced for other area-sensitive forest birds, most Ovenbird nest records (76% overall for both atlases) were from public land blocks, where larger tracts of preferred mature forest habitat exist. During the first atlas, 9% of Ovenbird records confirmed nesting, which increased to 18% confirmed records during BBA II. Due to the difficulty of locating Ovenbird nests, atlases in both Missouri (Jacobs and Wilson 1997) and Illinois (Kleen et al. 2004) also experienced similar low confirmation rates. The highest percentage of records found during both Iowa atlases was in the possible category. Most confirmed records were attending young, followed by recently fledged young. There were only nine total records indicative of a nest being found and five records of distraction display by an adult.

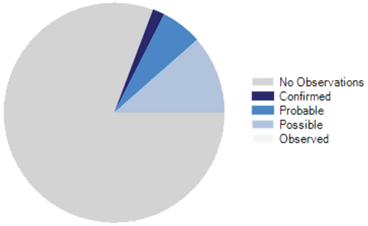
During the first atlas, (Jackson et al. 1996) reported that records for this species were found in nearly every county in eastern Iowa while it was virtually absent in the western third of the state. During BBA II, similar results were found in eastern Iowa, although the number of records found in western Iowa more than doubled. Records in extreme northwestern Iowa were absent for both atlases. During BBA II there was an increase in number of records along the Little Sioux River in northwestern Iowa. Many of the records from the Loess Hills of western Iowa were of seven or more males singing, indicating that the maturing forest there is supporting substantial numbers of nesting pairs of Ovenbirds. The high incidence of confirmed and probable records from northeastern, south-eastern, and south-central Iowa seem indicative of the areas of the state with the largest and most mature forests.

One advantage that Ovenbird has over many other neotropical migrants is that it uses a variety of early-to-late successional habitats on their wintering grounds (Wunderle and Waide 1993), while the future of Ovenbird's breeding populations appears to depend on the continued existence of large areas of core habitat (Porneluzi et al. 2011). Nesting populations should thrive best when they avoid fragmented forest habitat, where higher risks of nest predation and brood parasitism exist (Donovan et al. 1995).

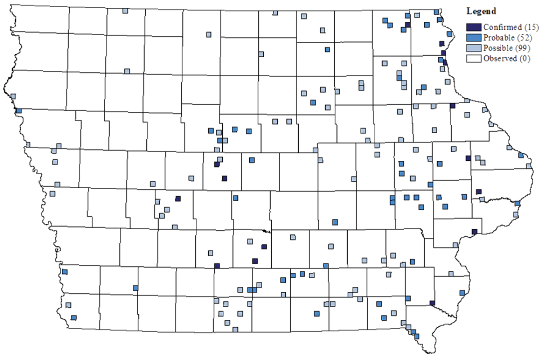
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	29	70	99
Probable	10	42	52
Confirmed	2	13	15
Conf & Prob	2.30%	13.80%	7.80%

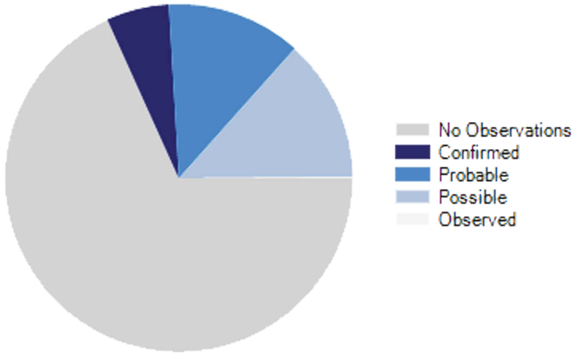
BBA I Results



BBA I



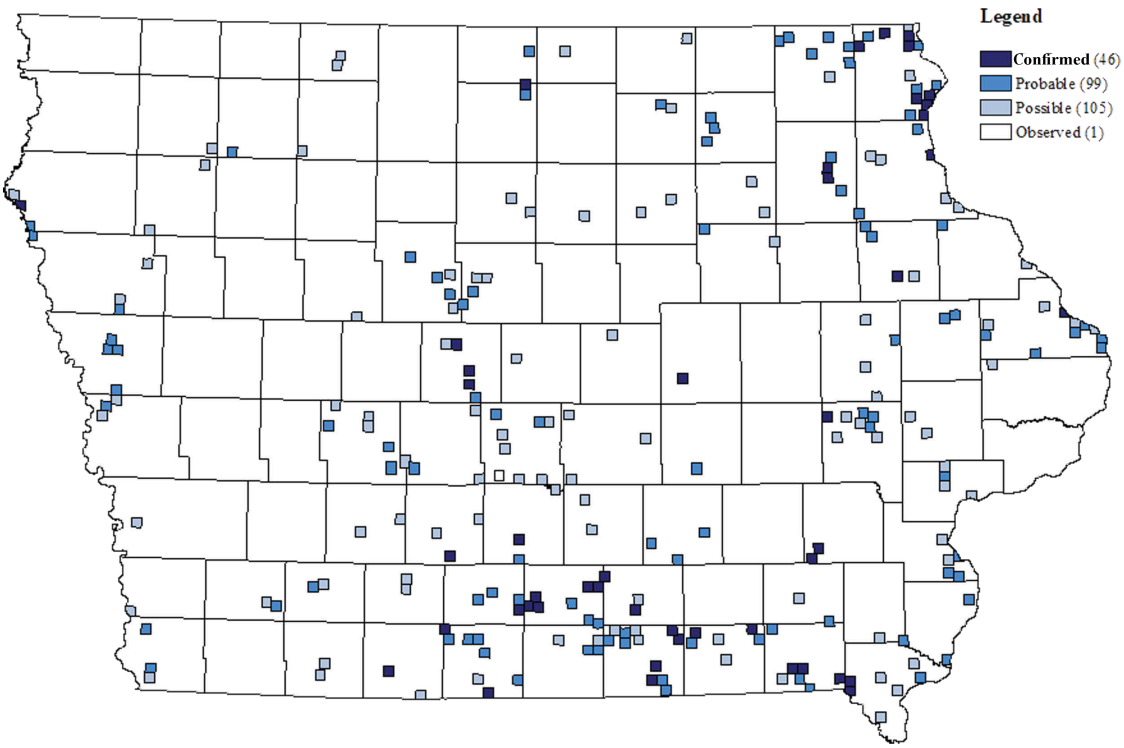
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	1	1
Possible	28	77	105
Probable	26	73	99
Confirmed	3	43	46
Conf & Prob	5.60%	29.10%	16.80%

BBA II

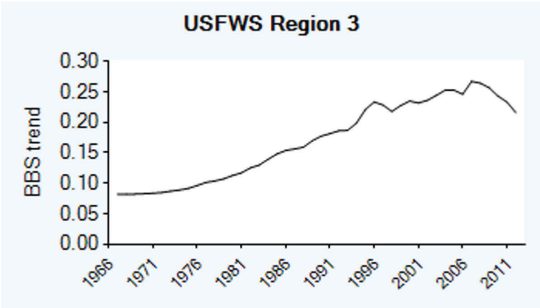


Sponsored by Katy Patterson

© James Durbin

Habitat	Large tracts of mature deciduous and mixed forest, in hilly terrain with patches of shrubs and dense understory
Breeding Dates	13 Jul (PR)–13 Jul (PR)
Nest Type	Nest on the ground, usually surrounded by leaf litter, in a cup-shaped nest constructed of dead leaves and lined with moss, fungi mycelia, fine grasses, and hair
Clutch Size	4–6 eggs (5 eggs avg.)
Incubation	11–17 days (13 days avg.)
Fledging	10 days
Status	Regular and rare nesting species
BBS Trend	Stable (trend = 0.1, 95% CI is –1.5, 1.7) [Central US]

Patterns since BBA I



Worm-eating Warbler, one of Iowa's rarest nesting birds, is most often found in hilly terrain in the interior of extensive, older forests with a well-developed understory and much ground cover. It is a most difficult species to locate in its dense understory habitat, and its Chipping Sparrow-like song makes it difficult to identify, unless it is seen. As evidence of its rarity, this warbler was only reported in eight (0.9%) blocks in BBA I, slightly increasing to 12 (1.5%) blocks in BBA II. This species has only once been detected on Iowa's BBS. Throughout its U.S. breeding range, populations have undergone an average annual increase from 2005–2015 of 1.63% (Sauer et al. 2017).

The Worm-eating Warbler is one of the most sensitive North American songbirds to forest fragmentation (Vitz et al. 2013), and it tends to breed in large stands (>350 ha or 875 acres) of mature forest (Robbins et al. 1989). Incidence of Brown-headed Cowbird nest parasitism on this warbler appears strongly related to forest fragmentation (Vitz et al. 2013). At fragmented forest sites in Missouri, nine of 12 nests were parasitized, while none of 27 nests were parasitized at unfragmented forest sites (T. Donovan unpublished in Vitz et al. 2013).

Like results found for other area-sensitive forest birds, ten of 12 BBA II Worm-eating Warbler records and seven of eight BBA I records were from public land blocks, where larger tracts of preferred mature forest habitat exist. There was only one record of confirmed nesting during BBA I and zero confirmed nesting records during BBA II. The highest incidence of nesting was one probable (agitated behavior) record at Eldon WMA in Davis County, and 75% of BBA II records were possible nesting. The record of adults feeding recently fledged young (during BBA I) was the first nesting record confirmed during the 1900s, and it occurred in the Croton Unit of Stephens State Forest in Lee County (Jackson et al. 1996). Nesting was confirmed at Croton Unit of Stephens State Forest from 1984–1990 (Kent and Dinsmore 1996), and Cecil (1988) also documented double brooding of this species at the same location. Croton Unit's importance to this species was exemplified when Cecil and Sandrock (1985) observed about ten Worm-eating Warblers in a small area of the forest. There was no atlas block located in the Croton Unit during the second atlas, although Worm-eating Warbler sightings continued at this location during that same time-period.

Distribution of Worm-eating Warbler changed only slightly between atlases. During BBA I, this species was found in six counties (Jackson et al. 1996), and it was found in nine counties during BBA II. Like BBA I, records came from the eastern and central part of the state, with an increase in records from south-central Iowa during BBA II. New counties with atlas records include Allamakee, Winneshiek, Lucas, Monroe, Appanoose, Davis, and Louisa. Since BBA I, most of Iowa's larger public forests have matured, and it appears that Worm-eating Warbler is summering (probably nesting) in many of these larger public forests that contain its preferred habitat. Yellow River State Forest in Allamakee County and Shimek State Forest in Lee and Van Buren counties are two of the largest contiguous forested areas remaining in the state, and two records came from each of these forests during BBA II.

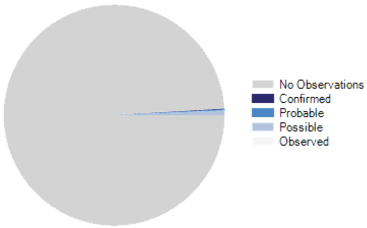
Securing a stable future for this species requires maintaining a system of large continuous forests to serve as source populations for new breeding pairs, which will increase reproductive success by decreasing cowbird parasitism and nest predation (Robinson et al. 1995).

By Bruce L. Ehresman

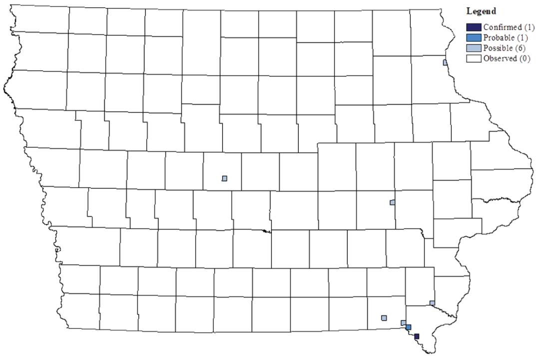
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	1	5	6
Probable	0	1	1
Confirmed	0	1	1
Conf & Prob	0.00%	0.50%	0.20%

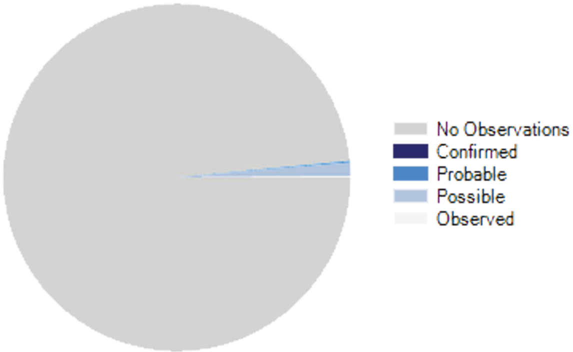
BBA I Results



BBA I



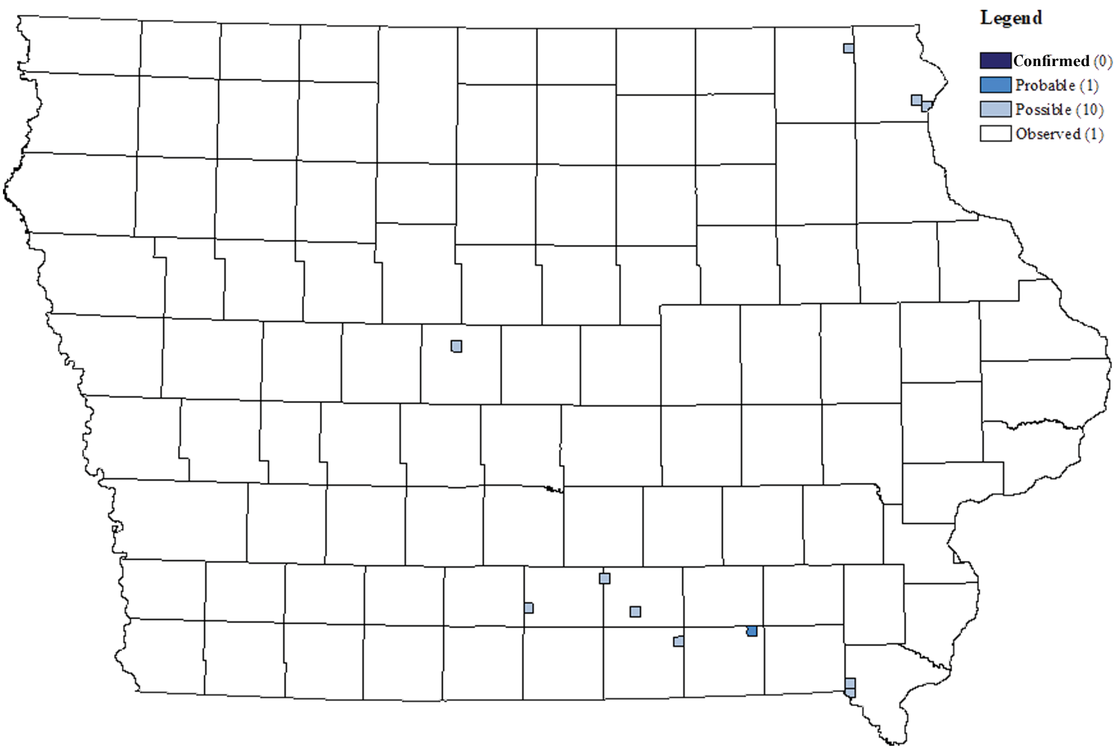
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	1	0	1
Possible	1	9	10
Probable	0	1	1
Confirmed	0	0	0
Conf & Prob	0.00%	0.30%	0.10%

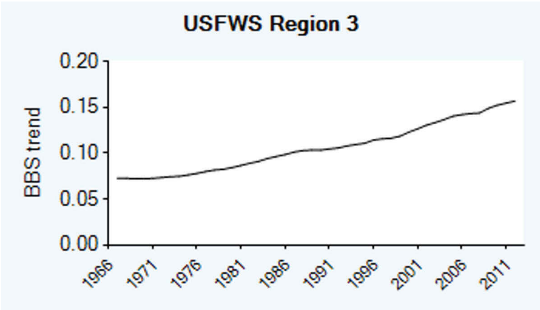
BBA II



© Kevin Murphy

Habitat	Breeds along fast-flowing, clear, gravel-bottomed streams flowing through hilly, closed-canopy, deciduous forests
Breeding Dates	15 Apr (PR)–8 Aug (PR)
Nest Type	Typically in a hole in a steep bank of a stream; base is a mass of leaves and small twigs, with an interior cup formed with mosses and dry grasses, small rootlets, plant stems, and hair
Clutch Size	2–6 eggs (5 eggs typically)
Incubation	12–14 days
Fledging	9–11 days (typically 10 days)
Status	Regular and locally uncommon nesting species
BBS Trend	Stable (trend = 1.0, 95% CI is –0.1, 2.1) [Central US]

Patterns since BBA I



Louisiana Waterthrush is Iowa's only wood warbler that is primarily found in and along small streams within large deciduous forests, where it nests on the ground, typically in small cavities along a stream bank. It is the first warbler to arrive each spring and the first warbler to nest (Mossman and Lange 1982, Jackson et al. 1996). Since this warbler primarily feeds on aquatic invertebrates, the clarity of the water and quality of the stream determine the amount of food available, which influences the territory density and nesting occupancy of this species (Mattsson and Cooper 2006). Like what was found for other Iowa warbler specialist species, Louisiana Waterthrush was reported in 40 (4.6%) blocks in BBA I, with reports increasing to 92 (11.6%) blocks in BBA II. This species is not found on Iowa's BBS, so there is no known Iowa population trend. Throughout its U.S. breeding range, populations have undergone an average annual increase from 2005–2015 of 1.67% (Sauer et al. 2017). Most of the significant increase in Louisiana Waterthrush records of BBA II (from BBA I) is probably related to the extra effort of atlassers to document wood warblers, coupled with an overall increase in the population of this species.

As a bird of interior forest streams, Louisiana Waterthrush is sensitive to water pollution and forest fragmentation (Mattsson et al. 2009) and is considered an excellent bio-indicator of stream health and quality (Mattsson 2006). As streams are acidified or polluted in other ways from human activities, these streams lack sufficient insect prey to support this species (Mulvihill et al. 2008). This wood warbler prefers older-growth forest and is considered area-sensitive, requiring tracts of mature forest 100 ha (250 acres) and larger (Robbins 1979 in COSEWIC 2006). As evidenced for other area-sensitive forest warblers, most Louisiana Waterthrush BBA II nest records (77%) and BBA I records (93%) were from public land blocks.

During the first atlas, Louisiana Waterthrush was found in 27 counties, and 33% of observations confirmed nesting—a high nesting confirmation rate, when compared to other warblers (Jackson et al. 1996). During BBA II, 28% of observations confirmed nesting, although twice as many (26) records of confirmation were added in the second atlas. This warbler was confirmed nesting in 12 counties during BBA I and 19 counties during BBA II. It probably nested in most blocks where it was recorded, similar to what was documented during atlases in Missouri (Jacobs and Wilson 1997) and Illinois (Kleen et al. 2004). The majority (23 of 26) of confirmed records from BBA II were of adults attending young, similar to what was found in other atlases (Jackson et al. 1996, Jacobs and Wilson 1997, Kleen et al. 2004). During BBA II, only one nest (with six eggs) was found (in Boone County) (Ehresman pers. obs.).

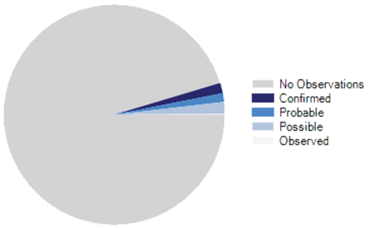
Even though the number of records collected for this warbler more than doubled between atlases, with records from 43 counties, the distribution of this species did not greatly change. In Iowa, this species is at the western edge of its range. It continues to be found in eastern and central portions of the state and along the Des Moines and Missouri rivers. During BBA II, there was a dramatic increase of records found in south-central Iowa, particularly in southern public forests and state parks with mature forests.

Louisiana Waterthrush remains a useful indicator species for environmental quality of forested streams. Its presence during breeding season is an indicator of habitat conditions consisting of relatively pristine headwater streams in extensive unfragmented forests (Mattsson et al. 2009).

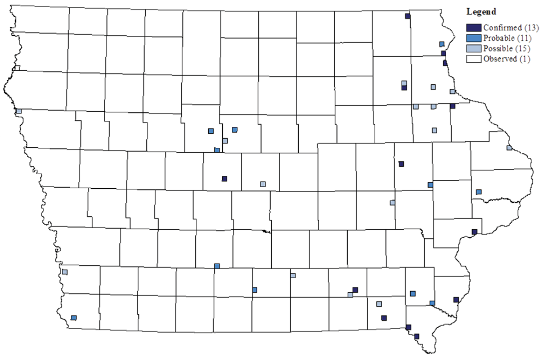
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	1	0	1
Possible	0	15	15
Probable	2	9	11
Confirmed	0	13	13
Conf & Prob	0.40%	5.50%	2.80%

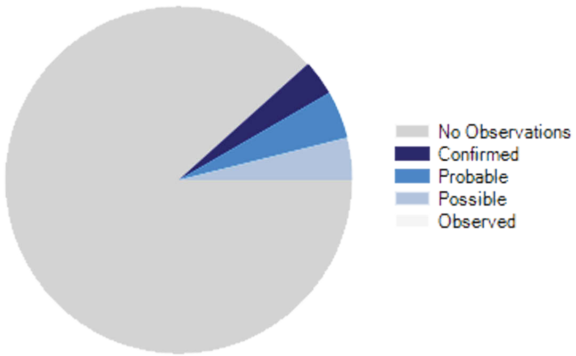
BBA I Results



BBA I



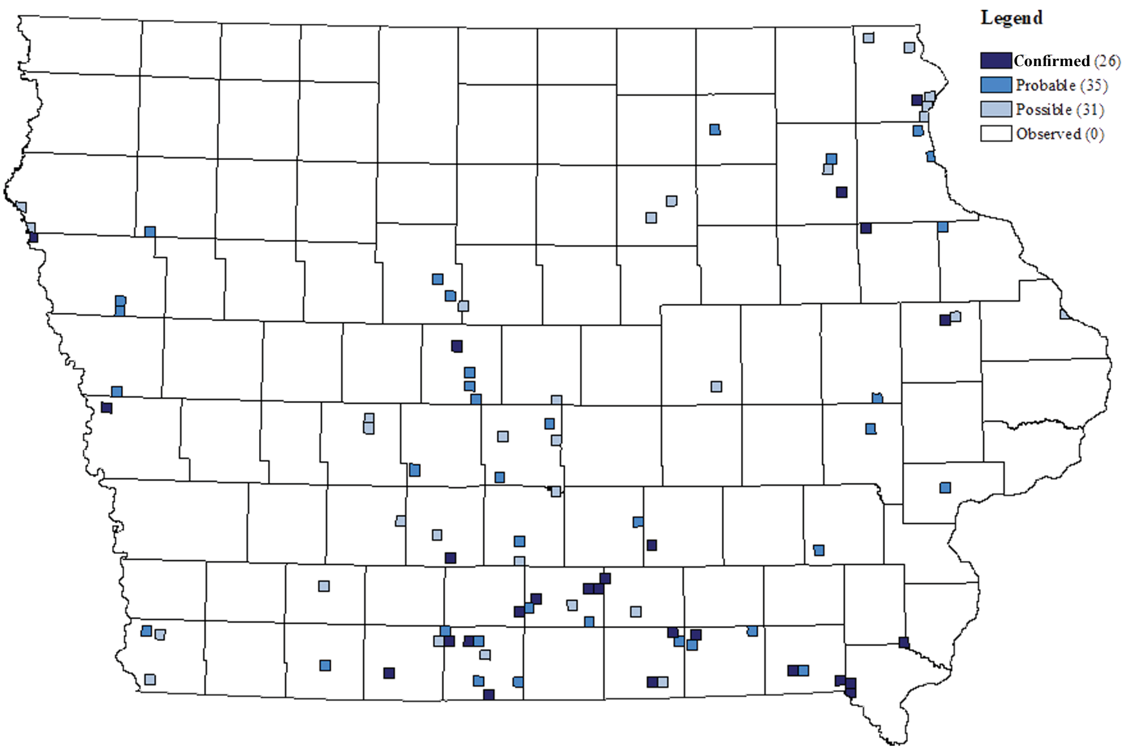
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	10	21	31
Probable	12	23	35
Confirmed	1	25	26
Conf & Prob	2.50%	12.00%	7.10%

BBA II



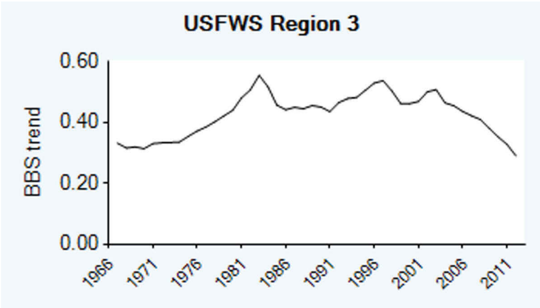
Sponsored by Bruce Ehresman

© James Durbin

Habitat	Shrubby habitat at the edge of forests and in old fields and forest clearings with new shrubby growth
Breeding Dates	18 May (PR)–9 Aug (CO)
Nest Type	Well camouflaged cup-shaped nest constructed near ground of dead leaves, coarse grasses, and shreds of grapevine bark, lined with fine bark shreds, grasses, and hair
Clutch Size	4–5 eggs
Incubation	10–11 days
Fledging	8–10 days
Status	Regular and uncommon nesting species
BBS Trend	Stable (trend = 1.0, 95% CI is –0.6, 2.6) [Central US]

Patterns since BBA I

In Iowa, the Blue-winged Warbler is most often found in early- to mid-successional habitats, especially in areas with dense vegetation and shrubby thickets. Its nest sites typically are close to woodland edges, with nests usually placed close to the ground in goldenrod, berry thickets, or clumps of grass (Gill et al. 2001). In favored habitats this species can be locally common, with a concentrated, significant number of singing males. Statewide, Blue-winged Warbler remains an uncommon species. It was reported in only 42 (4.9%) blocks in BBA I and 59 (7.5%) blocks in BBA II. Iowa's BBSs do not detect this species often enough to create a known trend, and the U.S. population of Blue-winged Warbler from 1966–2015 appears to be stable. While Iowa has been known to be at the north and west edges of its breeding range (Jackson et al. 1996), Robbins (1991) reported that in Wisconsin this warbler expanded its range north and west during the last 60 years. During Wisconsin's first BBA (1995–2000), observers confirmed breeding activity in 13% of the surveyed quads (Temple 2006a).



The percentage of records per breeding evidence category are quite similar for Blue-winged Warbler for both Iowa atlases. During BBA I this species was confirmed in 21.4% of the blocks, and it was confirmed in 24% of BBA II blocks. Attending Young was the code used for 80% of the confirmed records, and like the first atlas only one nest was located. Probable nesting comprised 38% of BBA I records and 31% of BBA II records, with agitated or territorial behavior codes used for most of the records. About 23% of the probable records were seven or more males singing, which indicates quality Blue-winged Warbler habitat in those blocks. Possible nesting comprised 41% of BBA I records and 44% of BBA II records. Public land blocks held 76% of BBA I records and 83% of BBA II records, which is a good indicator that the shrubby habitat that this warbler prefers is much more prevalent in public land blocks than it is in intensively farmed agricultural areas that characterize most grid blocks. Illinois found similar BBA data to Iowa, with only 69 Blue-winged Warbler records and 18% of records confirmed nesting (Kleen et al. 2004).

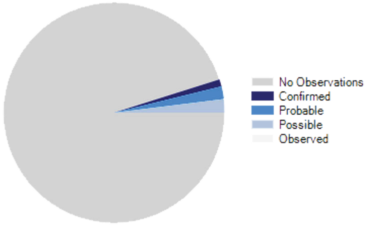
Blue-winged Warbler was found in 23 counties during Iowa's first atlas (Jackson et al. 1996) and in 26 counties in the second atlas. Distribution has typically been in eastern, central, and south-central Iowa (Kent and Dinsmore 1996). While no records came from the western third of the state during BBA I, during the second atlas two probable nesting records came from public land blocks (within Loess Hills WMA) in Monona County, and one possible nesting record came from Stone State Park in Woodbury County. At the 330-acre Sylvan Runkel State Prairie Preserve (Monona County), there were at least seven singing males noted on 1 June 2008, all in the shrubby (mostly dogwood) habitat existing between prairie and woodland (Ehresman pers. obs.). Blue-winged Warblers have been documented most years in this same area through 2019.

Many shrubby habitats that this species occupies, particularly old fields, are disappearing as forests mature in their place (Temple 2006a). Shrubby habitats continue to be cleared in Iowa to make way for more row-crops, and 1.5 million acres of grassland and shrub habitat was converted to row-crops from 2008–2011 (USDA 2012). The loss of mid-successional habitats in the winter range of the Blue-winged Warbler may be an even more significant threat (Gill et al. 2001).

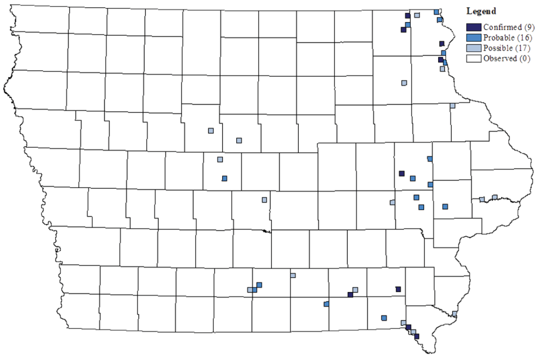
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	6	11	17
Probable	4	12	16
Confirmed	0	9	9
Conf & Prob	0.80%	5.30%	2.90%

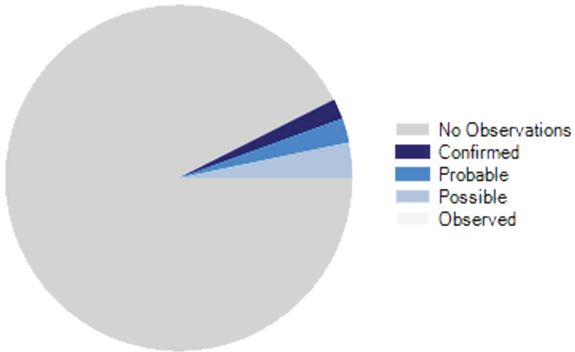
BBA I Results



BBA I



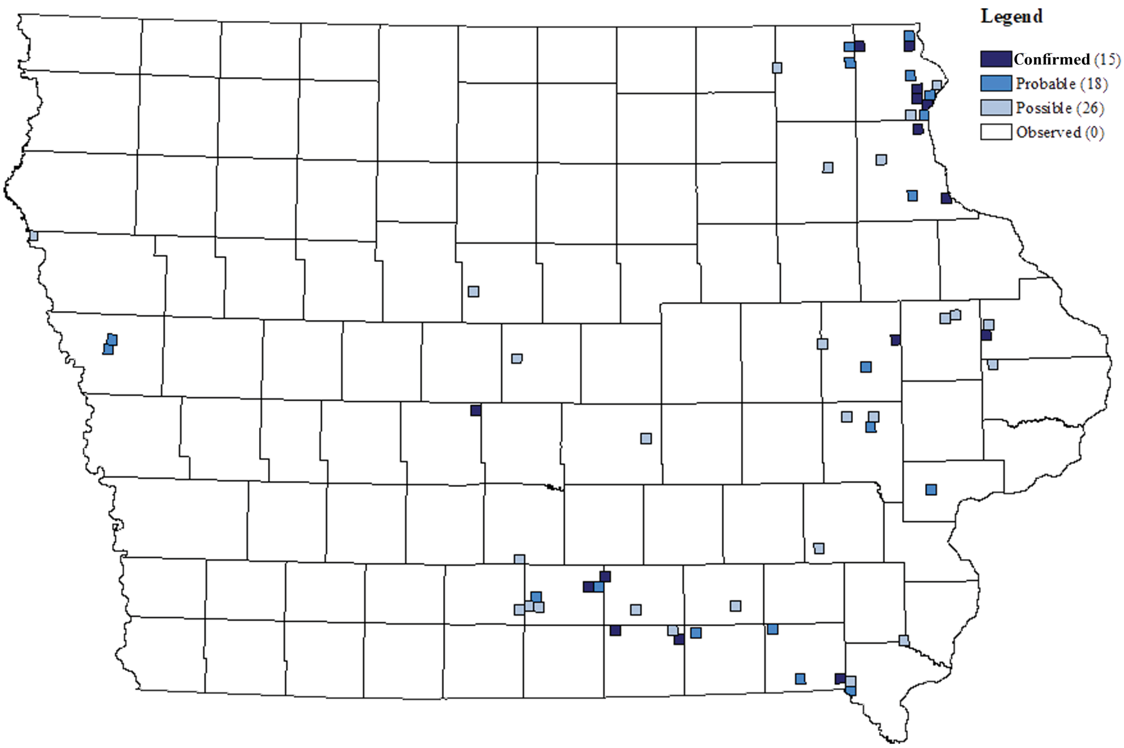
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	4	22	26
Probable	4	14	18
Confirmed	2	13	15
Conf & Prob	1.10%	6.80%	3.80%

BBA II



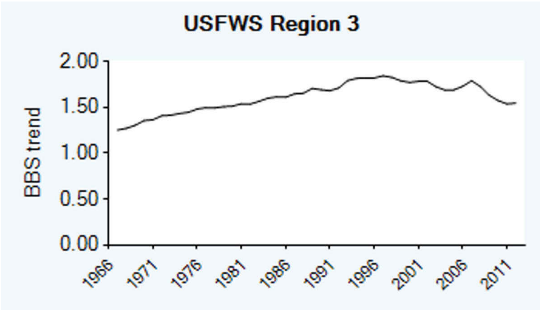
Sponsored by Tom Schilke

© Linda Petersen

Habitat	Large mature and second-growth deciduous and mixed forest; often associated with riverine forest
Breeding Dates	1 Jun (PR)–8 Aug (CO)
Nest Type	Cup nest (on the ground) constructed of dry leaves, coarse grass, skeletonized leaves, strips of inner bark (especially grapevine), pine needles, and rootlets lined with finer grasses, hair, and mosses
Clutch Size	4–6 eggs (ave. 5 eggs)
Incubation	10–12 days
Fledging	8–12 days
Status	Regular and rare nesting species
BBS Trend	Stable (trend = 0.1, 95% CI is –0.7, 0.9) [Central US]

Patterns since BBA I

Since the Black-and-white Warbler is the only North American wood-warbler that regularly forages for insects in the bark of trees (with tree-creeping posture like a nuthatch), it is easy to recognize when seen. Because it is a rare Iowa nester and nests on the ground at the interior of large forests, however, confirming its nesting can be difficult. Adding to detection difficulty is the fact that this bird has a weak, high-pitched song. Not surprisingly only 15 total records were found during BBA I, and even though that number more than doubled to 34 during BBA II, 82% of those BBA II records were in the possible category. Only one record of confirmation occurred in each atlas. During BBA II that record was of recently fledged young observed in a public forest area along the Cedar River in Floyd County. As evidenced for other area-sensitive forest birds, most Black-and-white Warbler records (for both atlases) were from public land blocks that contain large tracts of forest habitat.



Not enough records were gathered during Iowa's BBS to establish any trend for this species, while data from the national BBS (1966–2012) indicate an overall stable population for the species (Sauer et al. 2012).

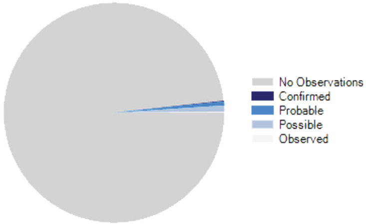
There were substantial changes to Black-and-white Warbler distribution between the two atlases. During BBA I, all records were from 11 counties in the southern half of the state, except for the confirmed nest record from Yellow River Forest in Allamakee County. Records were found in 24 counties during BBA II. In contrast to BBA I, 62% of the BBA II records came from the northern half of the state. One reason for this change in distribution may be related to the fact that more effort was directed at finding interior forest nesting species during BBA II than in the first atlas. More of this warbler's records were expected to be found in the Loess Hills of western Iowa, where a breeding population still is shown to exist (Kricher 2014). In fact, fewer records were found in the forests of the Loess Hills during the second atlas than the first. Like Cerulean Warbler records, most Black-and-white Warbler BBA II records came from large forests associated with larger river corridors. While confirmed and probable records made up only 9% of all records gathered, it is the opinion of bird atlassers in Missouri (Jacobs and Wilson 1997) and Illinois (Kleen et al. 2004) that due to the difficulty of detecting nesting of this species many of the blocks where this species was recorded as a possible nester likely contained nests.

Known as an area-sensitive forest species (Askins and Philbrick 1987, Kricher 2014), the Black-and-white Warbler requires a minimum of 295 ha (738 acres) of continuous forest to maintain a viable breeding population (Robbins 1979), and this species declines in areas where forest fragmentation occurs (Whitcomb et al. 1977, Morse 1989, Kricher 2014). On the positive side, the Black-and-white Warbler does well in many habitat types and successfully nests in both mid- to late-successional forests and mature forests. Overall, because it is a generalist with broad habitat tolerances (especially on its wintering grounds) and inhabits a wide geographic range, the outlook for the future of this unique tree-creeping species remains good (Kricher 2014). Regarding the future of this nesting species in Iowa, maintaining large unfragmented forest tracts along riparian corridors may be the best long-term management strategy: especially in conjunction with current landscape management strategies implemented in Iowa's BCAs.

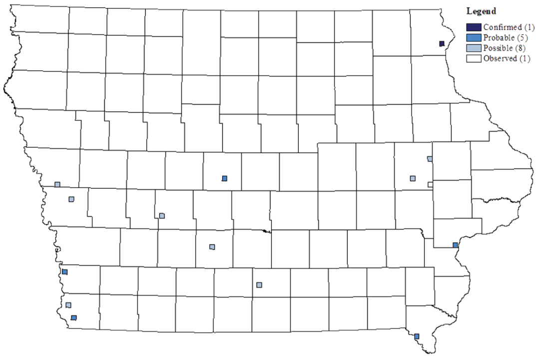
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	1	1
Possible	4	4	8
Probable	0	5	5
Confirmed	0	1	1
Conf & Prob	0.00%	1.50%	0.70%

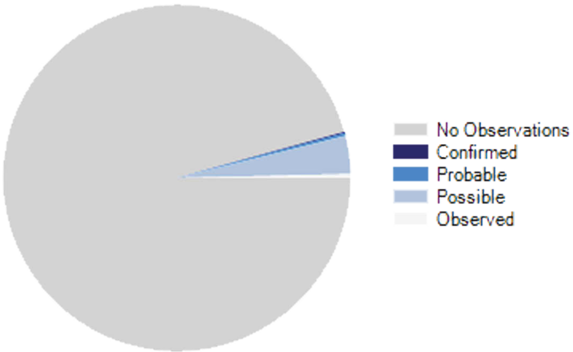
BBA I Results



BBA I



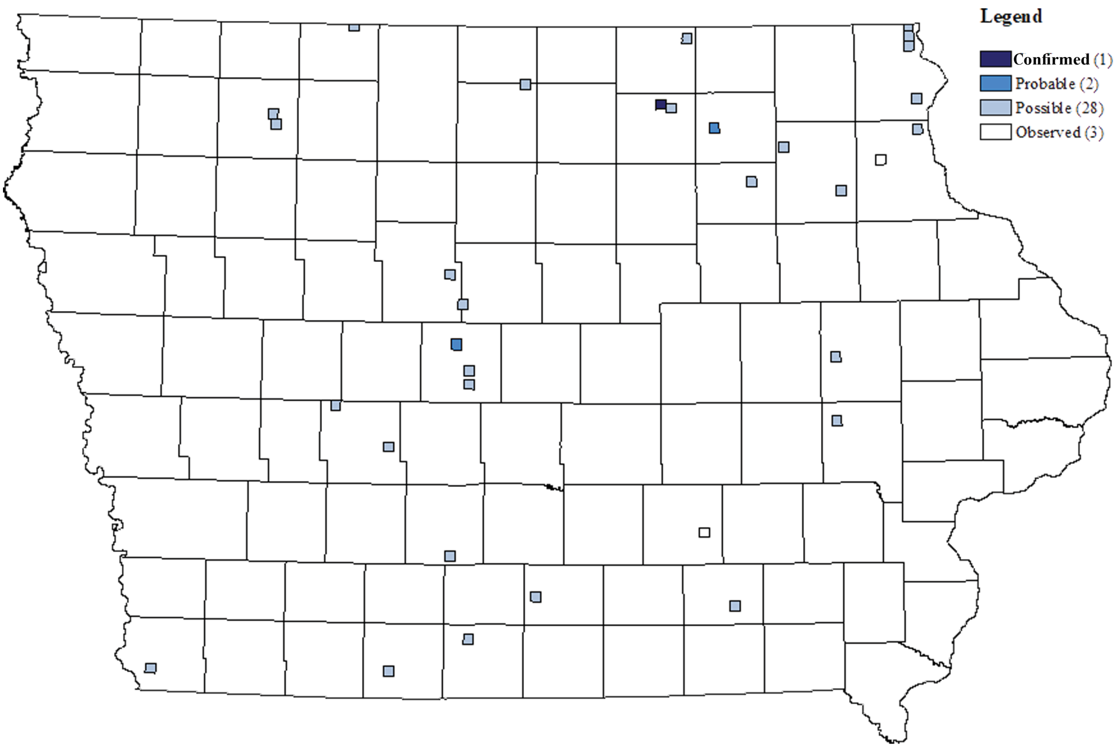
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	1	2	3
Possible	3	25	28
Probable	0	2	2
Confirmed	0	1	1
Conf & Prob	0.00%	0.80%	0.30%

BBA II



Sponsored by Billy Reiter-Marolf

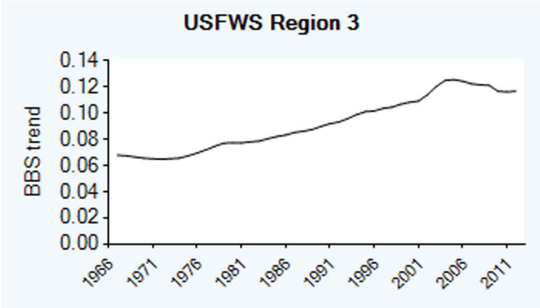
Prothonotary Warbler *Protonotaria citrea*

© Mark Brown

Habitat	Bottom land hardwood forests and swampy riparian woodlands with snags for nest sites
Breeding Dates	8 May (PR)–31 Jul (CO)
Nest Type	A tree cavity (or nest box) partly filled with moss, dry leaves, small twigs and bark; lined with fine rootlets, fine grasses and sedges, and hair
Clutch Size	3–8 eggs (5 eggs typically)
Incubation	12–14 days
Fledging	10 days
Status	Regular and locally common nesting species
BBS Trend	Decreasing (trend = −1.1, 95% CI is −1.9, −0.2) [Central US]

Patterns since BBA I

Prothonotary Warbler is the only cavity-nesting warbler in the eastern half of the United States. This strikingly beautiful bird rarely is found outside its specialized habitat of wooded backwater areas of larger rivers and lakes. It primarily nests in snags over water, especially nesting in tree cavities created by Downy Woodpeckers (Dryobates pubescens), and nesting in natural cavities (Petit 1999). This species was reported in 44 (5%) blocks in BBA I and increased to 83 (11%) blocks in BBA II. This species is not found often enough on Iowa's BBS to show a trend. Throughout its U.S. breeding range, populations have undergone an average annual decline from 1966–2015 of 1.10% (Sauer et al. 2017). The significant increase in Prothonotary Warbler records of BBA II is almost certainly related to extra effort to document wood warblers, using knowledge gained in the field during the first atlas.



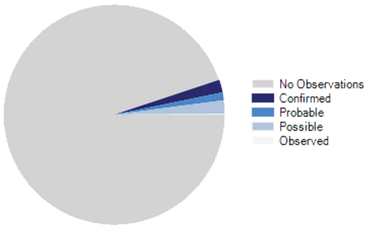
Prothonotary Warbler exhibits a moderate level of forest area sensitivity on breeding grounds and typically avoids forest tracts smaller than 100 ha (250 acres) (Robbins et al. 1989). It also typically avoids riparian woodlands that are less than 30 m wide (Kahl et al. 1985). As evidenced for other area-sensitive forest birds, approximately 90% of all Prothonotary Warbler nest records (from both atlases combined) were from public land blocks of preferred riparian forest habitat. Perhaps especially because of this warbler's propensity to nest in tree cavities in backwater areas that often are inaccessible, it is difficult to detect this bird unless it is heard singing. Once the singing male is detected, however, the nest site often can be found. The nest usually is 5–10 feet above the water or ground. This species often raises two broods per year (Petit 1999), which provides more opportunities for nests to be discovered. During the first atlas, 36% of Prothonotary Warbler observations confirmed nesting, which was the highest incidence of nesting confirmation for all Iowa warblers (Jackson et al. 1996). During BBA II, 28% of observations were confirmations of nesting (in 13 counties). It was confirmed nesting in 11 counties during BBA I. Records came from 26 counties in BBA I (Jackson et al. 1996) and from 36 counties during BBA II. Kent and Dinsmore (1996) indicate summer records for 37 counties, from 1960–1995. Certainly, most of the nesting for this species occurs in the eastern two-thirds of the state. Like what was observed during BBA I, the Mississippi River held most of the confirmed nesting records. During BBA II, every eastern border county except Dubuque held one or more blocks with nesting confirmation. Other major rivers with multiple records include Des Moines, Skunk, Iowa, Wapsipinicon, Cedar, and Missouri. Unlike what was found during the first atlas, no records were documented along the Little Sioux River or in the Great Lakes area of Dickinson County. Throughout much of western Iowa the lack of riparian forests in intensively farmed areas limits the occurrence of this species. As more and more land is cleared of trees (for farming) along Iowa's waterways (as is happening along the Little Sioux and many other rivers) more Prothonotary Warbler habitat can be expected to disappear.

While logging and agricultural conversion of bottomland hardwood forests have proven detrimental to breeding populations, a greater threat to this beautiful songster of the swamp may be the rapid destruction of its mangrove habitats in northern South America, where most Prothonotary Warblers overwinter (Petit 1999). Prothonotary Warbler remains a useful indicator species for environmental quality of forested wetlands.

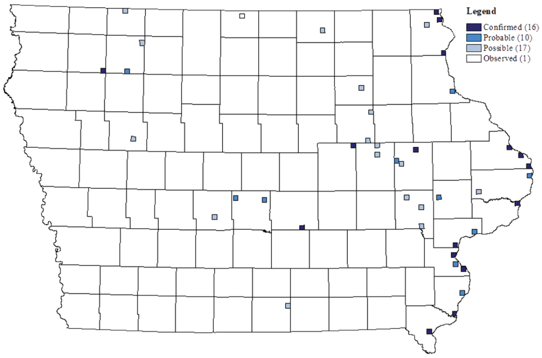
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	1	1
Possible	4	13	17
Probable	0	10	10
Confirmed	0	16	16
Conf & Prob	0.00%	6.50%	3.00%

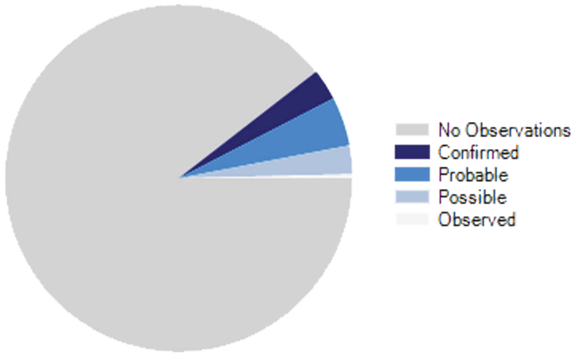
BBA I Results



BBA I



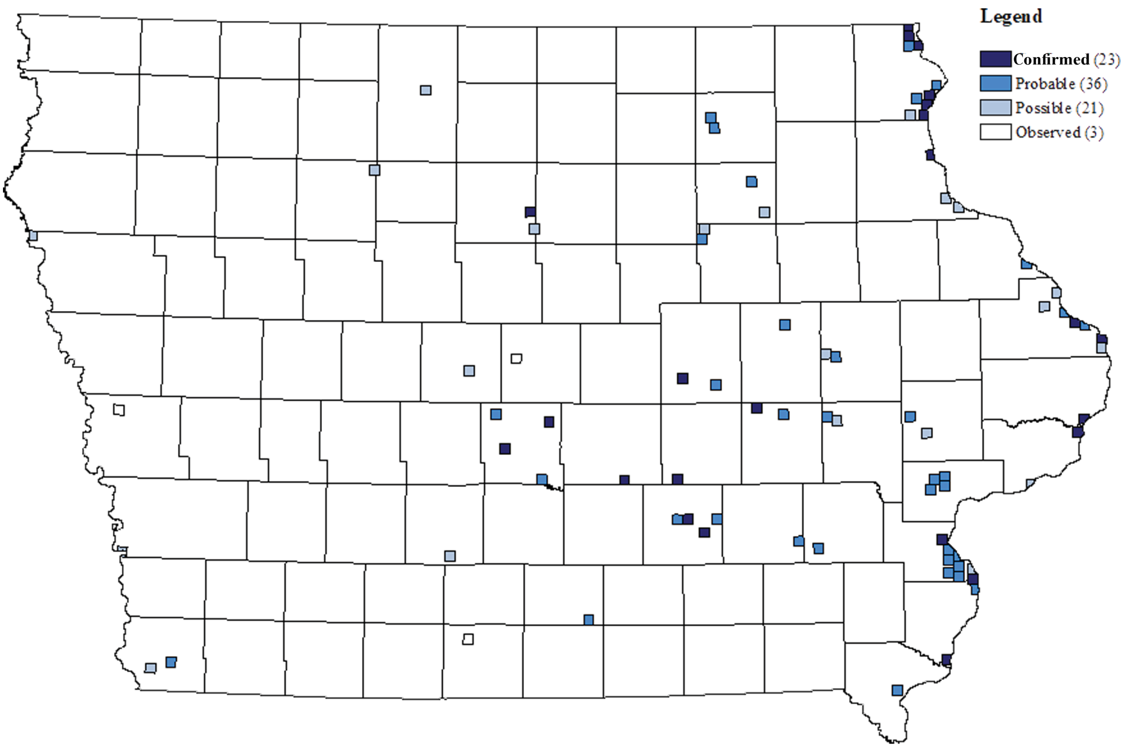
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	1	2	3
Possible	2	19	21
Probable	5	31	36
Confirmed	3	20	23
Conf & Prob	1.50%	12.80%	6.90%

BBA II



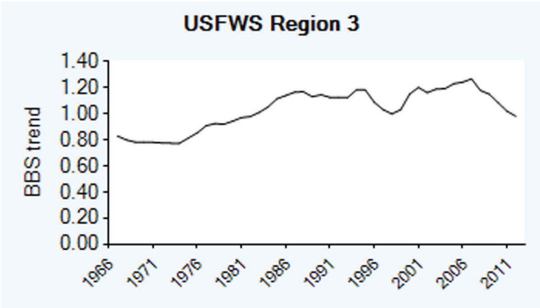
Sponsored by Ric Zarwell

Kentucky Warbler *Geothlypis formosa*

© James Durbin

Habitat	Large tracts of structurally diverse deciduous forests (especially oak-hickory), typically with interior streams or ravines
Breeding Dates	10 May (PR)–4 Aug (CO)
Nest Type	Open cup of thick grasses lined with rootlets and finer grasses placed within unique bed of 3-6 oak leaves on the ground and braced by adjacent stems of shrubs, saplings, and brush
Clutch Size	3–6 (typically 4)
Incubation	11–13 days
Fledging	7–10 days (typically 8-9)
Status	Rare to locally fairly common nester
BBS Trend	Decreasing (trend = −0.9, 95% CI is −1.5, −0.3) [Central US]

Patterns since BBA I



Rare over much of Iowa, the Kentucky Warbler reaches sizable numbers in a few heavily forested areas in the state's southern and eastern thirds. Although this secretive, long-legged warbler was found in 10% of blocks on both atlases, total detections grew from 55 to 75 and probable/confirmed nesting almost doubled (26 to 45). Confirmed nesting nearly tripled (8 to 22). Not surprisingly, 89.3% of all data came from habitat blocks that contain most of the public lands holding big, diverse forests favored by this area-sensitive species. Because Kentucky Warbler adults and fledglings have loud, distinctive call notes and spend most of their time near an observer's eye level (McDonald 2013), all confirmations on BBA II stemmed from fledglings (4) or adults attending young (18). Moreover, ten of these confirmations produced two or more broods, and two instances of probable nesting resulted from an observer finding >7 singing males.

In both BBAs, Kentucky Warbler persisted at long-established locations. Jackson et al. (1996) said this species was "locally common in prime habitat in Lee and Van Buren counties," and this characterization was true in BBA II. Both atlases showed lines of detections in contiguous forests along Mississippi River tributaries to approximately Cedar Rapids and Fort Dodge. Several isolated blocks away from major rivers in central and eastern Iowa had probable/confirmed nesting. The Loess Hills produced data from southwestern Iowa to near South Dakota.

The BBA II atlassers documented clusters of probable and confirmed nesting in BCAs through Appanoose, Davis, Lucas, and Monroe counties, and even further west to Decatur and Ringgold. This region is swathed by wide ribbons of hilly oak-hickory forests, often far from major riparian corridors. In previous centuries, portions of these habitats were oak savannas, which have since transformed by natural succession and changes in land-use practices. Kentucky Warblers have pioneered accordingly through the rolling terrain of these newly linked forests. A similar process likely guided the species' earlier progression through the Loess Hills. Similar northward expansion has occurred in Illinois (Graber et al. 1983, cited in Johnson et al. 1996). The BBS data also indicate annual population gains at the northwest extent of the species' range in Missouri (1.58%/year) as well as Kansas (5.32%/year), despite declines in other regions (Sauer et al. 2017).

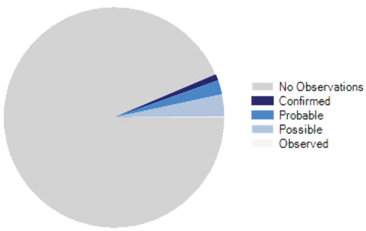
Concentrations of confirmed/probable nesting in BBA II were strongly associated with state forests and wildlife management areas. Some of these sites, such as the ~15,000-acre Stephens Forest in south-central Iowa, are actively managed for a wide variety of purposes including sustainability, silviculture, wildlife habitat, and research (Iowa Department of Natural Resources Bureau of Forestry 2009). Resulting practices can create small openings that mimic treefall gaps, which provide the dense ground cover preferred by Kentucky Warblers on their breeding territories (Kilgore et al. 1996, Gram et al. 2003, Bakermans et al. 2012, McDonald 2013). Elsewhere, heavy use of even-aged stand management has produced the opposite effect on the forest understory, and Kentucky Warblers have declined (Augenfeld et al. 2008, cited in McDonald 2013). Prescribed fire has shown negative short-term effects on Kentucky Warbler (Aquilana et al. 2003), but small, patchy fires might stimulate regrowth suitable for the species. Relatively small (500 ha) or narrow forests are unlikely to sustain populations, especially in heavily fragmented landscapes of the Midwest (Gibbs and Faaborg 1990, Peak and Thompson 2006). Protection of Iowa's largest forests and judicious management techniques will play a prominent role in Kentucky Warbler's persistence into BBA III.

By Shane S. Patterson

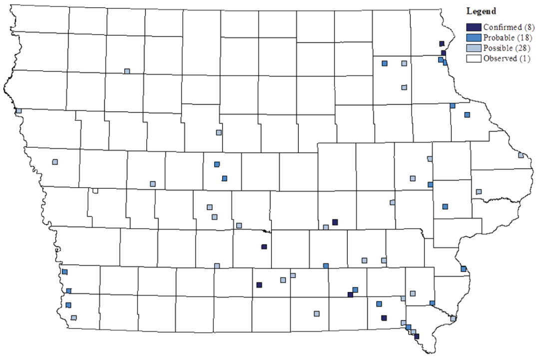
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	1	1
Possible	7	21	28
Probable	2	16	18
Confirmed	0	8	8
Conf & Prob	0.40%	6.00%	3.00%

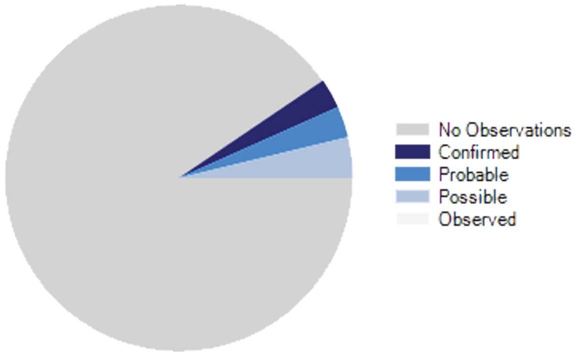
BBA I Results



BBA I



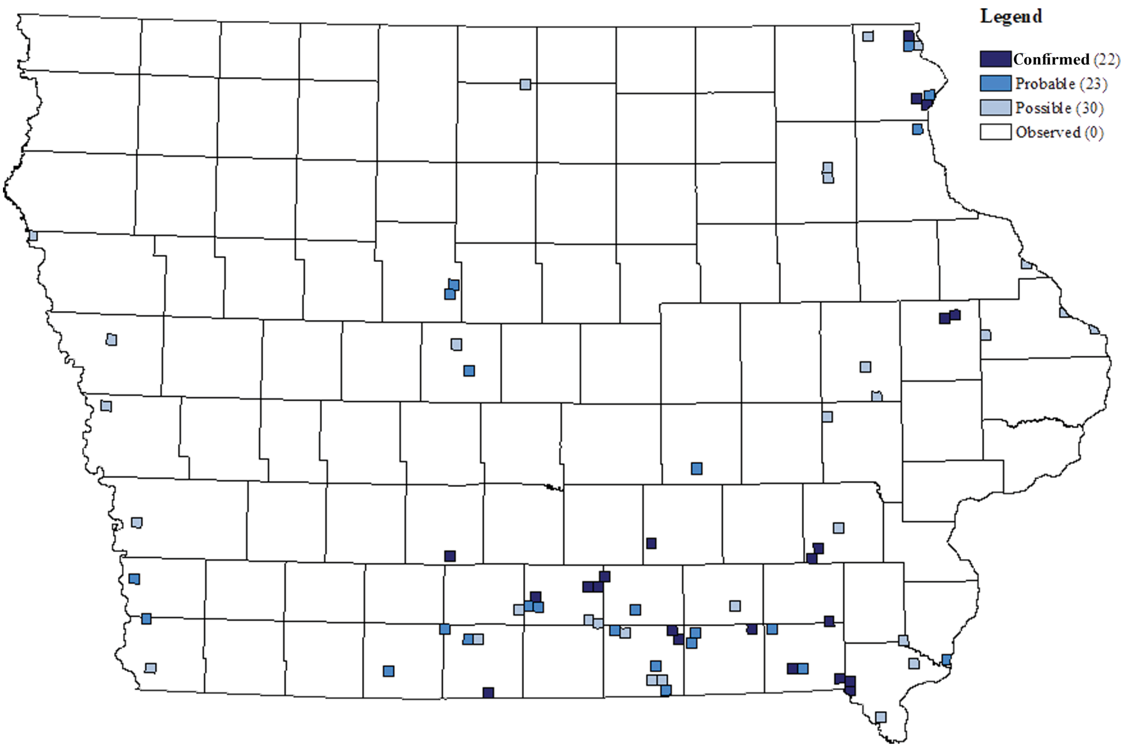
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	4	26	30
Probable	0	23	23
Confirmed	4	18	22
Conf & Prob	0.80%	10.30%	5.20%

BBA II



Sponsored by Marlene Ehresman

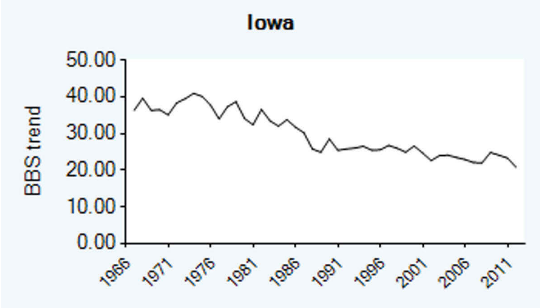
Common Yellowthroat *Geothlypis trichas*

© Linda Petersen

Habitat	Wide range of sunny habitats: prairie-pothole marshes, sloughs, meadows, floodplains, prairies, moist forest margins
Breeding Dates	6 May (PR)–27 Aug (PR)
Nest Type	Bulky cup placed on or near ground; outer layer of thick stems and leaves of various plants and more intricately woven inner cup comprised of finer stems of grasses and sedges
Clutch Size	1–6 eggs (typically 4)
Incubation	12 days
Fledging	12 days
Status	Fairly common to abundant nester statewide
BBS Trend	Decreasing (trend = −1.1, 95% CI is −1.6, −0.5) [Iowa]

Patterns since BBA I

Long established as a prolific nester in Iowa (J. J. Dinsmore et al. 1984), the Common Yellowthroat lives up to its name by thriving in all of Iowa's landforms. Thus, it is not surprising that atlassers detected Common Yellowthroat in 99.5% of blocks and established it as probable/confirmed in 95.7%, thereby placing this boisterous warbler soundly within the top 15 in both categories on BBA II. Of 299 confirmations, the majority (218) occurred in habitat blocks (public lands), where observers had more opportunities to pursue nesting birds on foot. In the largely agricultural landscapes of grid blocks, such as those in the western quarter of the state, instances of probable nesting were typically restricted to roadside auditory detections of singing males.



Common Yellowthroat is the most thoroughly distributed warbler in Iowa (Kent and Dinsmore 1996), and on BBA II, atlassers filled in most of the remaining small gaps within the state. Much of this consolidation may have stemmed from more comprehensive observer coverage, particularly in grid blocks. However, other growth could have resulted from localized habitat restorations that occurred as a remedy to long-term declines in wetlands and grasslands across the species' range.

Although still widespread and numerous in the state, Common Yellowthroat populations have diminished steadily. According to the BBS, the species has been decreasing in Iowa by an average annual rate of 1.29% since 1966, and neighboring states have experienced comparably significant reductions (Sauer et al. 2017). This overlaps with centuries-long, mass reduction in wetlands in the United States, such as in Iowa, where at least 89% of all wetlands were lost by the late 1980s (Dahl 1990). Much of this damage came from removal of prairie-pothole marshes, sloughs, and floodplain wetlands by installation of ditches and drainage tiles (Bishop 1981). The Common Yellowthroat lost considerable nesting habitat and a downward trajectory has since defined this warbler's populations (Guzy and Ritchison 1999, Sauer et al. 2017).

In recent decades, farmers and public-land managers alike have recognized the importance of wetlands and used a variety of methods to restore these dynamic habitats on Iowa's public and private lands (Galatowitsch and van der Valk 1994). These actions may have helped to buoy Common Yellowthroat populations in the face of potentially steeper declines. The Common Yellowthroat can be a secondary beneficiary of projects aimed at waterfowl, which also nest in prairie-pothole habitats (Guzy and Ritchison 1999). Perhaps the establishment of conservation easements, like Wetland Reserve Program fields, played a role in increased detections and confirmations on BBA II. This would be especially likely in the Des Moines Lobe of the prairie-pothole region, which is considered of utmost priority by waterfowl conservation groups (Ducks Unlimited 2018).

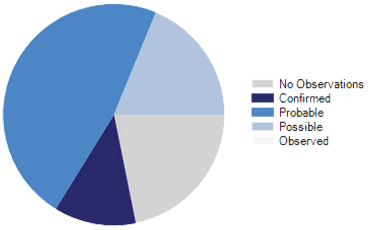
This distinct warbler not only nests along wetlands but also in prairies (Lowther 1993b), notably thriving in dense native grasslands of CRP fields (Patterson and Best 1996, Delisle and Savidge 1997, Cunningham 2000). CRP acreage during the decades leading up to BBA II was higher than at the initiation of BBA I, and this grassland habitat may have helped to sustain yellowthroat populations that would have otherwise declined more rapidly. The CRP acreage has fallen steadily since its peak in 2007, however, coinciding with a continued overall reduction in grassland on the landscape. Retaining and expanding what is left of Iowa's prairies and marshes will prove vital in keeping the Common Yellowthroat common into BBA III, along with providing protection for rarer species in those habitats.

By Shane S. Patterson

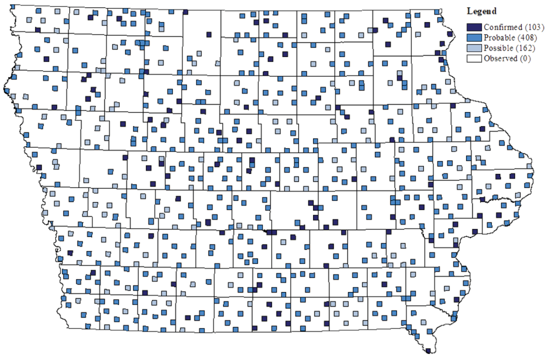
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	114	48	162
Probable	187	221	408
Confirmed	36	67	103
Conf & Prob	42.70%	72.20%	59.30%

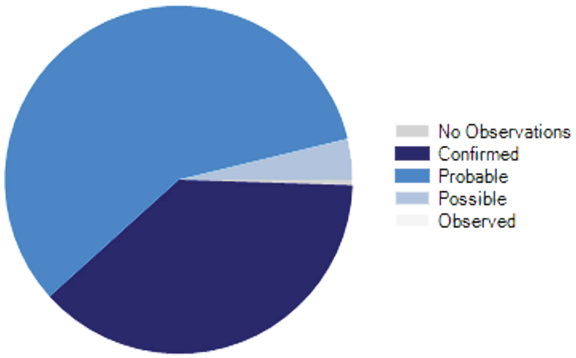
BBA I Results



BBA I



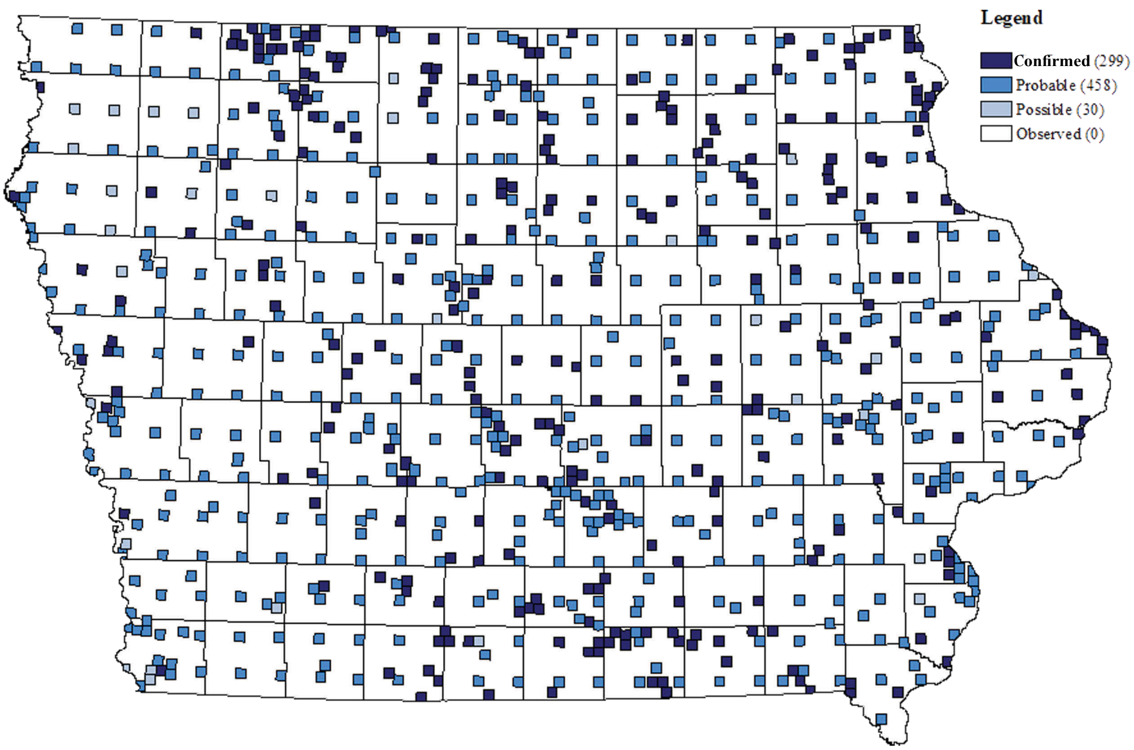
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	23	8	31
Probable	289	171	460
Confirmed	81	218	299
Conf & Prob	70.90%	97.50%	88.20%

BBA II

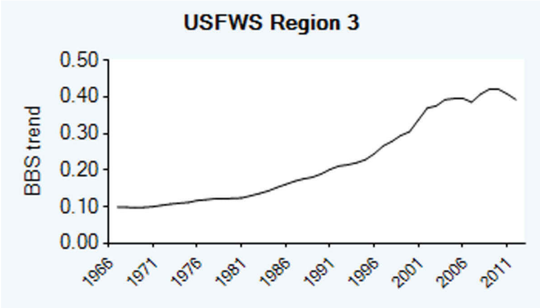


Sponsored by Connie Van Ersvelde

© Tyler Harms

Habitat	Large tracts of mature deciduous forests, where it is associated with dense understory vegetation in forest gaps
Breeding Dates	28 May (PR)–8 Aug (PR)
Nest Type	Cup-shaped nest constructed of dead leaves, plant fibers, grasses, and fibrous bark lined with fine rootlets, soft grasses, plant fibers, and hair, wrapped together with spider silk
Clutch Size	2–5 eggs (ave. 4 eggs)
Incubation	12 days
Fledging	8–9 days
Status	Regular and rare nesting species
BBS Trend	Increasing (trend = 1.9, 95% CI is 0.9, 2.8) [Central US]

Patterns since BBA I



Hooded Warbler is a shy and reclusive interior-forest species, and it nests low to the ground in dense vegetation. The species is regarded as a "gap specialist," since its habitat typically includes gap or edge habitat that is preferred by females for nesting (Chiver et al. 2011). Unless the Hooded Warbler's song is heard, even when this species is present it probably goes largely undetected. This warbler was only reported in seven (0.8%) blocks in BBA I, slightly increasing to 14 (1.8%) blocks in BBA II. While this species is not detected on Iowa's BBS, throughout its U.S. breeding range populations have undergone an average annual increase from 1966–2015 of 1.36% (Sauer et al. 2017).

While Hooded Warblers primarily breed in large mature forests (Robbins 1979), some studies have found that this species also nests in small forest fragments (less than five ha) that occur near large contiguous forests (Tarof et al. 1998, Norris and Stutchbury 2001, Rush and Stutchbury 2008). Studies also have found that productivity was lower in these small fragments, due to increased parasitism by Brown-headed Cowbirds, which suggest that small fragment woodland habitats are population sinks (Rush and Stutchbury 2008). Higher nesting densities of this species generally are found when there is a more extensive shrub layer and a larger area of contiguous forest. Forests that are larger than 150 ha fledge more young per nest than small (5 – 30 ha) forest fragments (Chiver et al. 2011).

Most atlas records for Iowa's area-sensitive forest birds have been found in public land blocks. For Hooded Warbler, 100% of both atlas records came from public land blocks, where large tracts of preferred mature forest habitat exist. During the first atlas there was one (14%) record of confirmed nesting, which increased to four (29%) confirmed records during BBA II. Due to the difficulty of locating Hooded Warbler's nests and the fact that this bird also is a rare nester in adjacent states, atlassers confirmed no nests in Missouri (Jacobs and Wilson 1997) and only four in Illinois (Kleen et al. 2004). The highest percentage (43%) of records found during BBA II was in the possible category, and 21% of records were in the observed category. Three confirmed records were attending young, two in Shimek State Forest in Lee County and one in Coralville Reservoir in Johnson County. The fourth record (Holst Forest in Boone County) was of recently fledged young.

Distribution of Hooded Warbler changed very slightly between atlases. During BBA I, this species was found in six counties (Jackson et al. 1996), and during BBA II it was found in twelve counties. For both atlases, records came from the eastern and central part of the state. During BBA II, however, three additional records came from south-central and one record came from north-central Iowa. According to Kent and Dinsmore (1996), most consistent summer records have come from Allamakee and Lee counties.

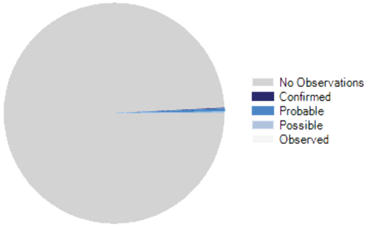
Specifically, Yellow River State Forest in Allamakee County and Shimek State Forest in Lee and Van Buren counties are two of the largest contiguous forests remaining in the state. Records came from both forests during both atlases.

According to Chiver et al. (2011), Hooded Warbler is widespread and abundant throughout its breeding range, and no species-specific management is needed. It is on the winter grounds where the biggest threat to this species may exist, and many parts of the winter range already have been deforested, eliminating crucial habitat for winter territories (Stutchbury 1994).

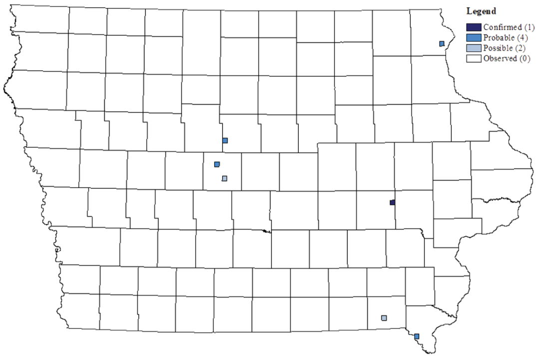
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	0	2	2
Probable	0	4	4
Confirmed	0	1	1
Conf & Prob	0.00%	1.30%	0.60%

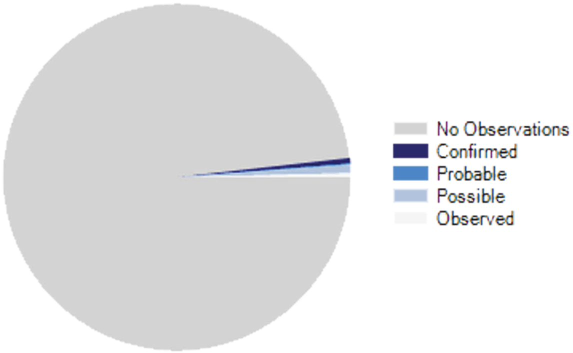
BBA I Results



BBA I



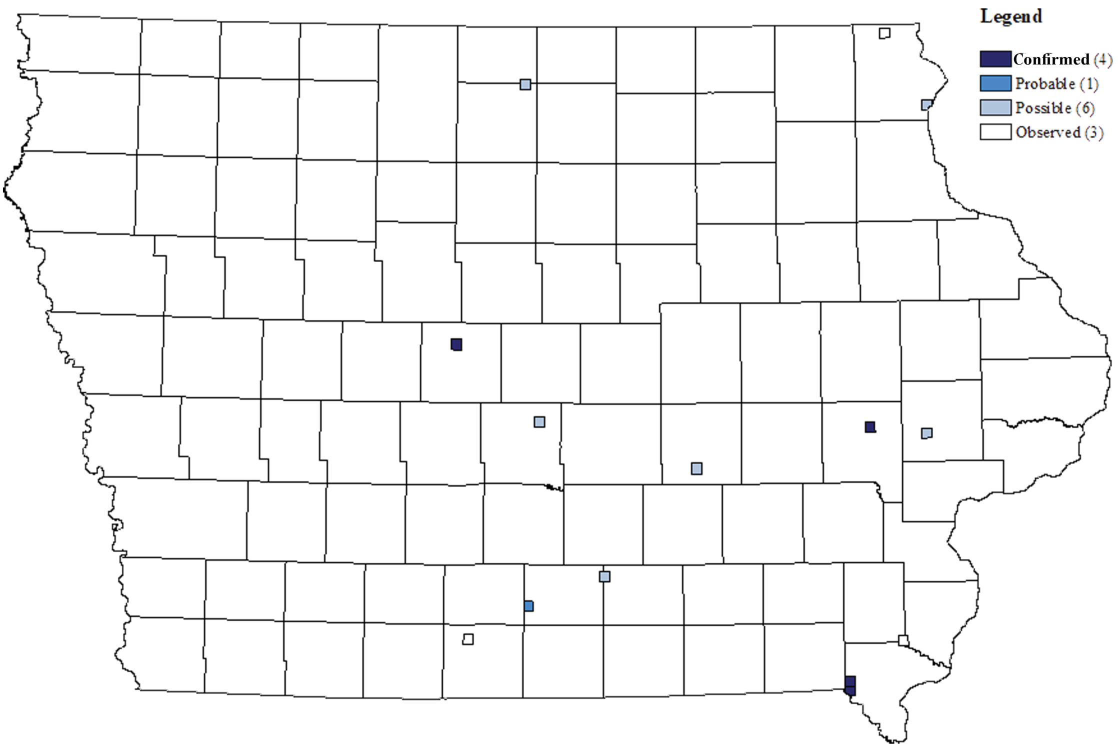
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	3	3
Possible	0	6	6
Probable	0	1	1
Confirmed	0	4	4
Conf & Prob	0.00%	1.30%	0.60%

BBA II



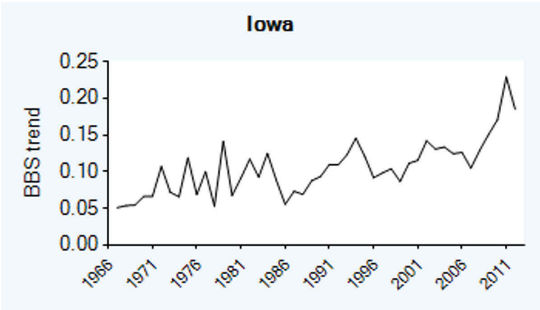
Sponsored by Dan Ehresman

© James Durbin

Habitat	Nests in moist, deciduous, second-growth woodlands with abundant shrubs, primarily along rivers, streams, and lakes
Breeding Dates	14 May (PR)–18 Aug (PR)
Nest Type	Cup nest in tree or shrub constructed of plant fibers, rootlets, and spider-silk lined with fine grasses, shredded bark, and hair, ornamented with lichens, mosses, and feathers
Clutch Size	1–5 eggs (ave. 4 eggs)
Incubation	11–12 days
Fledging	9 days
Status	Regular and common nesting species
BBS Trend	Stable (trend = 2.4, 95% CI is –1.3, 7.7) [Iowa]

Patterns since BBA I

American Redstart is the third most frequently reported warbler in Iowa, following Common Yellowthroat and Yellow Warbler, as was true in the first atlas (Jackson et al. 1996). This species especially inhabits young or second growth woodlands with a dense shrub and understory component, particularly along woodland edges or streamside, in floodplain forests and swampy woodlands, and in thickets that border marshes and lakes. While 202 (26%) total records were found during BBA I, that number more than doubled to 456 (53%) records found during BBA II. While these numbers might seem to indicate that Iowa's redstart population dramatically increased, Iowa's BBS indicates a stable population (Sauer et al. 2012). In the United States from 1966–2013, the American Redstart population declined by 1.43% per year (Sauer et al. 2014). The increase in detection during the second atlas may be due to increased effort and more experienced atlassers collecting field data.



While nearly half of BBA I records were in the possible category, only 25% of BBA II records were. On the other end of the spectrum 51% of BBA I records were confirmed or probable, and 74% records were confirmed or probable during BBA II. The fact that 72% of all BBA I and 69% of all BBA II records were found in public land blocks indicates that this species is found more consistently on lands that are more specifically managed for wildlife than are private lands (where less than one-third of all records were found). The confirmation rate went from 15% in BBA I to 27% in BBA II. Nests of this species are usually in shrubby habitat and difficult to find, which may be why most nesting confirmations were of parents attending young or recently fledged young. Since the redstart tends to be more aggressive than shy, it probably was detected in most blocks where it occurred, and this species likely nested in every block in which it was detected as a possible or probable nester (Jacobs and Wilson 1997, Kleen et al. 2004).

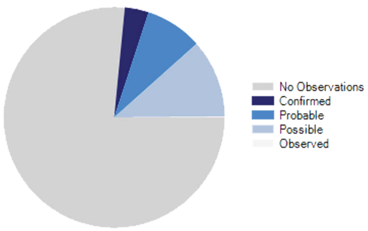
Although the American Redstart was found in 76 counties during the first atlas (Jackson et al. 1996) and 93 counties in the second atlas, the distribution within the state probably did not significantly change. The sparsity of records in northwestern Iowa fits well with the U.S. distribution map (Sherry et al. 2016) that indicates very little nesting in that part of Iowa. There are many more American Redstart records in north-central Iowa (especially in Dickinson, Emmet, Clay, and Palo Alto counties) in the second atlas than in the first. This may be related to a lack of atlassing effort in that portion of the state during the first atlas, with much more even coverage of the state's blocks during BBA II. This might also explain the increase of records in some of the more southern counties, where there was little coverage during BBA I.

An advantage that American Redstart has over area-sensitive forest species is that nesting territories typically are relatively small and population densities can be high (Sherry et al. 2016). Throughout the state, where redstart habitat was optimum, most probable BBA records collected were of seven or more males singing. Another advantage is that redstarts occur in a range of successional stages, especially in mosaics of forest plots of different ages (Yahner 2003), and early- to mid-successional habitats are more suitable and more preferred by this species over older forests (Sherry et al. 2016). Current Iowa forestry practices that encourage regeneration of oak trees should benefit American Redstarts.

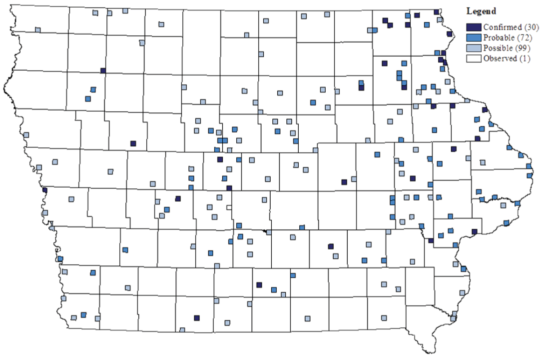
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	1	0	1
Possible	33	66	99
Probable	18	54	72
Confirmed	5	25	30
Conf & Prob	4.40%	19.80%	11.80%

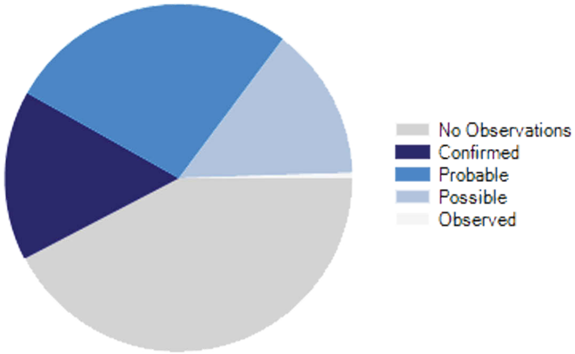
BBA I Results



BBA I



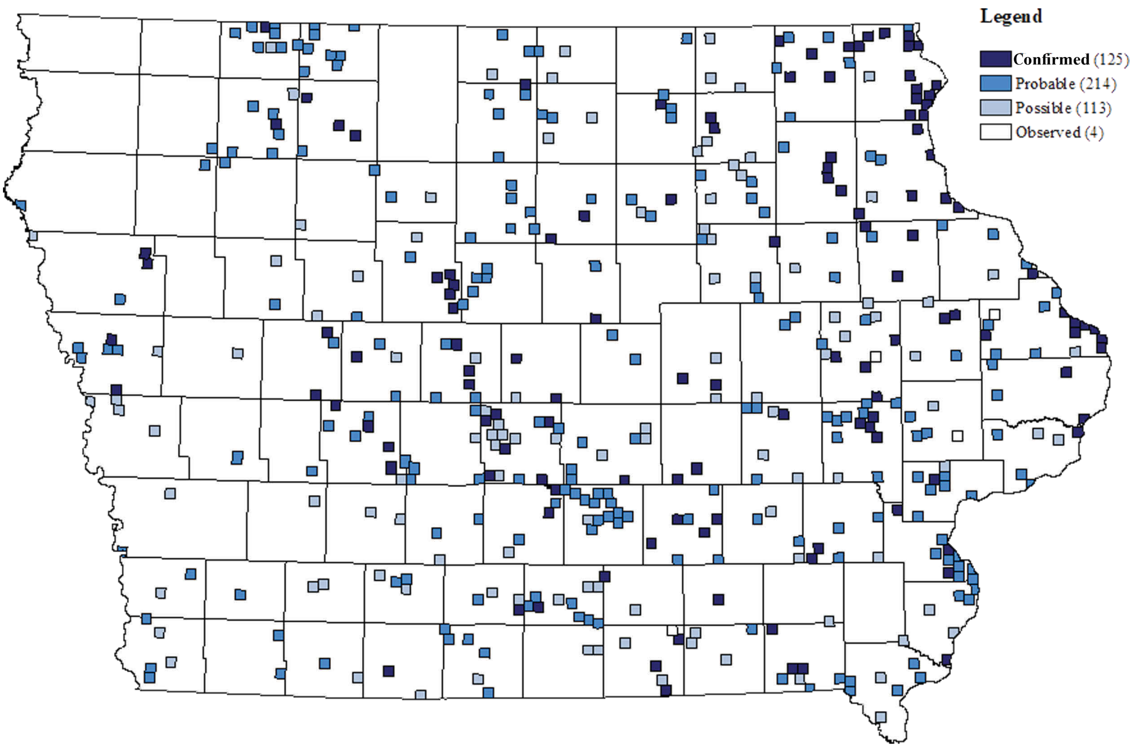
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	3	1	4
Possible	48	65	113
Probable	62	152	214
Confirmed	30	95	125
Conf & Prob	17.60%	61.90%	39.40%

BBA II



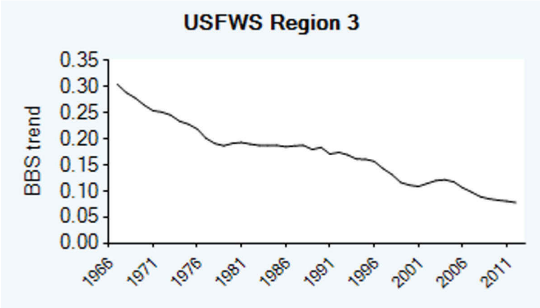
Sponsored by Kirsten Winter

© Mark Brown

Habitat	Large (1,000+ acre tracts) mature and older growth deciduous forests with broken canopies; typically nests and forages high in the canopy
Breeding Dates	14 May (PR)–26 Jul (PR)
Nest Type	Cup nest of fine plant fibers (especially grapevine bark) and spider or caterpillar silk, lined with animal hair, fine grass, and moss; decorated with lichens and other gray or white materials
Clutch Size	2–5 eggs (ave. 4 eggs)
Incubation	11–12 days
Fledging	10–11 days
Status	Regular and rare nesting species
BBS Trend	Stable (trend = −2.1, 95% CI is −5.4, 0.4) [Central US]

Patterns since BBA I

No nesting bird species better represents Iowa's largest mature deciduous forest stands than Cerulean Warbler, which is an umbrella species for mature deciduous forest management in both the United States and Canada. In forest tracts where Cerulean Warblers nest, most other Iowa forest breeding birds can be found nesting, too. The number of Cerulean Warbler records collected in both atlases was quite similar, with 44 records collected in BBA I and 46 records documented in BBA II. While not enough records were gathered during Iowa's BBS to establish a trend for this species (Sauer et al. 2012), data from the U.S. BBS (1966–2010) show a significant annual decline of 2.98% (Sauer et al. 2011).



As evidenced for other area-sensitive forest birds, most Cerulean Warbler BBA II nest records (85%) and BBA I nest records (82%) were from public land blocks within the largest tracts of preferred mature forest habitat. Since this warbler tends to nest high in treetops and is difficult to detect unless heard singing, few confirmed records were found during either atlas: only three (7%) in BBA I and seven (15%) in BBA II. Atlas data collected for this species in Missouri were quite comparable to that collected in Iowa, especially regarding the low confirmation rate of 11% (Jacobs and Wilson 1997).

Cerulean Warbler distribution changed slightly between the two atlases, with five fewer counties with atlas records bordering the Mississippi River and a few more possible nest records picked up in western Iowa during BBA II. More records from the Loess Hills may be related to increasing maturity of the forests in this region. Still, the vast majority of probable and confirmed records remain closely tied to riparian corridors that are heavily forested, especially along the Mississippi and Des Moines rivers and also along the Upper Iowa, Volga, and Skunk rivers. A confirmed nest in Pilot Knob State Preserve in Hancock County is a unique record, although that mature forest also is part of a larger forested public land complex associated with the Winnebago River. This deep forest warbler was located in 28 counties during the first atlas (Jackson et al. 1996) and was found in 27 counties during the second atlas.

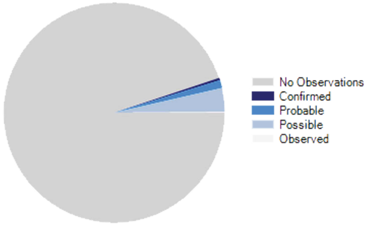
Effigy Mounds-Yellow River Forest BCA (Allamakee County) holds the largest population of breeding Cerulean Warblers in Iowa. In 2013, bird researcher Jon Stravers documented 191 Cerulean Warbler territories in this "Driftless" area of northeastern Iowa. This effort led to Iowa's largest contiguous forest tract being officially named a Globally Important Bird Area by National Audubon Society in May 2015. Smaller nesting populations of this warbler can be found in the Stephens State Forest 1,000 acres BCA in Monroe County (Shane Patterson pers. comm.), as well as in Lacey-Keosauqua-Lake Sugema BCA (Van Buren County) and Shimek State Forest BCA (Van Buren and Lee counties).

Land-use changes due to increasing human populations in the breeding, migratory, and winter ranges of this species appear to be the underlying cause of population decline of Cerulean Warbler (Buehler et al. 2013). As an area-sensitive species, it is affected negatively by fragmentation and increasing isolation of remaining mature deciduous forest (Robbins et al. 1992). Large forests managed with long rotations (100 years or more) represent the best potential habitat for this wood warbler, and protection of breeding habitat is the most important factor to consider (Hamel 2000). Land-use planning decisions favoring the existence of large landscapes of mature deciduous forest also are crucial (Thompson et al. 1996, Mueller et al. 1999, Thompson et al. 2012).

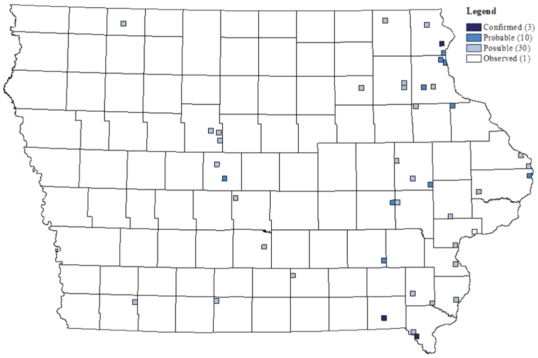
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	1	1
Possible	8	22	30
Probable	0	10	10
Confirmed	0	3	3
Conf & Prob	0.00%	3.30%	1.50%

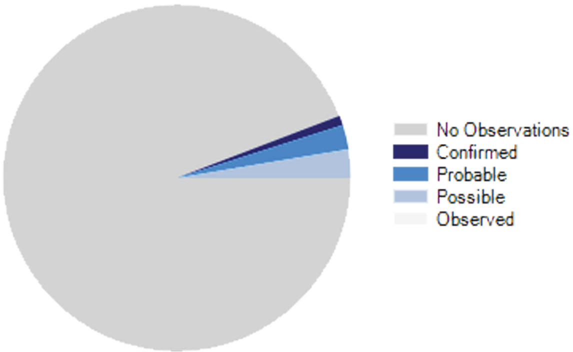
BBA I Results



BBA I



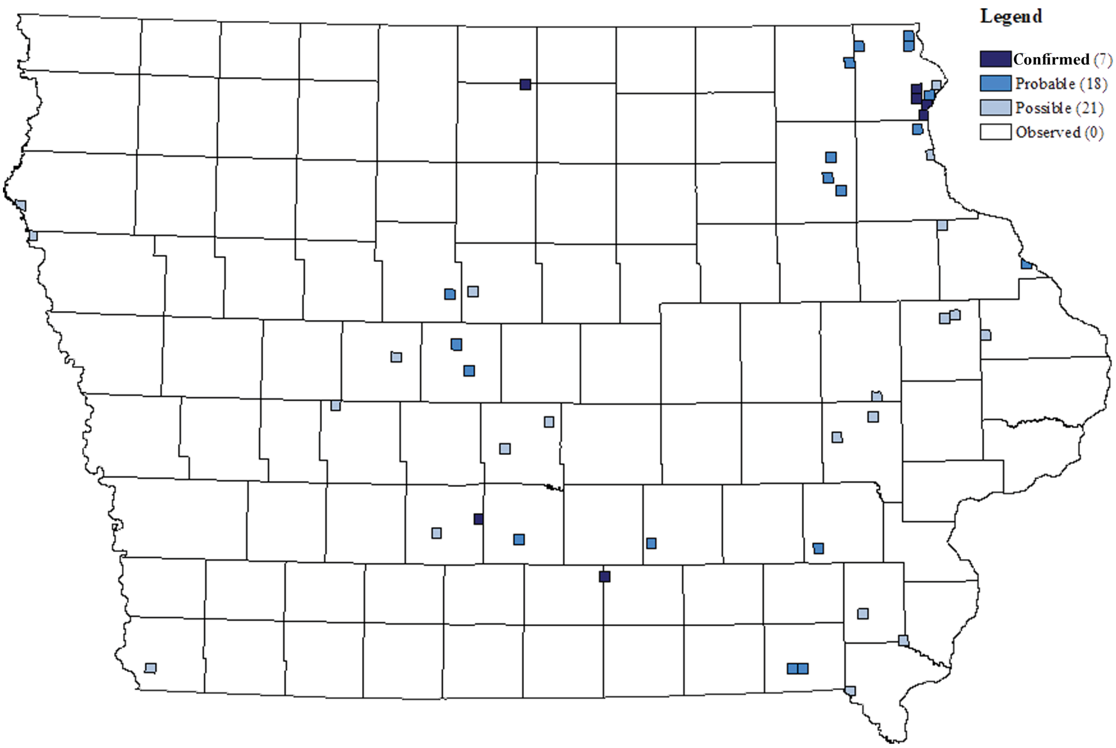
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	4	17	21
Probable	2	16	18
Confirmed	1	6	7
Conf & Prob	0.60%	5.50%	2.90%

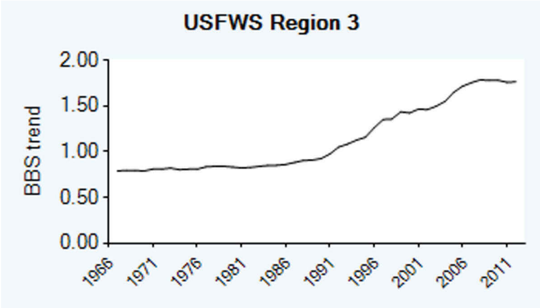
BBA II



© James Durbin

Habitat	Mature lowland forests with broad canopy trees (especially sycamore) and a semi-open understory; occasionally old-growth upland forests
Breeding Dates	5 May (PR)–24 Jul (PR)
Nest Type	Woven, hanging cluster of mosses, lichens, and fine plant fibers near branch tips accessed by a side entrance; nest height ranges widely and sometimes built in river debris deposited on branches during floods
Clutch Size	2–7 (typically 3–5)
Incubation	12–14 days
Fledging	10–11 days
Status	Rare to locally uncommon regular nester
BBS Trend	Stable (trend = 0.4, 95% CI is –0.5, 1.1) [Central US]

Patterns since BBA I



The Northern Parula is most at home in mature forests along rivers, lakes, and swamps of central and southern Iowa. This species was found in 31 blocks BBA I and increased to 136 blocks in BBA II. Most of these detections were possible (65) or probable (62), with singing males representing >90% of the data. Despite only two previously published records of confirmed nesting in Iowa history (Koenig 1979, Pinkston 1994), BBA II participants documented parula confirmations in nine blocks, spread evenly across the established range. This 6.6% confirmation rate is low for a warbler, but it is comparable to findings in neighboring states. For instance, the Minnesota BBA confirmed nesting in 2.4% of the blocks (Minnesota Breeding Bird Atlas 2019), despite this warbler's widespread distribution in the North Woods (Minnesota Department of Natural Resources 2017).

The parula seems more widespread as an Iowa nester now than throughout the twentieth century, when it was a rarity in summer (DuMont 1933, Kent and Dinsmore 1996). Further indications of expansion since 1966 may be found in BBS data from states with comparable floodplain forests: Illinois (+3.41%/year), Kansas (+5.46%/year), and Missouri (+2.08%), which coincides with an average increase of 1.11%/year across the entire nesting range (Sauer et al. 2017).

Similar to findings of Graber et al. (1983) in Illinois, parulas in Iowa often center their nesting territories around old-growth sycamore (Platanus occidentalis) (Bruce Ehresman pers. comm.). This canopy tree occurs naturally as an uncommon component of floodplain forests in the state's southern two-thirds and is planted at parks and reservoirs (Iowa State University Extension and Outreach 2019). More common floodplain canopy trees, such as eastern cottonwood (*Populus deltoides*), silver maple (*Acer saccharinum*), boxelder (*Acer negundo*), and oaks (*Quercus* spp.), are variously used by the parula in the Midwest (Thogmartin et al. 2009, cited in Moldenhauer and Regelski 2012). Singing males at the Little Sioux River in Clay County, the upper Iowa River in Wright County, and former savanna in Winnebago County all hint at expansion. Clusters of atlas detections in the Missouri River floodplain and central Loess Hills mirror increases in neighboring Nebraska (Silcock and Jorgensen 2018) at the species' western frontier. Multiple detections in Allamakee County contrast with no findings in southern Minnesota during its BBA (Minnesota Breeding Bird Atlas 2019) and rarity of the species in adjacent Wisconsin (Wisconsin BBA II data, in progress). The recent Iowa advancements have occurred within a long-term, contiguous rift stretching from southern Minnesota (Janssen 1987), Wisconsin (Robbins 1991), and Illinois (Bohlen 1989) eastward into southern Michigan (Brewer et al. 1991).

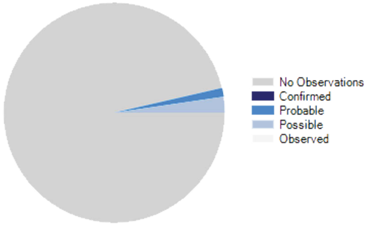
The deficiency of parula detections on Iowa BBS routes also suggests populations remain small (Sauer 2017). Robbins et al. (1989) found that parulas were rare in forests of <100 hectares (ha) and did not achieve peak abundance until forests exceeded 3,000 ha. With little of Iowa's forest lands meeting these thresholds, the ceiling for population expansion may not be much higher.

Populations could easily decrease as evidenced by clearing of mature forests in southern Wisconsin and eastern Missouri that greatly reduced parula numbers in the early mid-twentieth century (Robbins 1991, Robbins and Easterla 1992). With the parula's preference for trees >15 m tall (Thogmartin et al. 2009), any loss of mature trees in floodplain habitats could lead to a reversal of apparent gains since BBA I. In the Upper Midwest, various researchers have speculated that recent regeneration within floodplains may not be sufficient to replace late-successional tree species in these habitats (U.S. Geological Survey 1999). Thus, conserving wide berths of lowland forests—and ensuring proper replacement of the big trees found within them—will continue to be essential for maintaining parula populations in Iowa.

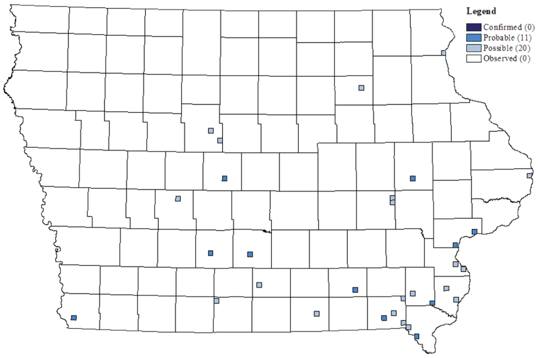
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	7	13	20
Probable	0	11	11
Confirmed	0	0	0
Conf & Prob	0.00%	2.80%	1.30%

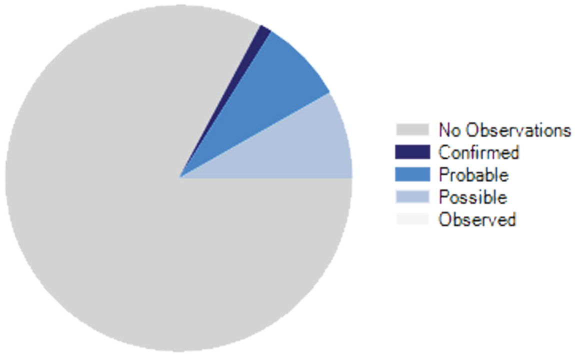
BBA I Results



BBA I



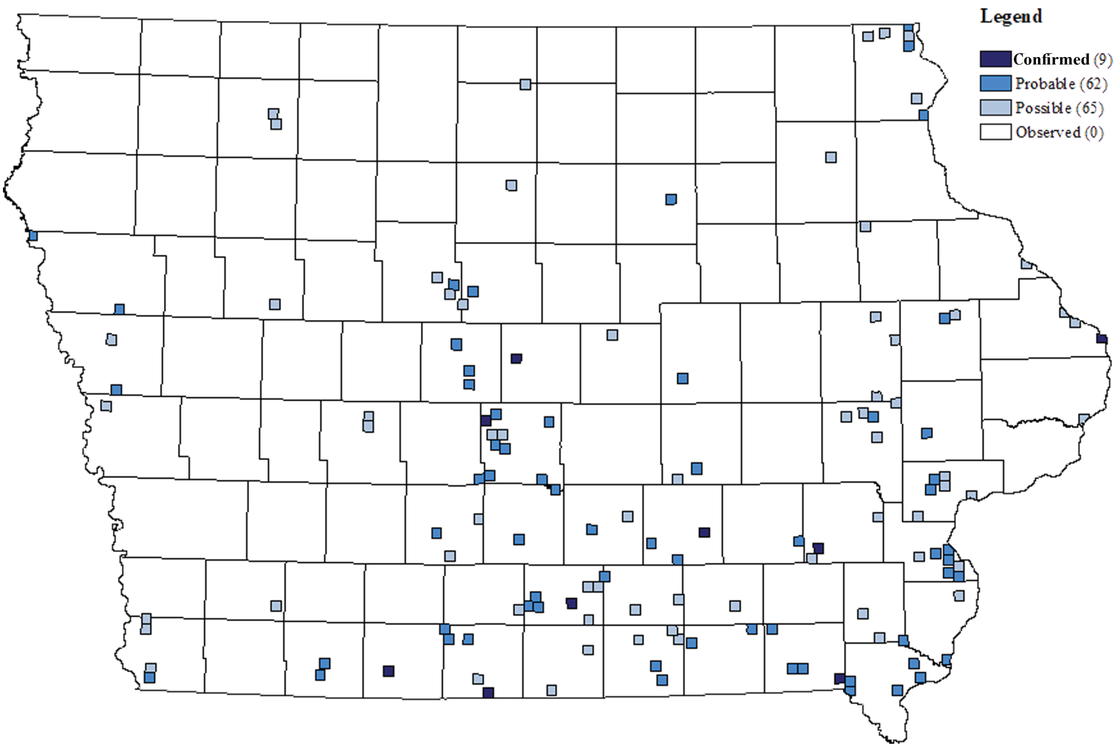
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	20	46	66
Probable	7	55	62
Confirmed	2	7	9
Conf & Prob	1.70%	15.50%	8.20%

BBA II



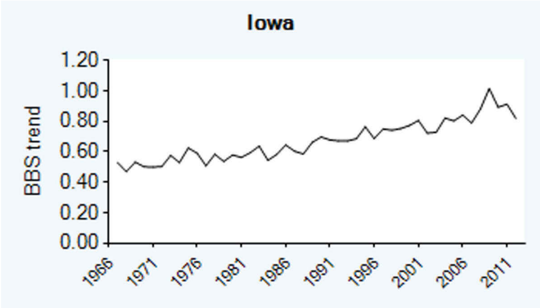
Sponsored by Paul Roisen

© Linda Petersen

Habitat	Nests in moist areas with abundant shrubs and low trees (especially willow thickets) along waterways, lakes, and marshes
Breeding Dates	5 May (PR)–18 Aug (PR)
Nest Type	Cup shaped nest constructed of fluffy materials like plant down and fine fibers, hair, feathers, and grasses and lined with fine materials.
Clutch Size	4 or 5 eggs
Incubation	11–13 days
Fledging	8–10 days
Status	Regular and common nesting species
BBS Trend	Increasing (trend = 1.8, 95% CI is 0.2, 3.3) [Iowa]

Patterns since BBA I

Yellow Warbler has the broadest distribution of any wood warbler in the New World. Next to Common Yellowthroat, it was the most frequently documented warbler species in both Iowa atlas projects. It also is second only to Common Yellowthroat as the most common nesting warbler in the atlases of Illinois (Kleen et al. 2004) and Indiana (Castrale et al. 1998). It was reported in 365 (42.4%) blocks in BBA I and increased to 618 (78.1%) blocks in BBA II. The BBA data appear to reflect Iowa's BBS data, which indicate this species is increasing at an average annual rate of 1.8% (Sauer et al. 2012). In neighboring states, its population is increasing, as well. During the period 1966–2000, Illinois Yellow Warbler population increased at an estimated 6.3% per year (Kleen et al. 2004). In the Great Lakes Plain region, which includes eastern Wisconsin, it increased at a rate of 2.5% per year from 1966–1996 (Sauer et al. 1997).



While 50% of BBA I records were in the possible category, only 31% of BBA II records were. The biggest difference in data was the change in number of confirmed records, with only 62 (17%) in BBA I dramatically increasing to 190 (31%) in BBA II. Most records were collected in public land blocks, with 65% in BBA I and 60% in BBA II. These data indicate that the shrubby wetland habitat (especially willow thickets) this warbler prefers is generally more prevalent in public land than it is in intensively farmed agricultural areas that characterize grid blocks.

Yellow Warbler males are quite vocal on their territories, and their song is easy to identify. Since their nest typically is not very high off the ground, nests are easier to locate than are nests of many other wood warblers. The nests also are quite distinctive, since nearly every one of them is comprised of white fluffy material, including the fluffy white parachutes that carry cottonwood seed and material pulled from cattail heads. Most nest confirmations involved physically documenting a Yellow Warbler nest, with the highest proportion of these records being used nest. Most of the used nests were documented during nonnesting months, when nests could easily be seen because there were no leaves on the trees or shrubs that held the nests. The next highest nesting confirmation codes were nearly equally distributed between attending young and recently fledged young.

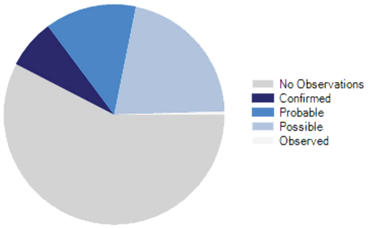
The Yellow Warbler was found in 96 counties during the first atlas (Jackson et al. 1996) and in all 99 counties in the second atlas. As was seen in the first atlas, this species was rather evenly distributed across the state. The highest densities of this warbler appear related to locations on riparian corridors. The Mississippi, Missouri, and Des Moines river watersheds all held high numbers of this species, as did the Iowa Great Lakes Region (especially Dickinson and Emmet counties). Saylorville, Red Rock, and Coralville reservoirs held significant numbers of nesting Yellow Warblers, as did south-central Iowa, where much shrubby habitat remains because industrial agriculture has not yet dominated that landscape.

The Yellow Warbler is a habitat generalist (Lowther et al. 1999) and nests in orchards, parks, woodland edges, roadside thickets, and woody edges of streams, lakes, marshes, and farm ponds. In a northwestern Iowa study, territory size averaged only about 150 feet in diameter (Kendeigh 1941a). This warbler has adapted better than most to Brown-headed Cowbird parasitism, and even in Iowa's most altered environments the Yellow Warbler persists.

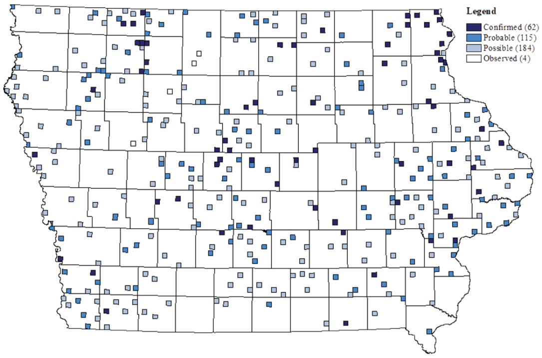
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	1	3	4
Possible	77	107	184
Probable	32	83	115
Confirmed	19	43	62
Conf & Prob	9.80%	31.60%	20.60%

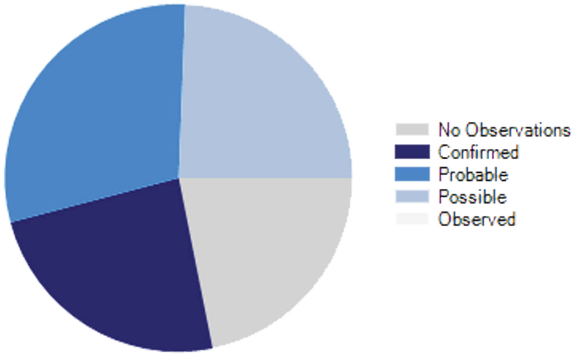
BBA I Results



BBA I



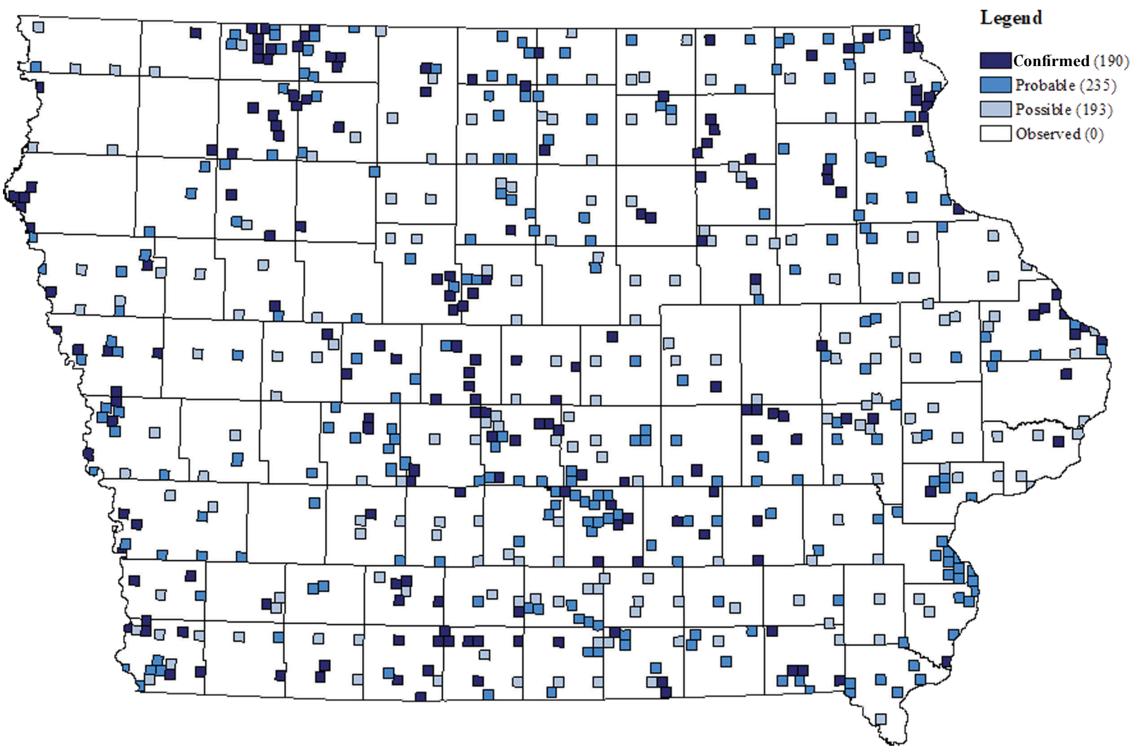
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	124	70	194
Probable	77	160	237
Confirmed	48	142	190
Conf & Prob	23.90%	75.70%	49.60%

BBA II

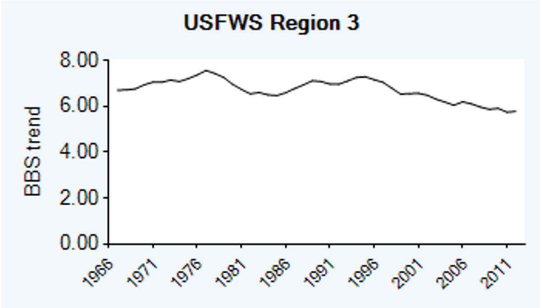


Sponsored by Jerry Von Ehwegen

© James Durbin

Habitat	Second growth forests, brushy thickets, overgrown pastures, deciduous woodland edges, and regenerating clear cut areas
Breeding Dates	2 Jun (PR)–17 Aug (PR)
Nest Type	Loosely woven thin-walled cup made of coarse or fine strips of inner bark, shredded weed stems, grasses, and plant down lined with fine grasses, hair, sedges, and rootlets
Clutch Size	3–5 eggs (4 eggs typically)
Incubation	10–12 days
Fledging	10–11 days
Status	Regular and rare nesting species
BBS Trend	Increasing (trend = 3.4, 95% CI is 0.5, 7.4) [Central US]

Patterns since BBA I



While Chestnut-sided Warbler is a common Iowa migrant, it is one of Iowa's rarest nesting species. This has not always been the case since it was considered a common summer resident by Anderson (1907). This is the same history experienced in Indiana (Castrale et al. 1998) and Illinois (Kleen et al. 2004), because Chestnut-sided Warbler reacted quite favorably to forest clearing by settlers and was common in much of its current breeding range by the early 1900s. Historically, this warbler was known to nest in 12 Iowa counties, ten of these in the eastern half of the state (Kent and Dinsmore 1996). Chestnut-sided Warbler responds most favorably to clear-cuts in forests, reaching highest breeding densities where the forest is allowed to regenerate (Hobson and Bayne 2000). This species was reported in only five (1%) blocks in BBA I and increased to 38 (5%) blocks in BBA II. This species is not found often enough on Iowa's BBS to show a trend; however, throughout its breeding range, populations have undergone a slow decline from the early 1960s to present (Byers et al. 2013).

All five (100%) BBA I blocks where Chestnut-sided Warbler was found were public land blocks, and it was found in 26 (79%) BBA II public land blocks. Perhaps early successional woody nesting habitat is more prevalent in public land blocks than it is in intensively farmed and pastured agricultural areas that characterize grid blocks; and perhaps, with more forested land in private ownership than public, fewer records came from private land blocks because of less access. This warbler was confirmed nesting in one (20%) of BBA I blocks and none of BBA II blocks. It is difficult to find the nest of a Chestnut-sided Warbler, which tends to nest in shrubby thickets such as raspberry plants. During BBA II, ten (26%) records were recorded as observed. Because this species is a late migrant, it is believed that some atlas records from late May could have been singing males in route to their more northerly breeding grounds, and some records from August could have been adults migrating southward.

Like the first atlas, where the five records for this species were found in five scattered counties, the 38 BBA II records were found in 24 scattered counties. All records came from the eastern two-thirds of the state, the same as was observed during BBA I (Jackson et al. 1996). Iowa currently is near the southwestern edge of Chestnut-sided Warbler's breeding range, with the next closest breeding population to the north in east-central Minnesota (Byers et al. 2013). The population distribution map indicates Iowa's breeding population of Chestnut-sided Warbler in the eastern one-third of the state (Byers et al. 2013). Other disparate populations breed locally from extreme southern Illinois (Kleen et al. 2004) south through the Ozark Plateau of both Missouri (Jacobs and Wilson 1997) and Arkansas (Byers et al. 2013).

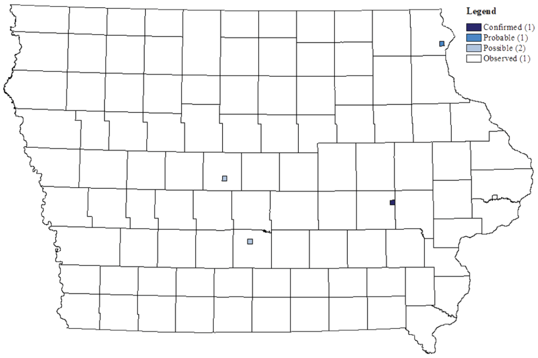
As a species of early successional stages, Chestnut-sided Warbler is highly responsive to forest management activities that maintain such habitat (Hobson and Bayne 2000, Byers et al. 2013). As a habitat specialist, it also appears quite sensitive to habitat changes. Chestnut-sided Warbler was listed as a species of management concern by Thompson et al. (1993). Reasons for that concern include perceived threats on its wintering grounds (southern Mexico south through Central America to Panama), evidence of recent population declines, and because the Midwest is an important breeding area for this species. Iowa's current emphasis on regenerating oak trees potentially should provide more nesting opportunities for Chestnut-sided Warblers.

BBA I (1985–1990) Breeding Evidence

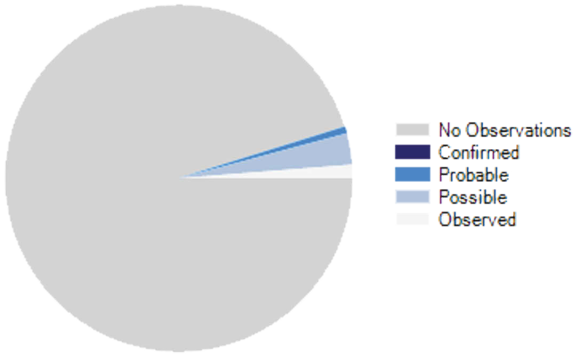
Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	1	1
Possible	0	2	2
Probable	0	1	1
Confirmed	0	1	1
Conf & Prob	0.00%	0.50%	0.20%

BBA I Results

BBA I



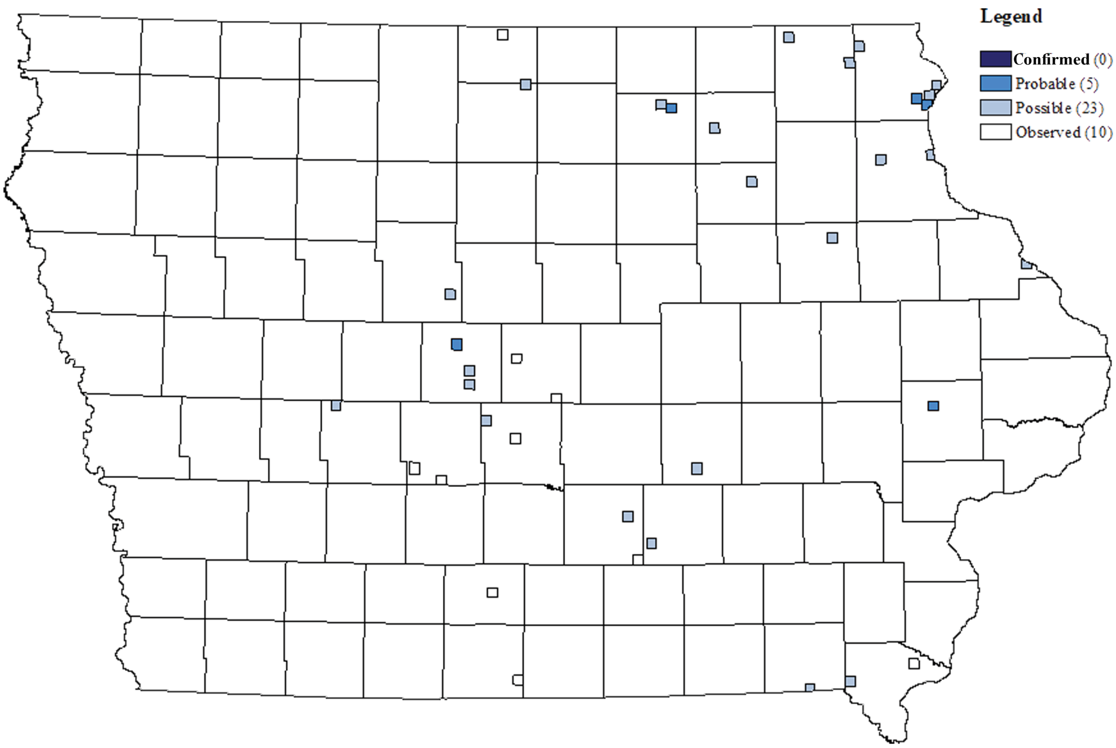
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	6	4	10
Possible	2	21	23
Probable	0	5	5
Confirmed	0	0	0
Conf & Prob	0.00%	1.30%	0.60%

BBA II



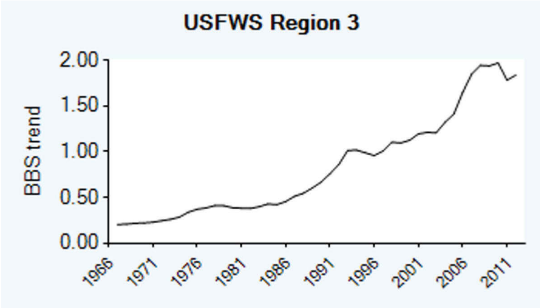
Sponsored by Linda Rudolph

© Stephen J. Dinsmore

Habitat	Large tracts of mature pine-hardwood forests; most abundant where dominant open canopy pines occur with sparse deciduous understory
Breeding Dates	25 Jun (PR)–14 Jul (PR)
Nest Type	Compact cup constructed of grass, plant stems, bark strips, pine needles, and fine roots, often bound together with silk of spiders or caterpillars and lined with feathers or animal hair
Clutch Size	3–5 eggs (4 eggs avg.)
Incubation	12–13 days
Fledging	10 days
Status	Rare nesting species
BBS Trend	Stable (trend = 0.7, 95% CI is –0.2, 1.4) [Central US]

Patterns since BBA I

Strongly tied to pine trees, the Pine Warbler is a common breeding species and permanent resident in southeastern United States. It breeds throughout northeastern United States and as far north as southeastern Canada, where it is migratory and among the earliest warblers to arrive in spring and latest to depart in fall (Rodewald et al. 2013). There is a gap in its breeding range across the Midwest in areas that hold few pine trees (Kent and Dinsmore 1996). This warbler typically places its nest high in a pine tree, where it is well concealed from below making nest detection extremely difficult. It prefers to forage high in trees, slowly and meticulously searching for insect prey on foliage and the bark of pines. Its song is quite similar to Chipping Sparrow, which also lowers detection probability since these two species often occur in the same habitats.



Pine Warblers were not known to nest in Iowa until a family group of four young and an adult male were documented in 2004 (July 5–12) in Lee County in the Donnellson Unit of Shimek State Forest (J. J. Dinsmore 2004). Closest significant nesting populations to Iowa occur in southwestern Wisconsin (Rodewald et al. 2013) and within Missouri's Short-leaf Pine range of the Ozark Natural Division (Jacobs and Wilson 1997). This warbler was not reported in any blocks during BBA I and found in only three blocks in BBA II. While this species is not detected on Iowa's BBS, throughout its U.S. breeding range, populations have experienced an average annual increase from 1966–2015 of 0.83% Sauer et al. 2017). Pine Warblers have undergone range expansions in areas where pines have been introduced into historically deciduous forest, such as the Ozark Highlands of Arkansas and Missouri (Smith and Petit 1988), and in the Shawnee Hills of southern Illinois (Robinson 1996).

The Pine Warbler is generally referred to as an area-sensitive forest-interior species (Robbins 1980, Whitcomb et al. 1981, Schroeder 1985). Shroeder (1985) suggested that breeding populations may require a minimum of 10–15 ha of forest habitat, while Robbins (1980) suggested a minimum of 30 ha is required. Most atlas records for Iowa's area-sensitive forest birds have been found in large forest public land blocks, and this holds true for Pine Warbler, too, where all three BBA II records were found. One confirmed record of adults attending young was found in Shimek State Forest in Lee County, a probable record was found in Shimek State Forest in Van Buren County, and a possible nesting record was found at Jester Park in Polk County. Approximately 1,000 acres of older growth pine plantings exist within Shimek State Forest, undoubtedly a major reason why Pine Warblers were found nesting in this location. Considering the fact that it is difficult to locate a Pine Warbler nest and because this bird also is a rare nester in Illinois, it is not surprising that only 18 records were found by atlassers in Illinois, with just three of these records confirming nesting—all in extreme southern Illinois and especially associated with mature pines (Kleen et al. 2004).

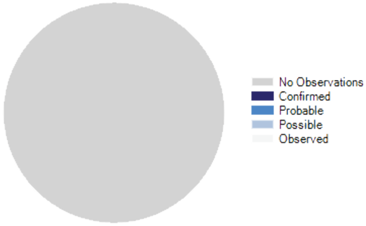
Most Pine Warbler records come from eastern and central Iowa (Kent and Dinsmore 1996). Because this species prefers to nest in mature pines, besides nesting in Shimek State Forest it probably also nests in extreme northeastern Iowa in the state's largest public forest, Yellow River State Forest, an area that contains substantial stands of mature native white pine trees.

By Bruce L. Ehresman

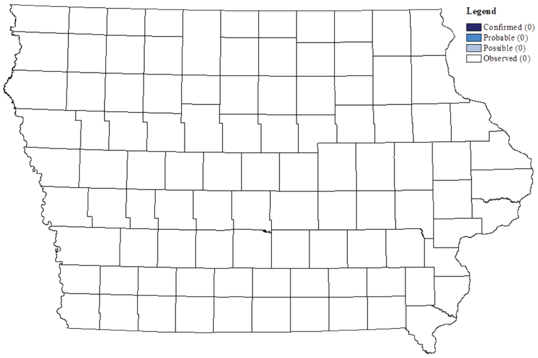
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	0	0	0
Probable	0	0	0
Confirmed	0	0	0
Conf & Prob	0.00%	0.00%	0.00%

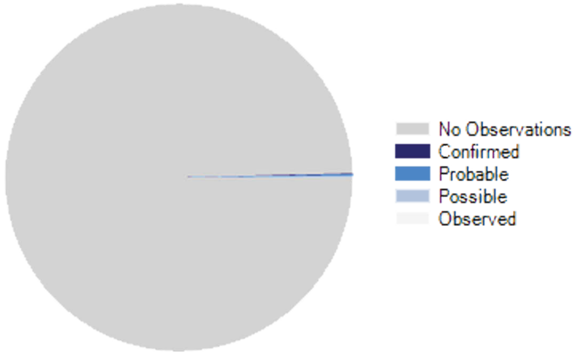
BBA I Results



BBA I



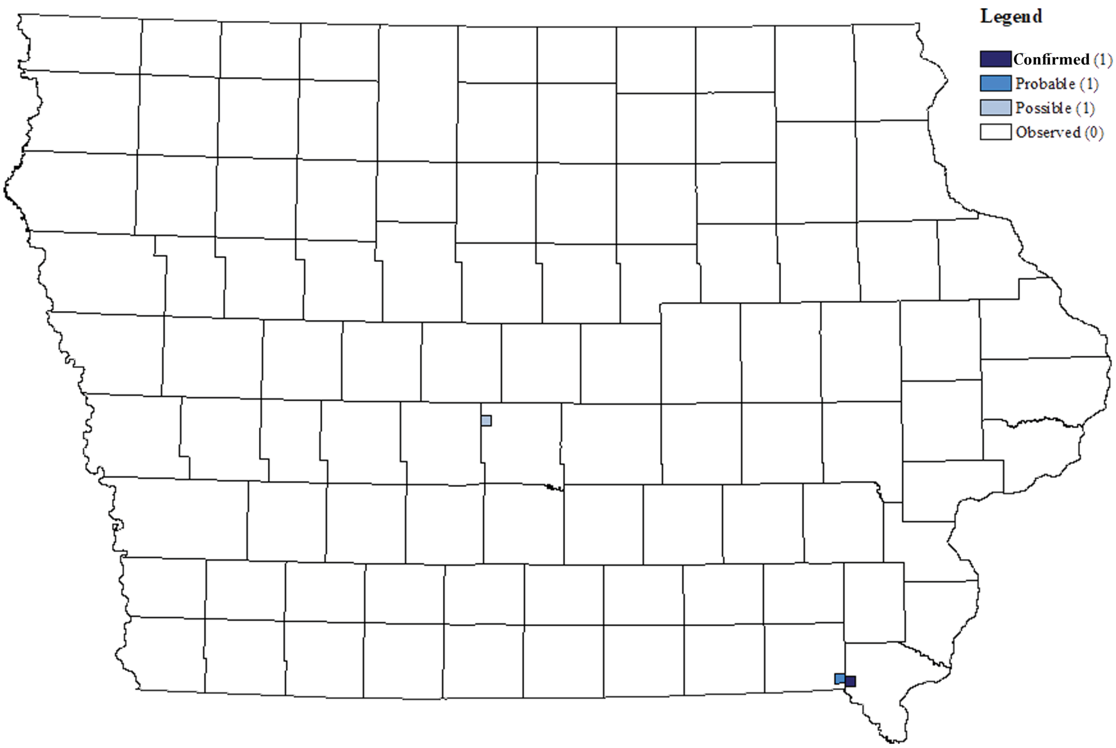
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	0	1	1
Probable	1	0	1
Confirmed	0	1	1
Conf & Prob	0.20%	0.30%	0.20%

BBA II



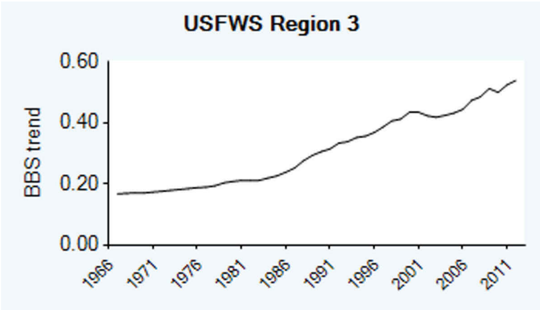
Sponsored by Diana Pesek

Yellow-throated Warbler *Setophaga dominica*

© Stephen J. Dinsmore

Habitat	Associated with sycamores (in natural floodplain forests, swamps, and suburbs) or pines (plantations and native stands)
Breeding Dates	14 May (PR)–5 Aug (PR)
Nest Type	Open cup nest woven from fine strips of bark, grasses, and forbs lined with sycamore seed balls; placed on branches in canopy of mature trees
Clutch Size	3–5 (typically 4)
Incubation	12–13 days
Fledging	Probably 10 days
Status	Regular and locally rare nesting species
BBS Trend	Stable (trend = 0.9, 95% CI is −0.2, 2.1) [Central US]

Patterns since BBA I



The Yellow-throated Warbler was formerly known as the Sycamore Warbler (Widman 1907), because of its affinity for sycamore trees. This association still holds true in Iowa, particularly in the bottomlands along the Des Moines and Skunk rivers, where majestic, tall, old sycamore trees continue to occur. This warbler also prefers to nest in clumps of tall, mature pine trees with an open understory, even when these pines occur in otherwise deciduous forests (McKay and Hall 2012). Most Iowa BBA II records for this warbler were associated with sycamore trees and secondarily associated with large pine trees. It prefers to forage in the forest canopy from 20–100 ft above the ground and nests in the forest canopy (Hall 1996), usually nesting 15–60 ft. above the ground (Baicich and Harrison 1997). This is one of the earliest arriving warblers, typically showing up in extreme southeastern Iowa by mid-April (Jackson et al. 1996). Yellow-throated Warbler was reported in 16 (2%) blocks in BBA I and reports more than tripled in number to 50 (6%) blocks in BBA II. This species is not found on Iowa's BBS, and there is no known Iowa population trend. Throughout its U.S. breeding range, populations have undergone an average annual increase from 2005–2015 of 2.27% (Sauer et al. 2017). While most of the significant increase in Yellow-throated Warbler records of BBA II (from BBA I) may be related to the extra effort of atlassers to document wood warblers, some of the increase may be related to an overall increase in the population of this species.

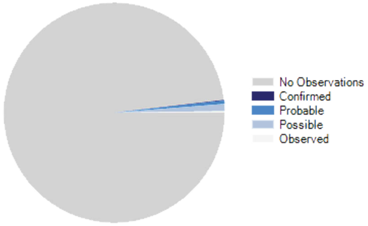
During the first atlas, Yellow-throated Warbler was found in 15 counties (Jackson et al. 1996), and it was found in 27 counties during BBA II. Only 6% of BBA I observations were confirmed nesting, increasing to 14% nesting confirmation during BBA II. Five of the confirmed nest reports were of adults attending young, and the other two were of recently fledged young. Rates of breeding confirmation for Yellow-throated Warbler are low, compared to most other warblers, since it spends most of its time in the upper portions of tall trees, where its nest is well hidden atop a horizontal branch. Similar low nesting confirmation rates were documented in atlases of Missouri (Jacobs and Wilson 1997), Illinois (Kleen et al. 2004), and Indiana (Castrale et al. 1998). Most breeding evidence (44%) was documented in the probable category for BBA II (primarily territorial males), with 42% of records in the possible category. During the first atlas, 56% of records were possible (singing males) and 25% were probable (territorial males). As evidenced for other forest nesting species, most Yellow-throated Warbler BBA II nest records (82%) and BBA I nest records (88%) were from public land blocks.

The distribution of Yellow-throated Warbler was similar for both atlases. In Iowa, this warbler is at the northern and western edge of its range. It continues to be found in eastern portions of the state, in central Iowa, and in south-central Iowa. Like its woodland relative, Northern Parula, records for this "Sycamore Warbler" mainly came from riparian corridors. Twenty-four records were associated with the Des Moines River (as far north as Humboldt County), six records each came from the Mississippi and Skunk rivers, five records were from the Iowa River, four records were associated with the Raccoon River, and the northwesternmost record came from the Little Sioux River in Cherokee County. Several records came from lake or smaller stream habitat. Since the Yellow-throated Warbler is expanding its breeding range northward (McKay and Hall 2012), its future currently appears secure.

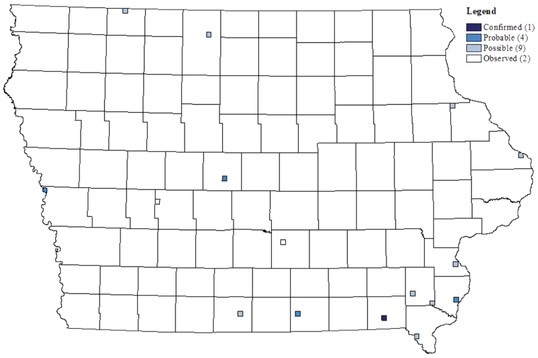
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	2	2
Possible	3	6	9
Probable	1	3	4
Confirmed	0	1	1
Conf & Prob	0.20%	1.00%	0.60%

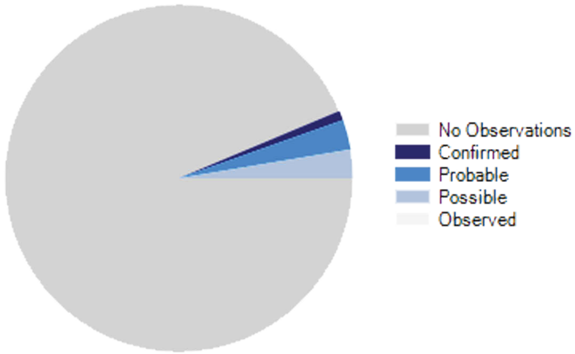
BBA I Results



BBA I



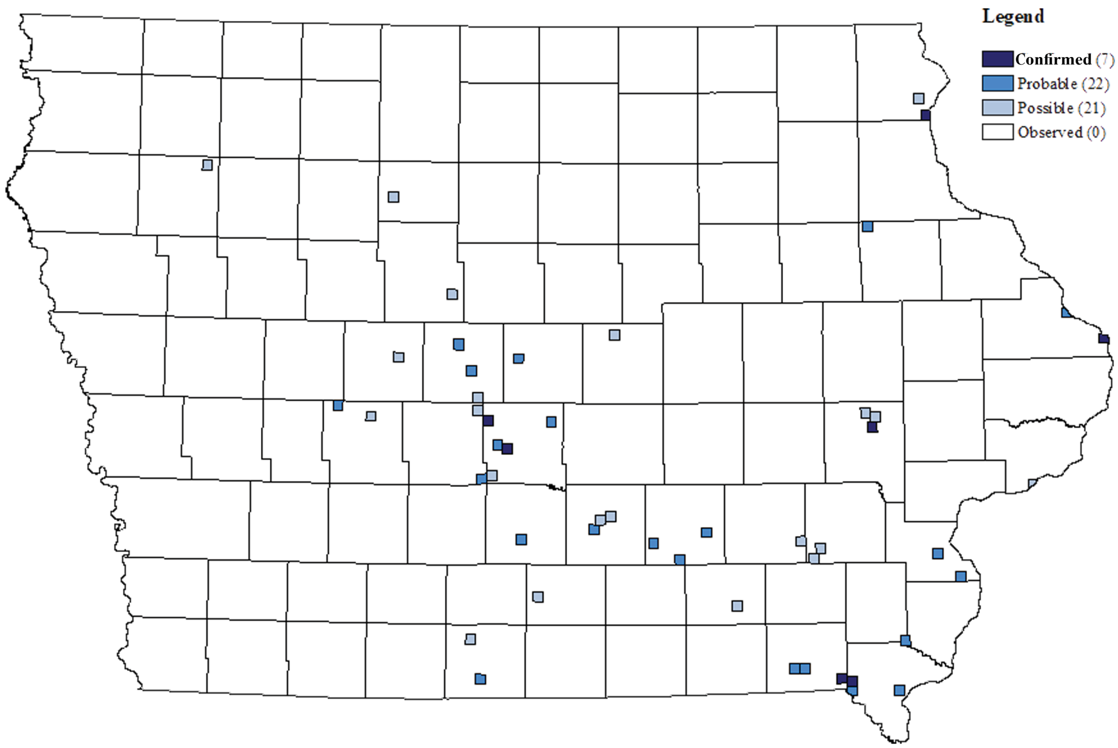
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	4	17	21
Probable	4	18	22
Confirmed	1	6	7
Conf & Prob	1.00%	6.00%	3.40%

BBA II

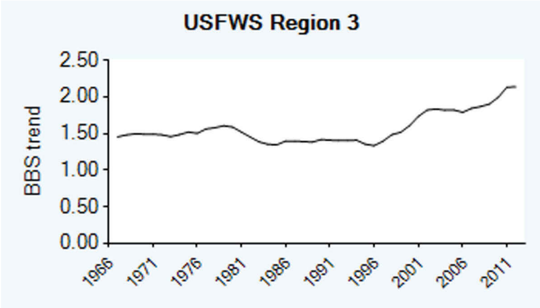


Sponsored by Douglas E. Chapman

© Larry Dau

Habitat	Nests in savannas and open deciduous woodlands; especially found near large gaps in woodland and along woodland edge
Breeding Dates	10 May (CO)–23 Aug (CO)
Nest Type	A loosely built open cup nest constructed of dry, herbaceous vegetation; often placed in a leaf cluster on a horizontal branch
Clutch Size	3–4 eggs, typically
Incubation	11–12 days
Fledging	8–12 days, usually 9–10
Status	Uncommon breeding species, primarily in the southern part of the state
BBS Trend	Increasing (trend = 0.6, 95% CI is 0.3, 1.0) [Central US]

Patterns since BBA I



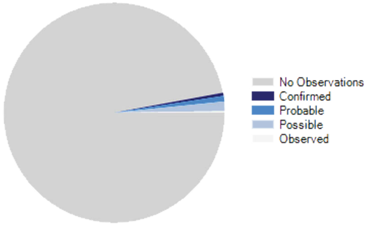
The Summer Tanager is a bird of open oak woodland and savannas and is much less dependent on larger interior forests than the Scarlet Tanager (Robinson 2012). While there is insufficient Iowa BBS data to indicate a trend for this species (Sauer et al. 2012) and while this species continues to remain uncommon, there was a significant increase in the number of records for this species from the first atlas project to the second. For instance, Summer Tanager was documented to occur in 26 (3%) of BBA I blocks, while it occurred in 87 (11%) blocks during the second atlas. Results were similar for both atlases regarding where this species was found, with 73.1% of records in priority blocks and 26.9% in grid blocks during BBA I and 75.9% of records in habitat blocks and 24.1% in grid blocks during BBA II. This may be an indication that the habitat this species prefers is most often found in public ownership. The low percentage of confirmed nests documented (13.8% in BBA II) compares well to the BBA confirmed nesting data (13.3%) gathered in Missouri (Jacobs and Wilson 1997), as well as to the BBA confirmed nesting data (15.5%) gathered in Illinois (Kleen et al. 2004). Similarly, probable nesting data (44.8%) for Iowa during BBA II are comparable to the probable nesting BBA data (45.7%) in Missouri (Jacobs and Wilson 1997) and the probable nesting BBA data (40.3%) for Illinois (Kleen et al. 2004). Since 59% of all BBA II nesting records are either probable or confirmed, it seems likely that this tanager nested in most blocks where it was reported.

The current statewide distribution of Summer Tanager seems well reflected by BBA II data. This distribution has changed over time, with the first northward range extension noted by Brown (1971). While there was not a dramatic change in statewide distribution between BBA I and BBA II, there was a notable increase in the number of records from western Iowa and northeastern Iowa counties. For instance, while there were Summer Tanager records found in only 19 counties during BBA I (Jackson et al. 1996), there were records from 22 additional counties during BBA II. Illinois is also documenting this northward expansion of Summer Tanager range and Walk et al. (2010b) suggest this northward extension fits with the warming trend associated with climate change. Jackson et al. (1996) suggested that the future of Summer Tanager in Iowa is linked to availability of appropriate woodland habitat, and with increasing efforts to restore open woodland and savanna habitat in southern Iowa where this tanager is most abundant, the future for this species appears bright.

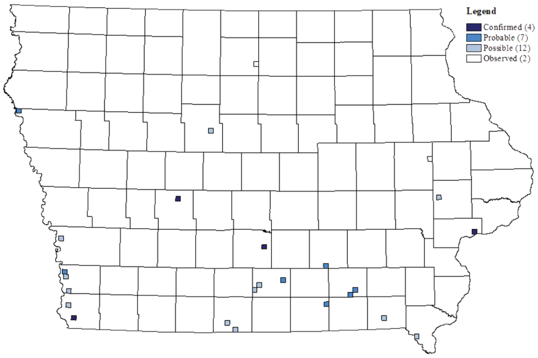
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	2	0	2
Possible	2	10	12
Probable	2	5	7
Confirmed	0	4	4
Conf & Prob	0.40%	2.30%	1.30%

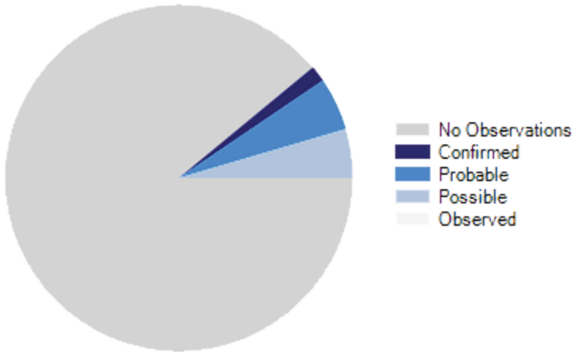
BBA I Results



BBA I



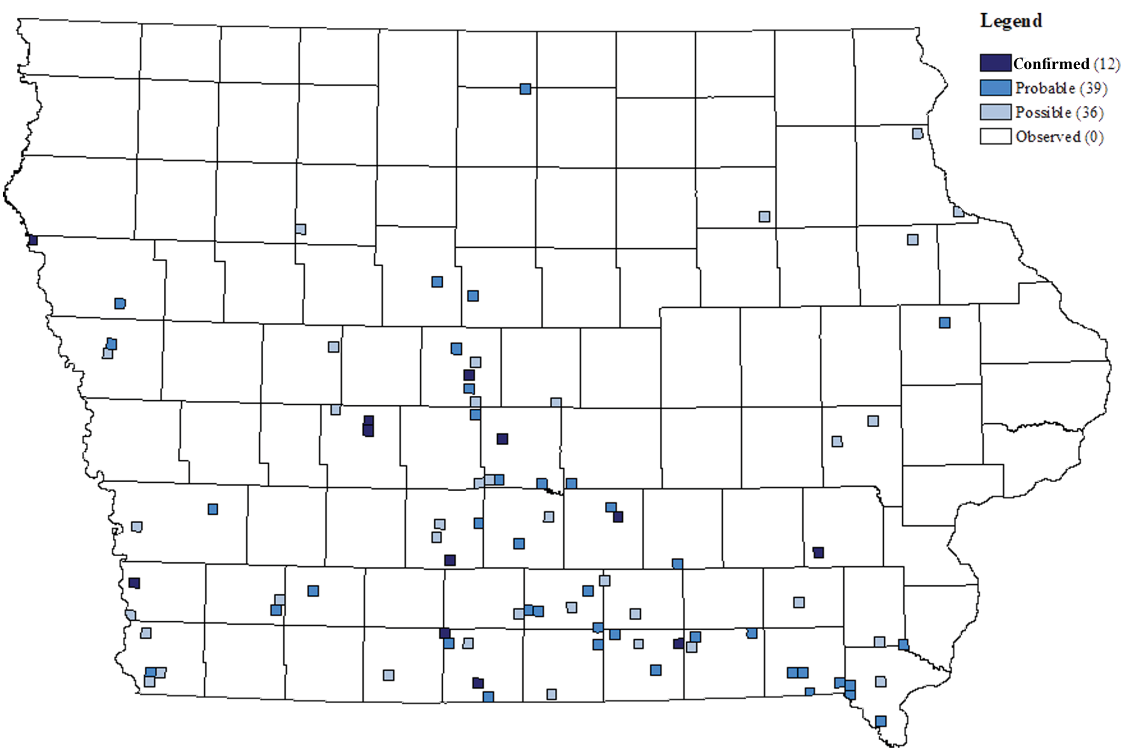
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	13	23	36
Probable	6	33	39
Confirmed	2	11	13
Conf & Prob	1.50%	11.00%	6.00%

BBA II



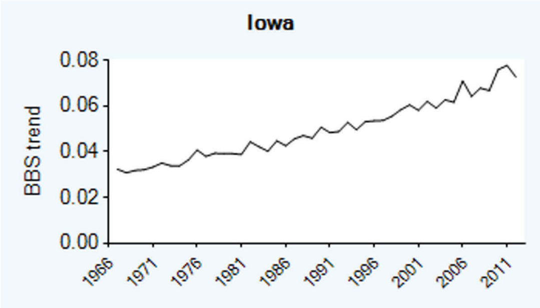
Sponsored by Jerry Von Ehwegen

© James Durbin

Habitat	Large mature deciduous forests, especially oak forests
Breeding Dates	7 May (PR)–15 Aug (CO)
Nest Type	Shallow, loosely woven cup-shaped structure woven of twigs, grasses, and plant stems and lined with fine plant fibers and rootlets
Clutch Size	3–5 eggs, usually 4
Incubation	13–14 days
Fledging	9–10 days
Status	Regular nesting species in forests
BBS Trend	Stable (trend = 3.2, 95% CI is −0.4, 7.7) [Iowa]

Patterns since BBA I

As an interior forest nesting species, the Scarlet Tanager is known to be sensitive to forest fragmentation, suffers high rates of predation and brood parasitism in small and/or highly fragmented forest patches, and is often completely absent in small isolated forest patches (Brawn and Robinson 1996, Mowbray 1999, Roberts and Norment 1999, Rosenberg et al. 1999). Because Iowa has lost almost two-thirds of its original forest, this tanager was probably more common in the past than it is today. And even into the early 1900s, Anderson (1907) described the Scarlet Tanager as a common summer resident in all wooded portions of Iowa. On a more positive note, Iowa BBS data indicate the recent population trend for this species is stable (Sauer et al. 2012). Further, there was a significant increase in the number of records for this species from the first atlas project to the second. For instance, Scarlet Tanager was documented to occur in 173 (20.1%) of BBA I blocks, while it occurred in 307 (38.8%) blocks during the second atlas. Results were similar for both atlases, regarding where this species was found with 76.3% of records in priority blocks and 23.7% in grid blocks during BBA I, and 74.6% of records in habitat blocks and 25.4% in grid blocks during BBA II. This may be an indication that the habitat this species prefers is more often found in priority and habitat blocks, along with the fact that public land was more accessible for atlassing than privately owned land in grid blocks.



The percentage of confirmed nests documented in Iowa (25.1% in BBA II and 14.5% in BBA I) is comparable to Illinois, where confirmed nesting was documented in 16.5% of its sampled blocks (Kleen et al. 2004), while Missouri BBA confirmed nesting in just 7.7% of its blocks (Jacobs and Wilson 1997). Probable nesting data (31.9% of all records for Iowa during BBA II and 33% of all records for BBA I) are comparable to the probable nesting BBA data (32.4%) in Missouri (Jacobs and Wilson 1997), as well as being similar to the probable nesting BBA data (37.5%) for Illinois (Kleen et al. 2004). When probable and confirmed records are combined, they comprise 57% of all Iowa BBA II nesting records, indicating this species probably nested in most of the blocks where it was detected.

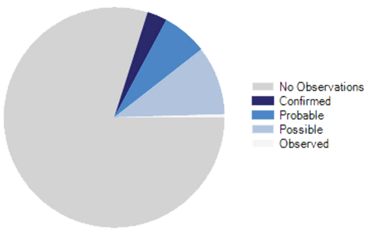
The statewide distribution of Scarlet Tanager was quite similar during both BBA I and BBA II, with extreme northwestern Iowa lacking records for both atlases. Essentially, this tanager nests wherever large blocks of mature forest occur. This is evidenced along every major riparian corridor that is heavily wooded, and especially in the eastern two-thirds of the state. One area where there was an increase in the number of records in blocks is along the Little Sioux River in northwestern Iowa, where the forest has apparently matured since the first BBA. Similarly, there were more records during the second atlas than there were during BBA I, in blocks along the upper reaches of the Des Moines River.

As Jackson et al. (1996) aptly pointed out, the future of the Scarlet Tanager in Iowa is closely tied to preserving large tracts of mature, unfragmented forest. According to Robbins et al. (1989), Robinson et al. (1995), and Villard et al. (1999), preventing further habitat loss, while preserving and restoring extensive forested areas on breeding grounds, should be the number one management strategy to maintain sustainable breeding populations of Scarlet Tanagers.

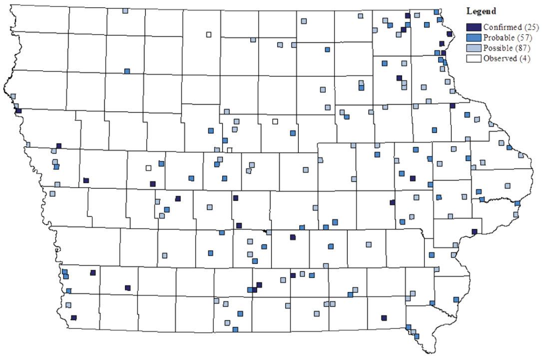
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	3	1	4
Possible	27	60	87
Probable	10	47	57
Confirmed	1	24	25
Conf & Prob	2.10%	17.80%	9.50%

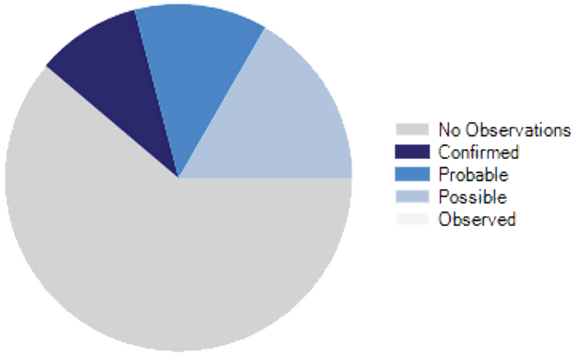
BBA I Results



BBA I



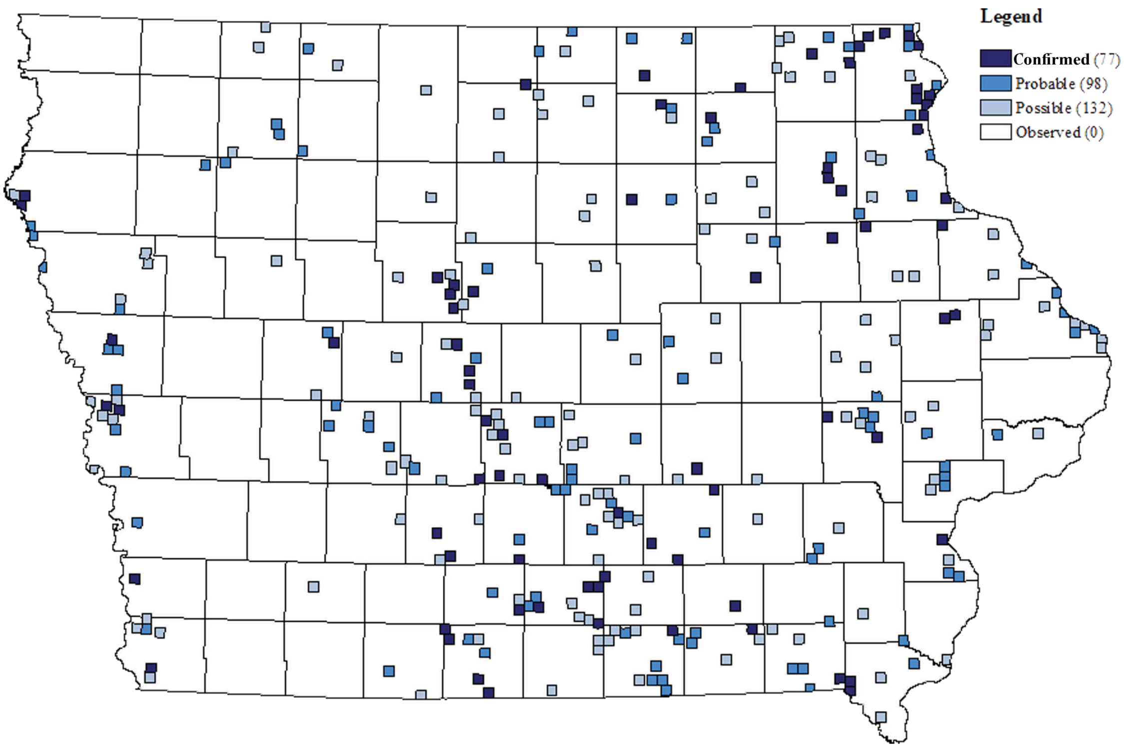
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	45	88	133
Probable	19	79	98
Confirmed	14	64	78
Conf & Prob	6.30%	35.80%	20.40%

BBA II



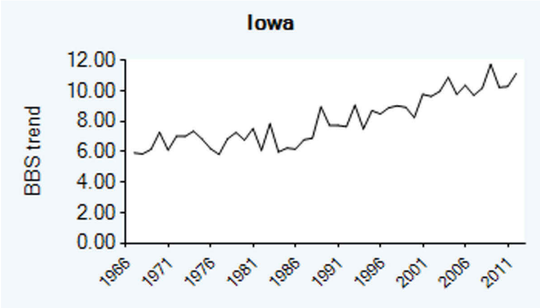
Sponsored by Chris Edwards

© Doug Harr

Habitat	Wide variety of sites; typically a shrubby thicket, overgrown pastures, or woodland edge
Breeding Dates	21 Mar (PR)–7 Sep (CO)
Nest Type	Loose cup of thin twigs, herbaceous stems, strips of bark, grass, and leaves lined with rootlets, fine grasses, and sometimes hair
Clutch Size	3–4 eggs (range 2–5)
Incubation	11–13 days
Fledging	9–11 days
Status	Common statewide resident
BBS Trend	Increasing (trend = 1.1, 95% CI is 0.4, 1.8) [Iowa]

Patterns since BBA I

According to a Wildlife Diversity Program survey, the Northern Cardinal is Iowa's favorite backyard bird. It is a species found in just about every thicket, berry patch, or wooded edge tangle, whether it be country or town, and its easily identified song can be heard for nine or ten months of the year. Iowa populations seem to be growing, and Iowa BBS records show this bird increasing at an average annual rate of 1.1% (Sauer et al. 2012). Perhaps somewhat a reflection of an increasing population, the cardinal was documented to occur in 578 (67.1%) of BBA I blocks and increased to 763 (96.5%) blocks during the second atlas. Results were similar for both atlases regarding where this species was found, with a similar number of records in priority/habitat blocks as were found in grid blocks during both atlases. These results indicate that there was no difference whether a block held public land or not and that this generalist species seems to find its preferred nesting habitat of dense, low-growing vegetation wherever it occurs. Further evidence that this bird of red is abundant and widespread is reflected by the fact that confirmed nesting was documented for it in 59.2% of all BBA II blocks. Adding the number of blocks with probable nesting to this, cardinals were found as confirmed or probable nesters in 80.1 % of all BBA I and 88.3% of all BBA II blocks. Essentially it is difficult to find any locale in Iowa where this species does not nest.



The number of confirmed nests documented in Iowa was significantly different between BBA I to BBA II, with 2.5 times more nests confirmed during BBA II. The increase in nest documentation may be most related to having more experienced personnel involved during the second atlas, who focused more effort on confirming nesting for this species. The fact that this species can raise more than one brood per year also increases the opportunities to confirm its nesting, and the fact that most nests are placed only 4–5 feet above ground makes the viewing of nesting activity quite convenient. Iowa is not the only state to document high nesting confirmation rates, Illinois confirmed nesting in 62.8% of its BBA blocks (Kleen et al. 2004), while Missouri confirmed nesting in 50.8% of its BBA blocks (Jacobs and Wilson 1997).

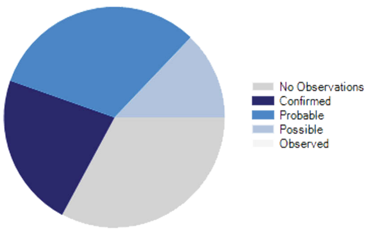
While data from both atlases indicate a statewide distribution for this species, there was somewhat less documentation of this species in northwestern Iowa during BBA I (Jackson et al. 1996). For one, there was a substantial increase in the number of records in northwestern Iowa blocks during BBA II. There also were many more northern counties with nest confirmations during the second atlas than the first. For example, while there were four counties bordering Minnesota with confirmed nesting during BBA I, there were nine counties bordering Minnesota with confirmed nesting records during the second atlas. The northward expansion of Northern Cardinal nesting has been documented since the early 1800s and is attributed to such factors as a warming climate, a human-altered landscape that provides additional habitat, and the presence of bird feeders during the winter months (Halkin and Linville 1999). Considering the cardinal's close association with human-modified habitats (and backyard bird feeders), its future seems most secure.

Northern Cardinal

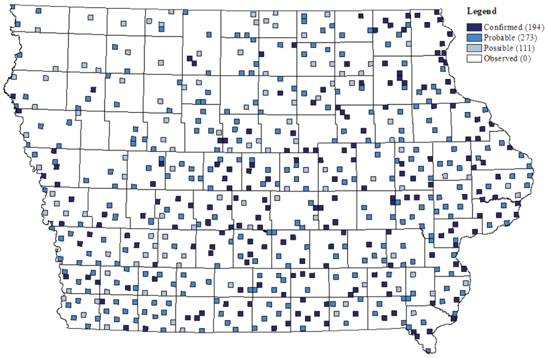
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	77	34	111
Probable	128	145	273
Confirmed	71	123	194
Conf & Prob	38.10%	67.20%	54.20%

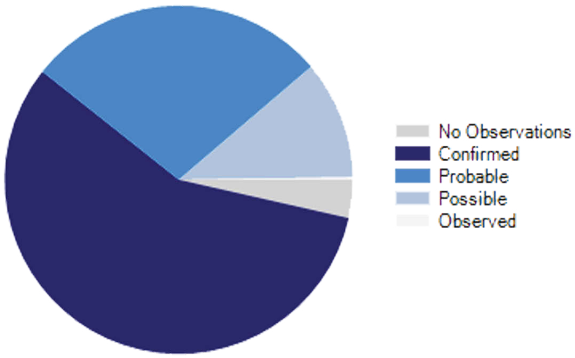
BBA I Results



BBA I



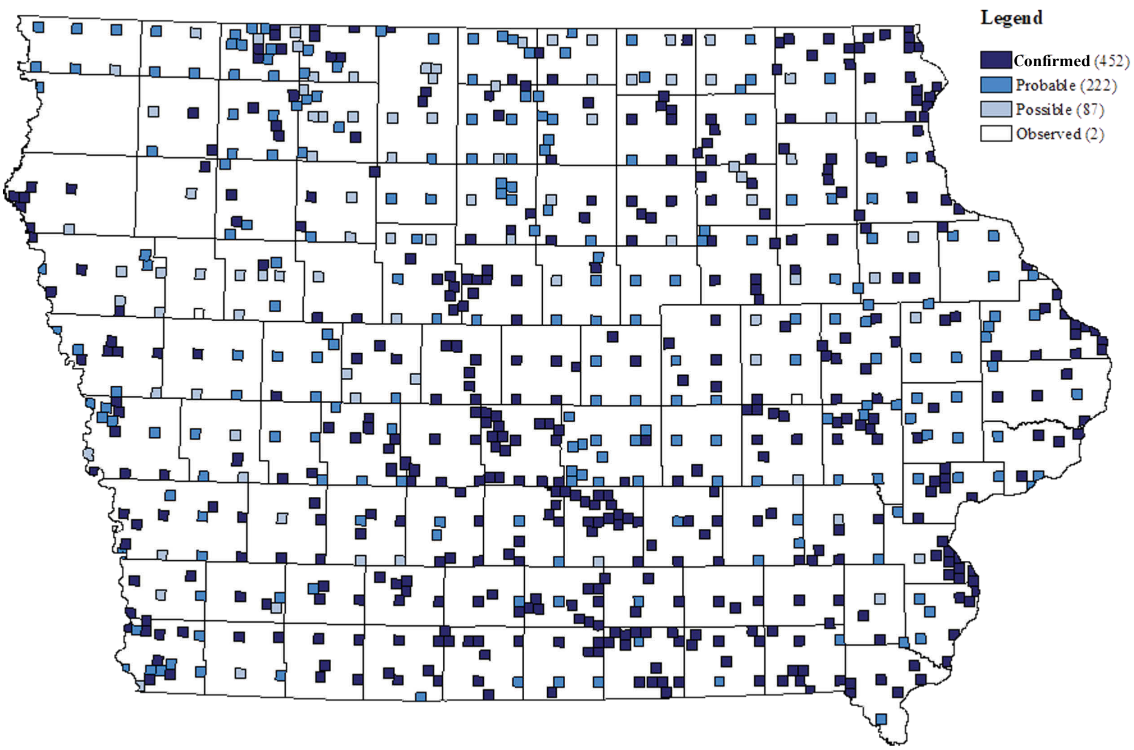
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	2	0	2
Possible	68	19	87
Probable	137	85	222
Confirmed	164	288	452
Conf & Prob	57.70%	93.50%	78.30%

BBA II

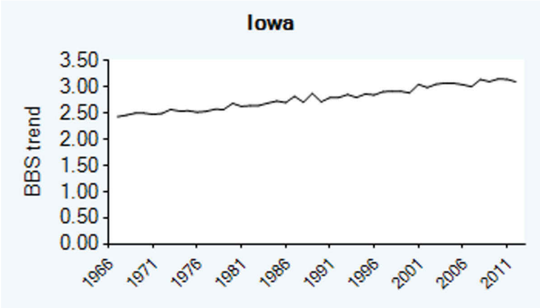


Sponsored by John Bissell

© Larry Dau

Habitat	Scrub woodland and shrubby growth by streams and woodland edges
Breeding Dates	4 May (PR)–31 Aug (CO)
Nest Type	Loose cup of small twigs, coarse grasses, weed stems, and decayed leaves lined with finer twigs, rootlets, and hair
Clutch Size	4 eggs (range 3–5)
Incubation	12–14 days
Fledging	9–12 days
Status	Common summer resident
BBS Trend	Increasing (trend = 1.2, 95% CI is 0.2, 2.2) [Iowa]

Patterns since BBA I



The Rose-breasted Grosbeak is a common summer resident that prefers breeding habitat within deciduous woods and woodland edges. Iowa's BBS data indicate that this songster of the woods is increasing at an average annual rate of 1.2% (Sauer et al. 2012). Perhaps as a reflection of a slightly increasing population, this grosbeak was documented to occur in 538 (62.5%) of BBA I blocks and increased to 680 (86%) blocks during the second atlas. Results were similar for both atlases, regarding where this species was found. During BBA I, evidence of grosbeak nesting occurred in 57.2% of priority blocks and 42.8% of grid blocks. During BBA II, this bird was found in 55.9% of habitat blocks and 44.1% of grid blocks. While these results indicate that public land blocks were slightly more important for this species than grid blocks, the type of block where this species was confirmed nesting most is more telling. For instance, 69% of all confirmed nesting records came from priority blocks during BBA I, and 71.5% of all confirmed nests were documented in habitat blocks during BBA II. A significantly higher percentage of probable nests were documented in priority/habitat blocks during both atlases, as well. Perhaps easier access to public land blocks allowed for this higher level of nesting confirmation. Overall, Rose-breasted Grosbeak was confirmed or probable in 370 (68.8%) of BBA I blocks and 513 (75.4%) of BBA II blocks. Possible breeding was documented in 30.9% of BBA I blocks and 24.6% of BBA II blocks.

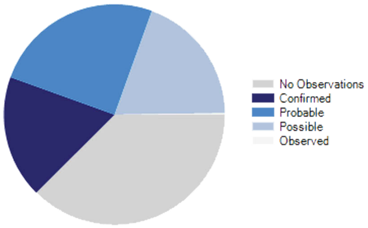
Essentially, aside from an increase of records documented in the second atlas, data collected for this grosbeak in almost every category were quite similar, during both atlases. One explanation for this may be related to the fact that this species is found in such a wide variety of disturbed woodland habitat types. It has been documented to nest in deciduous, mixed, and coniferous woodlands, overgrown fields and pastures, shrubby road and railroad rights-of-way, in gardens, parks, and residential areas (Wyatt and Francis 2002).

Rose-breasted Grosbeak was found in all 99 counties during BBA I (Jackson et al. 1996), and it was in all counties during the second atlas. Fewer records came from blocks in northwestern Iowa during both atlases, and more records came from eastern and southern Iowa, where more of the habitat exists that this grosbeak prefers. Essentially, Rose-breasted Grosbeak distribution remained the same. This grosbeak is known for range contractions and expansions that appear to be most related to changes in habitat, particularly following forest harvest, which increases the availability of edge and second-growth habitat (Bonney 1988). Kleen et al. (2004) found during their atlas project that the substantial number of records in southern Illinois was unexpected and was indicative of a southern range expansion. While high predation rates can be a primary cause of grosbeak nest failure (Best and Stauffer 1980), especially in small woodlots or other small wooded areas, this grosbeak's use of second-growth, edge, and otherwise disturbed habitats (as well as adaptation to suburban habitats) makes it potentially much less vulnerable to human disturbance than many other species of Neotropical migrants (Wyatt and Francis 2002).

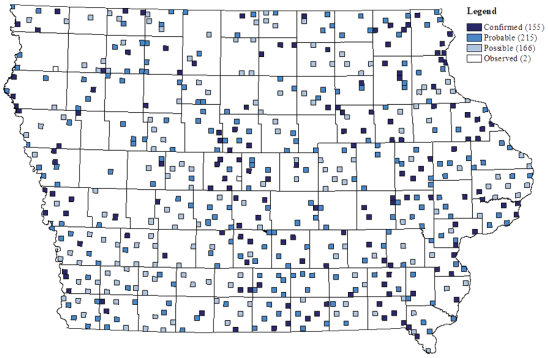
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	2	0	2
Possible	98	68	166
Probable	82	133	215
Confirmed	48	107	155
Conf & Prob	24.90%	60.20%	43.00%

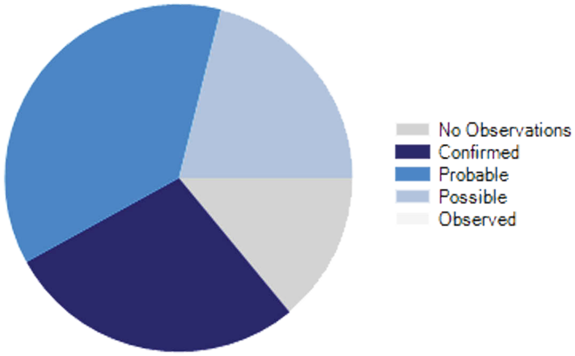
BBA I Results



BBA I



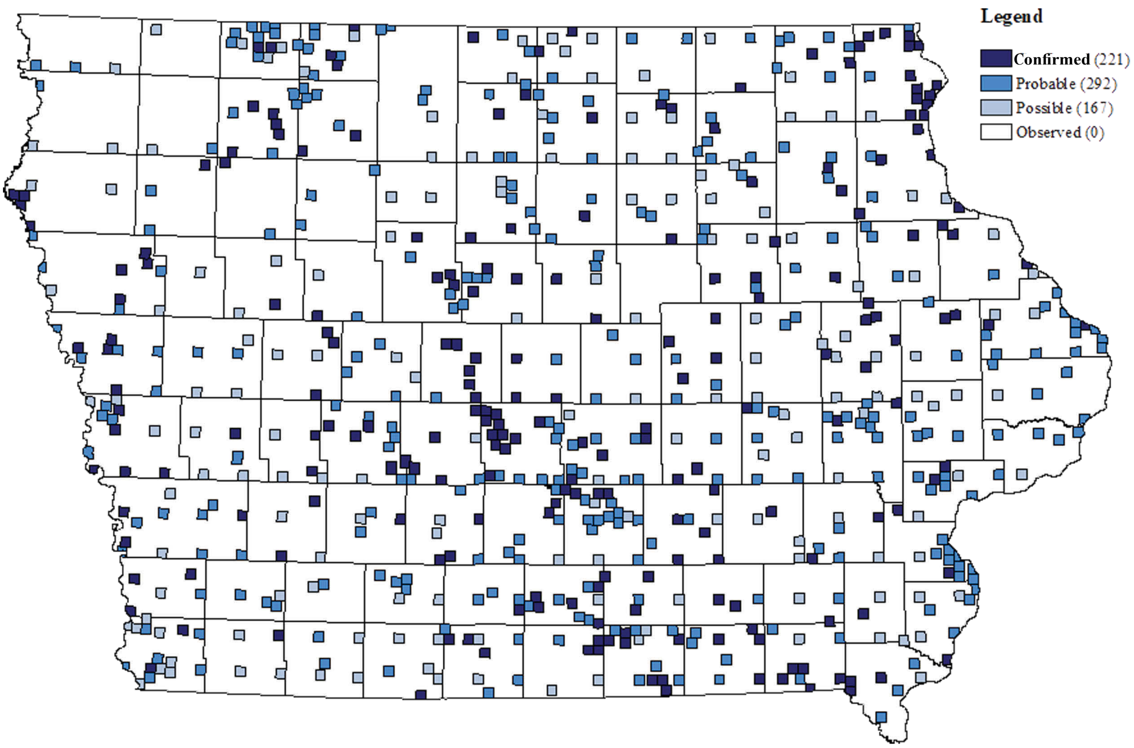
BBA II Results



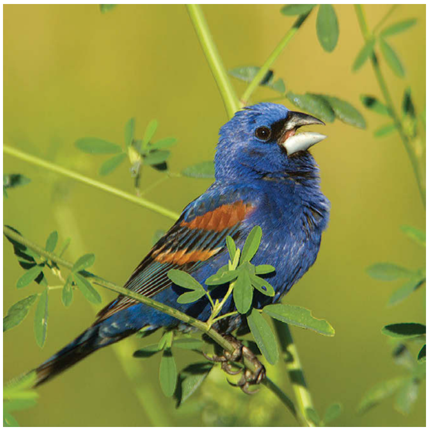
BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	122	45	167
Probable	115	178	293
Confirmed	63	158	221
Conf & Prob	34.10%	84.20%	59.70%

BBA II



Sponsored by Bob Van Ersvelde

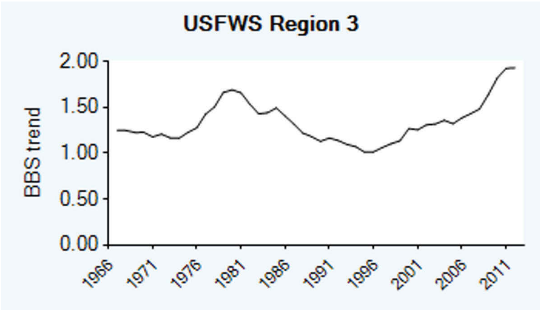


© Stanley Buman

Habitat	Open shrubby habitat along roadsides and streams, as well as in shrubby pastures and old fields
Breeding Dates	30 May (PR)–31 Aug (CO)
Nest Type	Compact cup-nest of stems, thin twigs, barks strips, and various other plant materials lined with finer rootlets, grasses, and hair
Clutch Size	4 eggs (range 3–5)
Incubation	11–13 days
Fledging	9–13 days
Status	Uncommon localized summer resident
BBS Trend	Increasing (trend = 0.9, 95% CI is 0.6, 1.3) [Central US]

Patterns since BBA I

The Blue Grosbeak is a bird of forest edge and shrub-lands, found most often in shrubby habitat in fencerows along roadsides and streams, in old fields, and in isolated patches of brushy vegetation in agricultural areas. While BBS data were lacking to indicate a population trend for Iowa, national BBS data indicate this species has been increasing significantly for many decades (Sauer et al. 2012). While this species was found in 58 (6.7%) blocks during BBA I, it was found in 160 (20.2%) blocks during the second atlas, a fairly dramatic increase of records. Results were similar for both atlases, regarding where this species was found. During BBA I, evidence of grosbeak nesting occurred in 55.2% of priority blocks and 44.8% of grid blocks. During BBA II, this bird was found in 48.1% of habitat blocks and 51.9% of grid blocks. Therefore, when data are combined for both atlases, this species was found equally well on private land as it was on public land blocks. Also, there was no appreciable difference in the number of confirmed records that came from either private land (grid) blocks or priority/habitat (public land) blocks. There was a slight increase in higher levels of confirmation during the second atlas, with confirmed and probable records making up 26 (44.8%) of BBA I records and 89 (55.6%) of BBA II records. Possible records comprised 31 (53.4%) of BBA I records and 70 (43.8%) of records for BBA II. For both atlases, the most commonly reported codes were those for singing males or sight records of a bird in suitable habitat. It is most likely that many records of this species were missed because the Blue Grosbeak song can be easily mistaken for the song of Orchard Oriole or House Finch, and Blue Grosbeaks share habitats with Indigo Buntings, which have a similar appearance. A quick sighting of a bird in flight or a bird perched high on a utility line might be mistaken to be an Indigo Bunting.



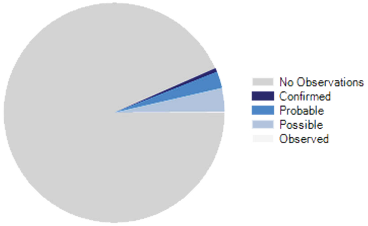
The Iowa distribution of Blue Grosbeak changed from BBA I to BBA II, and the number of counties with records more than doubled. During BBA I, records came from 22 counties, mostly from the westernmost two tiers of counties (Jackson et al. 1996). During BBA II, records were found in 50 counties, including most of the counties in the western one-third of the state and most of the counties in the southern four tiers of counties. After the first atlas, Jackson et al. (1996) suggested that "more birds may be found with more diligent searching in other southern Iowa counties." Results from BBA II indicate that diligent searching of southern Iowa counties paid off. The furthest northeast record was of a pair of Blue Grosbeaks in Black Hawk County along the Wapsipinicon River, and extreme northeastern Iowa was the only area of the state lacking records for this bird.

An increase in abundance and northward expansion for Blue Grosbeak has been documented in Illinois, beginning in the 1960s, and while most of the Illinois BBA records were found in the southern one-third of the state, nesting was confirmed throughout much of the state (Kleen et al. 2004). Missouri's BBA reported Blue Grosbeak in 57.5% of its blocks (with statewide distribution), and it is common in the southern two-thirds of that state (Jacobs and Wilson 1997). Iowans may be observing this species in more counties in the future.

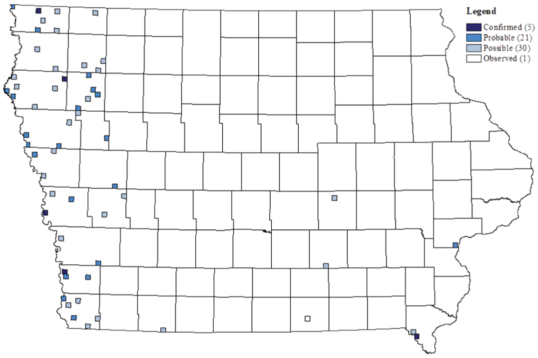
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	1	1
Possible	18	12	30
Probable	6	15	21
Confirmed	2	3	5
Conf & Prob	1.50%	4.50%	3.00%

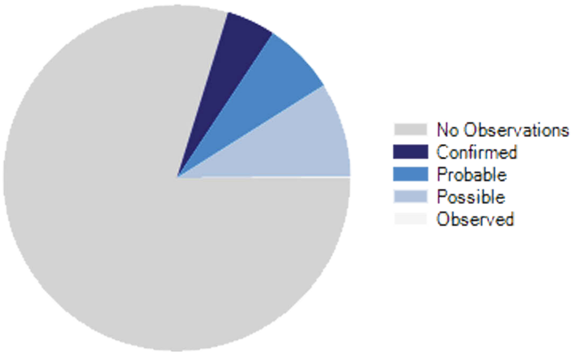
BBA I Results



BBA I



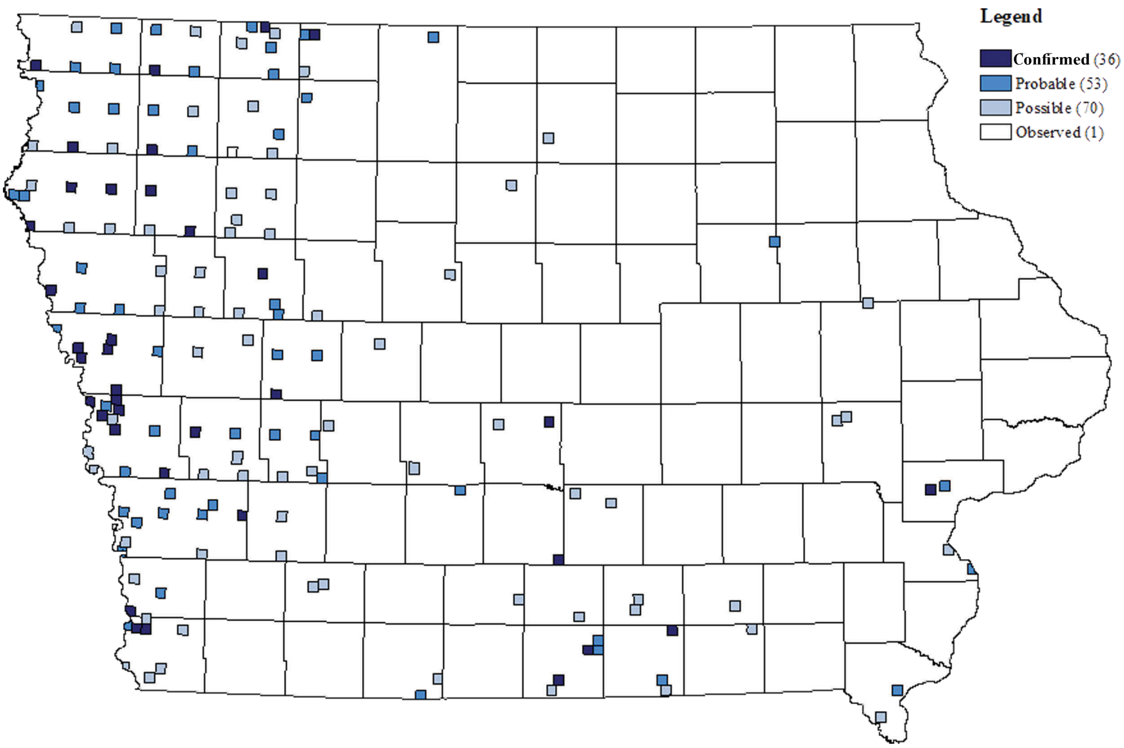
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	1	0	1
Possible	33	37	70
Probable	30	23	53
Confirmed	19	17	36
Conf & Prob	9.40%	10.00%	10.30%

BBA II



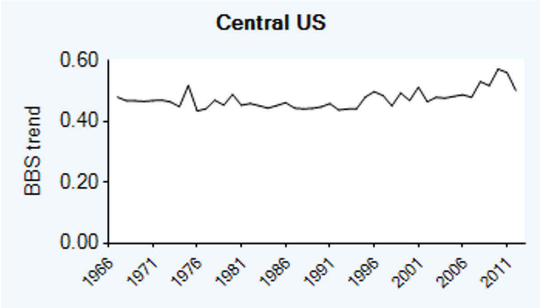
Sponsored by John Rutenbeck

© Reid Allen

Habitat	Diverse brushy habitats with an abundance of shrubs, low trees, and herbaceous vegetation
Breeding Dates	NA
Nest Type	Coarsely woven cup of dried grasses, lined with finer grasses and hair and well attached to supporting plant stalks or fork of a shrub usually 2–4 ft. up
Clutch Size	3–5 eggs (usually 4 eggs)
Incubation	11–14 days (usually 12 days)
Fledging	9–11 days
Status	Accidental
BBS Trend	Stable (trend = 0.9, 95% CI is –1.0, 2.5) [Central US]

Patterns since BBA I

The Lazuli Bunting is rarely seen in Iowa and in the past was listed as accidental in occurrence (Kent and Dinsmore 1996). It is a bird of the west and breeds from southwestern Canada south to Baja California, east into the Great Plains, extending about half-way to the east across the Dakotas and Nebraska, and south to the panhandle of Texas. This bunting appears sporadically during the nesting season in states that border the eastern edge of its breeding range. In the Great Plains, its breeding range overlaps that of the Indigo Bunting, and the two forms occasionally hybridize (Payne 1992).



From 1929 through 1996, Kent and Dinsmore (1996) reported there were 17 total Iowa records for Lazuli Bunting, eight of which were males in northwestern Iowa and one male in southwestern Iowa. One of these was a hybrid male that nested with a female Indigo Bunting (Youngworth 1959). Since 2000, there have been 20 additional accepted sightings of this species in Iowa (Iowa Ornithologists' Union 2013). All but four of these sightings occurred in the western half of the state, and all but two of these records occurred in May. One of these records is from Red Rock Lake in Marion County on 28 June 2012, and the second (the only Iowa BBA record) is a male seen by Tom Johnson on 8 July 2012 at the Rathbun Wildlife Management Area in Appanoose County.

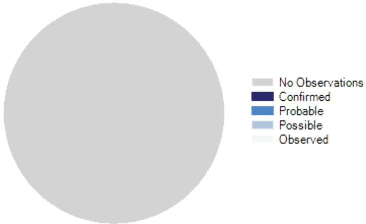
Throughout its United States range, the overall numbers of Lazuli Bunting appear relatively stable, with a nonsignificant annual declining BBS trend of 0.5%, between 1966 and 2011 (Sauer et al. 2012). There is no BBS trend in Iowa for this species, due to a lack of summer records.

Lazuli Buntings are generally abundant and widespread, where suitable habitat exists within their breeding range. In some portions of their range, however, heavy parasitism by Brown-headed Cowbirds greatly reduces their reproductive success (Greene et al. 2014). Lazuli Bunting numbers appear to have increased during the early part of the twentieth century with creation of large areas of early successional habitat, such as thickets along irrigation ditches (Dobkin 1994). This increase of shrubby habitat seemed to especially happen in the grassland plains east of the Rocky Mountains and appears to have extended the breeding range of this species eastward (Greene et al. 2014). While the Lazuli Bunting apparently is not extending its range east as fast as Indigo Bunting is extending its range west, the two buntings do hybridize where they co-occur; and the zone of overlap and hybridization is now extensive (Kroodsma 1975). Whether or not the Lazuli Bunting will eventually breed in Iowa is yet to be seen.

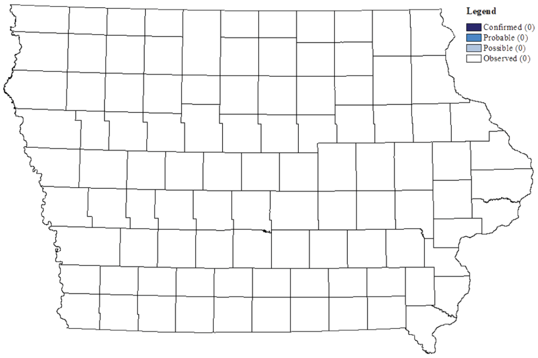
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	0	0	0
Probable	0	0	0
Confirmed	0	0	0
Conf & Prob	0.00%	0.00%	0.00%

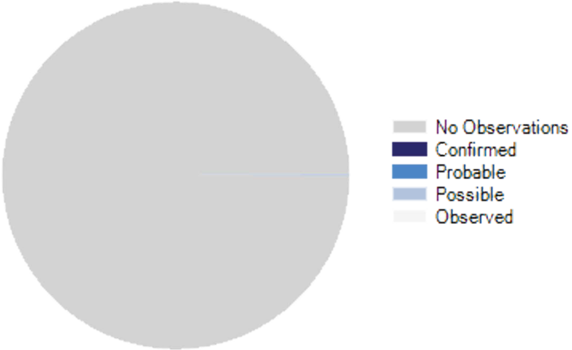
BBA I Results



BBA I



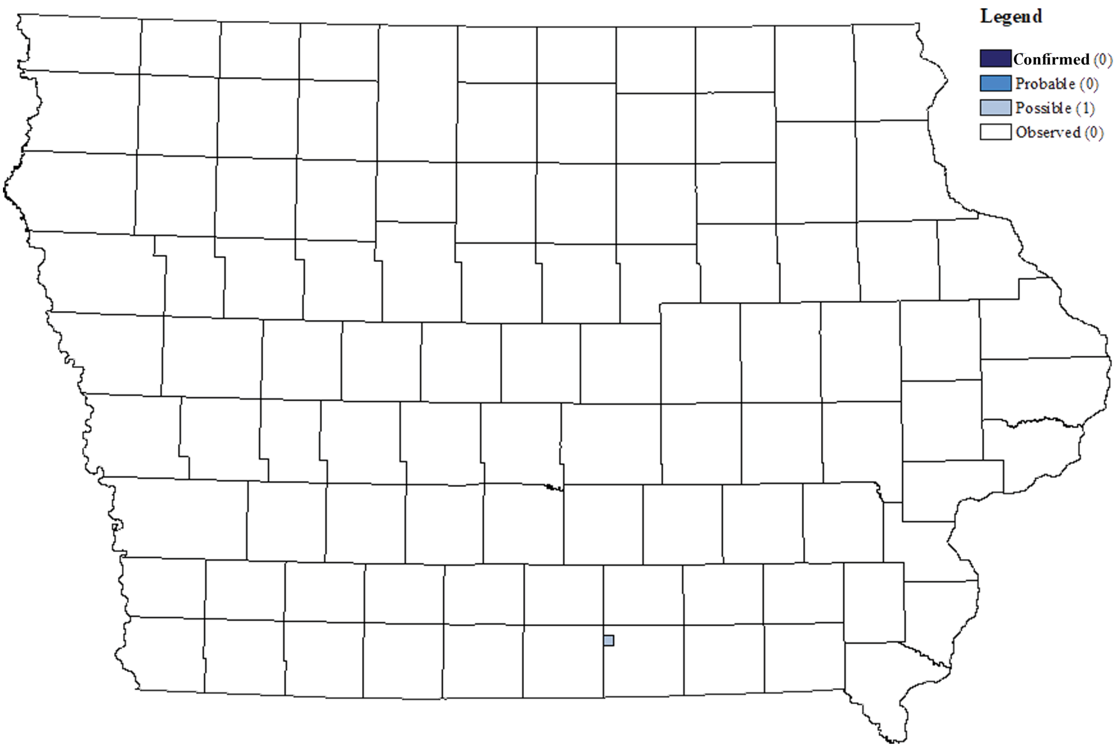
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	0	1	1
Probable	0	0	0
Confirmed	0	0	0
Conf & Prob	0.00%	0.00%	0.00%

BBA II

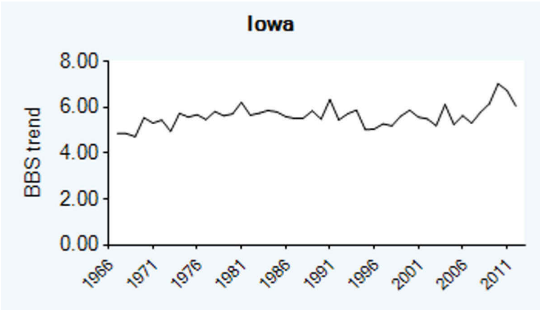


© Larry Dau

Habitat	Brushy wooded edges and clearings, hedgerows, shrubby habitat along roadsides, and shrubby pastures and old fields
Breeding Dates	5 May (PR)–4 Dec (CO)
Nest Type	Cup-nest of dry grasses, dead leaves, bark strips, and weed stems lined with fine grass, rootlets, hair, and feathers
Clutch Size	3–4 eggs, typically
Incubation	12–13 days
Fledging	9–12 days
Status	Common statewide summer resident
BBS Trend	Increasing (trend = 0.9, 95% CI is 0.2, 1.7) [Iowa]

Patterns since BBA I

During Iowa's breeding season, the Indigo Bunting is an abundant and widespread incessant songster. Iowa BBS data indicate this species is increasing at an average annual rate of 0.9% (Sauer et al. 2012). This bunting was detected in 643 (74.7%) of BBA I blocks and 779 (98.5%) of BBA II blocks, a significant increase in detection. Regarding where this species was found, results were similar for both atlases. During BBA I, evidence of Indigo Bunting nesting occurred in 51.6% of priority blocks and 48.4% of grid blocks. During BBA II, this bird was found in 50.6% of habitat blocks and 49.4% of grid blocks. This species was found equally well on private land as it was on public land blocks. There was a significant increase in the number and percent of confirmed records during the second atlas, increasing from 86 (13.4%) of BBA I records by a four-fold increase to 350 (44.9%) of BBA II records. Most (63.4%) of the confirmed records during the second atlas came from habitat blocks, which may indicate that access on public lands allowed atlassers to better find nests than they did during BBA I.



This bunting typically nests low to the ground in shrubby or dense vegetation, and during BBA I, only 25 nests were located, an indication of this bunting nesting in heavy cover (Jackson et al. 1996). Overall, when confirmed and probable nest records are combined, this total comprised 714 (91.7%) of all BBA II records. While possible records made up 27.4% of BBA I records, they comprised only 8.2% of BBA II records. This difference may be due to atlassers being more experienced during BBA II, along with more concentrated effort expended to confirm nests whenever possible.

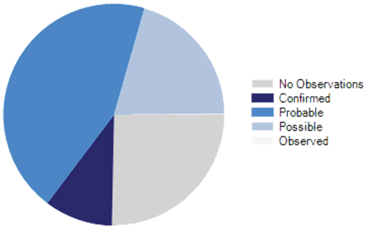
The distribution of Indigo Bunting was essentially the same for both atlases, and it is found in every county and every location where there is suitable habitat. As was determined during the first atlas, the few places where it was not detected (especially northwestern Iowa) were primarily the highly agricultural blocks, and it is most likely this bunting would have been found in those blocks, too, if more effort had been expended. According to Payne (2006), Indigo Bunting populations decrease locally with intensive agriculture, frequent mowing of rank vegetation along roadsides and on farms, increasing urbanization, and reversion of old fields to forests.

Data from other state atlases were quite comparable to Iowa's, for this ubiquitous bunting. Missouri documented Indigo Bunting in 98.4% of that state's blocks (Jacobs and Wilson 1997), and Illinois recorded this species in 89.5% of its blocks (Kleen et al. 2004). Indiana found it in 99% of its blocks (Castrale et al. 1998), and Ohio detected Indigo Buntings in all but one block (Peterjohn and Rice 1991). While early nests of Indigo Buntings are frequently parasitized by Brown-headed Cowbirds, late nests are not parasitized because the latest date of cowbird laying in any host species was 15 July, three weeks before the latest bunting clutch (Payne 2006). It seems that Indigo Bunting populations in Iowa and nearby states are presently quite secure.

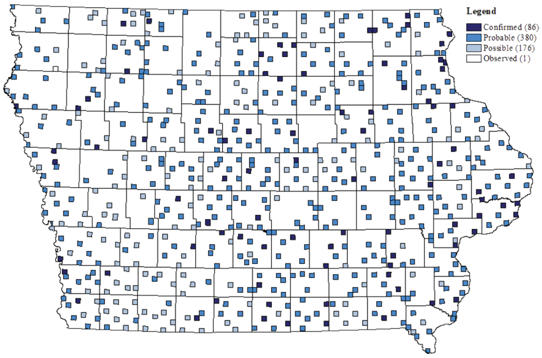
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	1	0	1
Possible	120	56	176
Probable	162	218	380
Confirmed	28	58	86
Conf & Prob	36.40%	69.20%	54.10%

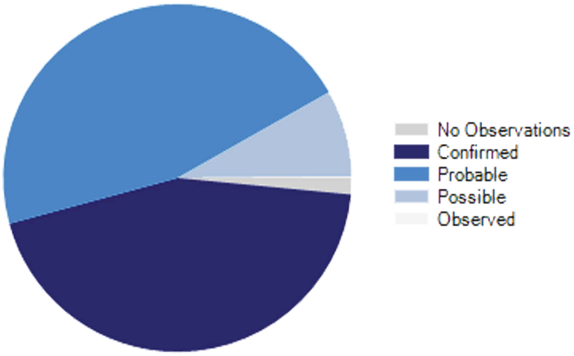
BBA I Results



BBA I



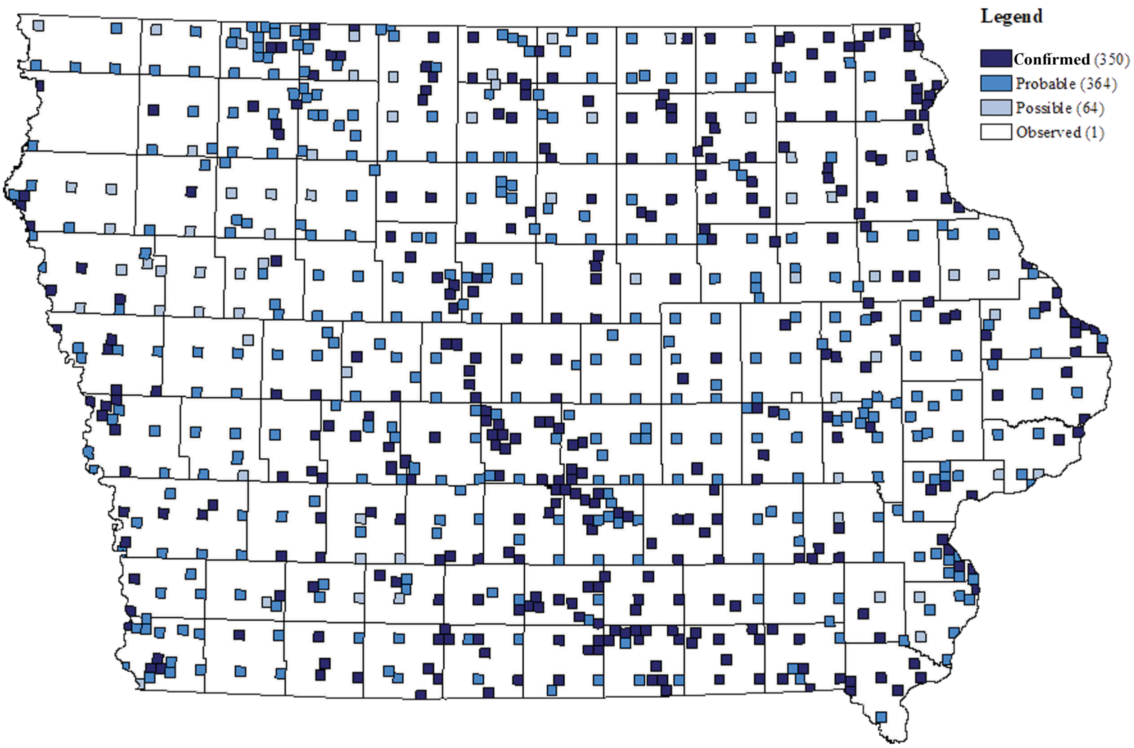
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	1	0	1
Possible	55	9	64
Probable	202	163	365
Confirmed	128	222	350
Conf & Prob	63.20%	96.50%	83.00%

BBA II



© Larry Dau

Habitat Various grasslands: prairies, CRP grasslands, weedy pasture, old fields, hay fields, weedy-grassy roadsides

Breeding Dates 3 May (PR)–29 Aug (CO)

Nest Type Bulky cup nest of coarse grass, weed stems, and leaves lined with finer grasses, rootlets, and hair placed close to the ground

Clutch Size 4 eggs (range 3–6)

Incubation 11–13 days

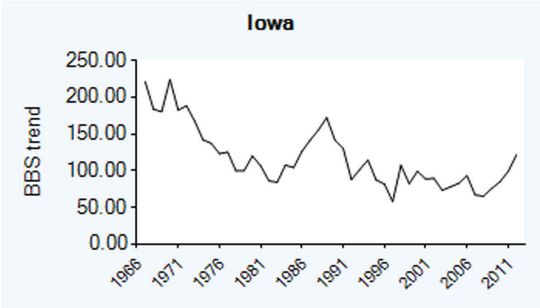
Fledging 8–10 days

Status Abundant statewide summer resident

BBS Trend Decreasing (trend = −2.3, 95% CI is −3.3, −1.3) [Iowa]

Patterns since BBA I

Another tireless singer, the Dickcissel is a familiar bird to both prairie enthusiasts and to those who spend much time during summer anywhere in Iowa where grasslands exist. While Iowa BBS data indicate an average annual decline of 2.3% (Sauer et al. 2012), Iowa atlas data did not reflect that trend. During BBA I, this grassland songster was found in 678 (78.7%) of all blocks, while it was located in 778 (98.4%) of blocks during BBA II. It was documented equally well in grid (private land) blocks and priority/habitat (public land) blocks during both atlases, and in fact was found in exactly the same number of grid as habitat blocks during BBA II. Access to public lands, during both atlases, may have mattered slightly for confirming nests, since 58% of confirmed nests were in priority/habitat blocks. There was a major increase in confirmed nests from BBA I, with 104 (15.3%) records increasing four-fold to 427 (54.9%) confirmed nesting records during BBA II. This significant increase in documentation was likely related to an increase in effort and expertise of atlassers during BBA II. Confirmed and probable records added together comprised 85% of BBA I records and 95.4% of BBA II records. During the first atlas, 73% of all records were listed as probable, and the majority of those records were more than seven singing males (Jackson et al. 1996). This likely occurred because Dickcissel males are almost always found in groups, and they are quite easy to hear and observe as they sing from their roadside perches on fence posts and utility lines. During BBA II, adults attending young and recently fledged young appeared to be the most used codes for nesting confirmation. Apparently very few nests were actually seen, probably because this bird nests so close to the ground and it is very difficult to locate the nest unless a bird is seen flying to it.



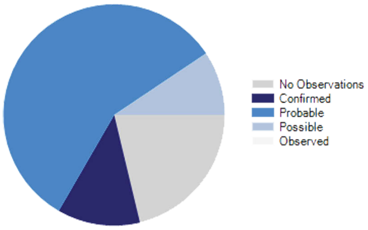
The statewide distribution of Dickcissel was essentially the same for both atlases, and it was found in every county during both atlas periods. While this species was located in more blocks during the second atlas than the first, it seems that difference is related more to effort and does not reflect an actual increase in distribution. Even in blocks that were >95% row-crop land cover, this species was found. The usable grassland habitat that existed in those industrial scale agricultural blocks was typically unmowed roadside ditches or an occasional unmowed grassy waterway.

Atlas data from adjoining states were quite comparable to Iowa's, for this prairie songbird. Missouri documented Dickcissel in 80.9% of that state's blocks (Jacobs and Wilson 1997), and Illinois recorded this species in 74.7% of its blocks (Kleen et al. 2004). Iowa is a particularly important state for this species, since it lies within Dickcissel's core range (Temple 2002). In core breeding range, male Dickcissels show particularly high site fidelity, with the highest probability of males returning if the previous year's nesting attempts proved successful (Zimmerman and Finck 1989). Males returning to the same territory in subsequent years show higher productivity than males that switched sites. Efforts that restore grasslands, such as the Conservation Reserve Program, create valuable nesting habitat for this species (Temple 2002), and it is especially important for the future of this and other grassland nesters that such Federal Farm Programs as this continue to receive public support for funding.

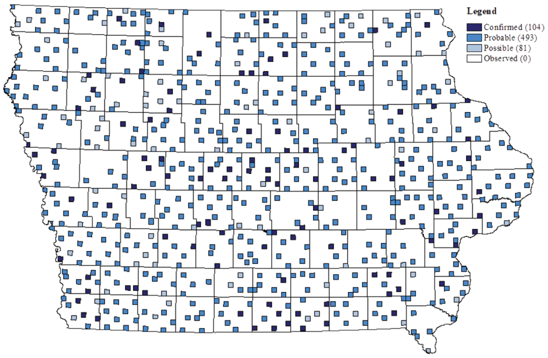
BBA I (1985–1990) Breeding Evidence

Blocks	Grid (522)	Priority (339)	Total (861)
Observed	0	0	0
Possible	48	33	81
Probable	260	233	493
Confirmed	43	61	104
Conf & Prob	58.00%	73.70%	69.30%

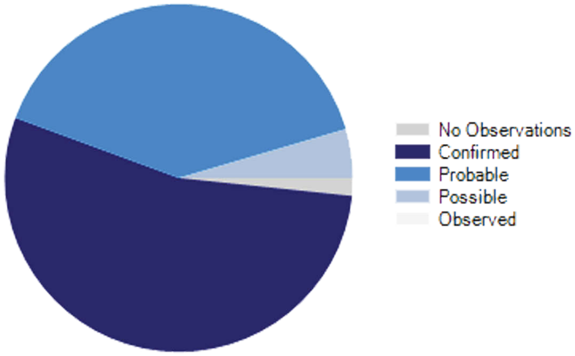
BBA I Results



BBA I



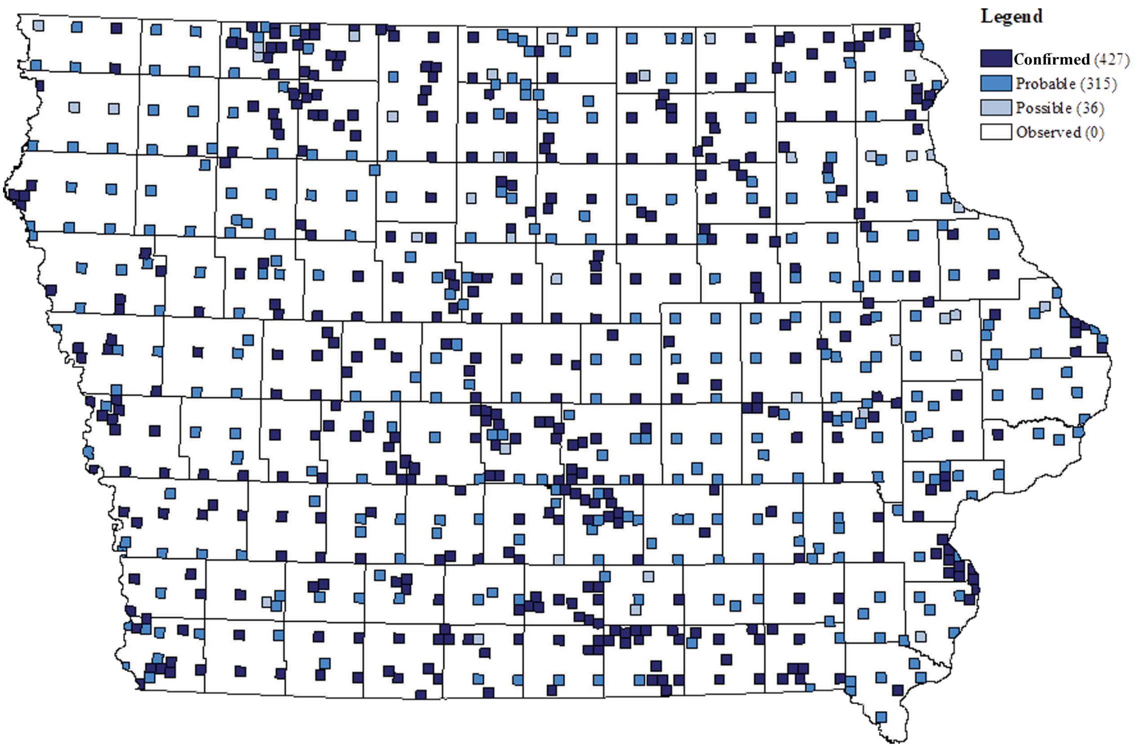
BBA II Results



BBA II (2008–2012) Breeding Evidence

Blocks	Grid (395)	Habitat (396)	Total (791)
Observed	0	0	0
Possible	20	16	36
Probable	190	127	317
Confirmed	181	247	428
Conf & Prob	71.10%	93.70%	86.50%

BBA II



Sponsored by Tony Winter

By Bruce L. Ehresman

Black-bellied Whistling-Duck

The breeding range of the Black-bellied Whistling-Duck substantially expanded northward from the coastal regions of Mexico during the last century (James and Thompson 2020), perhaps influenced when much of Louisiana's population was established through release programs (Wiedenfeld and Swan 2000). Broods documented on the Missouri River floodplain in Mills County represent the first confirmed nesting records for Black-bellied Whistling-Duck in Iowa (Silcock 2020), indicating a range expansion north from recent successful breeding in Kansas (Charlotte Otte pers. comm. in Silcock 2020) and in Missouri (Robbins 2018).

Black-bellied Whistling-Duck is a cavity nesting species that readily nests in Wood Duck nest boxes. Pair formation appears to take place in winter before spring migration begins (James and Thompson 2020). This tree-duck is monogamous and not territorial, except during egg-laying and incubation when the nest cavity is protected. Its primary nest sites are natural cavities in trees, and eggs are laid on debris within these cavities. In Texas, average clutch size is 13 eggs, and incubation is about 28 days (Bolen 1967 in James and Thompson 2020). Both sexes incubate the eggs, and both adults brood young at the nest for up to 24 hours after hatching; after which the entire family moves away from the nest site onto a water body. Young begin to fly at 56–63 days of age, and young remain with their parents for up to four months after fledging (Bolen et al. 1964). On 9 August 2019, Ross Silcock photographed an adult female Black-bellied Whistling-Duck with 10 or 11 young (estimated to be about a week old) in a roadside ditch near the Missouri River in Mills County (Silcock 2020), with other likely broods of this species sighted in this vicinity. Both sexes exhibit high breeding-site fidelity, with annual return rates to breeding areas in southern Texas of 42% for males and 58% for females (Bolen 1971). In Louisiana, instances of mixed Wood Duck and Black-bellied Whistling-Duck clutches were observed in 14.8% of 61 nests of the two species (Bolen and Cain 1968).

Trumpeter Swan

After Iowa initiated a reintroduction program for Trumpeter Swans in 1993, its first modern day hatch of three wild Trumpeter Swan cygnets occurred in 1998 in Dubuque County, followed by a second nest in 2000 in Winnebago County, west of Forest City (Fritzell 2017). Iowa's swans nest mainly in cattail marshes and prairie potholes and also in ponds and shallow lakes with cattail beds. Monogamous and firm pair bonds are not typically established until the third or fourth winter, when the pair remains in close proximity during courtship and breeding (Mitchell and Eichholtz 2020). Nests are built by both sexes and are comprised of a large mound of vegetation, often placed on top of muskrat houses. Breeding adults are quite territorial, with territory size being variable, 1.5 ha to >100 ha (Mitchell and Eichholtz 2020), and often an entire water body is aggressively defended. Humans in canoes are often attacked when paddling too close to an active nest site (Ehresman pers. obs.). The average clutch size is five eggs (range is 2–9), and the female incubates the creamy white eggs for about 33 days (Johnsgard 1979). Young are typically led from the nest within 24 hours of hatching. Both adults tend the young, which do not fly until 13 to 17 weeks old. Average Iowa brood size from 1998–2017 (n = 428) is 4.6 young and the average number of young fledged is 3.3 (Fritzell 2017). Young stay with their parents until the following spring. Iowa nesting dates are highly variable, even for individual pairs (David Hoffman pers. comm.). Iowa DNR (unpublished) and BBA II data indicate that egg-laying begins in April, most records of incubation are from May to early June, and most young hatch during June and through mid-July. Several Iowa nest sites have been active for 10–15 successive years (Ehresman pers. obs.).

Red-necked Grebe

Most Red-necked Grebes arrive in Iowa in April. The monogamous pair formation occurs during migration or at the breeding site. The mean territory size for pairs with young in North Dakota was 1.39 ha (Garner 1991 in Stout and Nuechterlein 1999). Courtship ceremonies are often accompanied by vocalization in displays that include whinny-braying, cat display, bouncy dive, and weed dance (Nuechterlein and Storer 1982, Stout and Nuechterlein 1999).

Red-necked Grebes usually nest as isolated pairs on shallow lakes or marshes, typically where there is some emergent vegetation. Semicolonial nesting may occur in larger shallow lakes with more extensive habitat. The nest is a mound of plant matter formed on a floating platform of vegetation and anchored to submerged or emergent vegetation. Water depth at the nest can vary and rarely is less than 20 cm, and more often 50 to 60 cm (Stout and Nuechterlein 1999). Both sexes build the nest. Clutch size is 1-9 (typically 4–5) eggs, colored pale blue or buff. An Iowa nest record with four eggs was recorded at Jemmerson Slough WMA in Dickinson County on 17 June 1998 (Fairbairn 1998), while most confirmed nesting in Iowa since then has been from observing young birds in northern wetlands. Incubation is by both sexes and normally begins after the first egg is laid. Incubation is typically 20 to 23 days, with a hatching date recorded in Iowa of 6 July (Fairbairn 1998). After hatching, back-brooding of young by both sexes occurs until the chicks are 10 to 17 days old. Parents feed their young for six to seven weeks and then begin to drive away the begging young (De Smet 1983 in Stout and Nuechterlein 1999). Young birds typically fledge at 49 to 63 days of age. Red-necked Grebes can dive as deep as 30 feet and prey on aquatic insects, small fish, and crustaceans (Stout and Nuechterlein 1999).

Horned Grebe

The Horned Grebe breeds over most of North Dakota east of the Missouri River, in extreme northwestern Minnesota, rarely in north-central South Dakota, and occasionally in the Nebraska Sandhills (Johnsgard 1979). Iowa's first nesting record occurred on 4 June 2014, when a low platform nest of Horned Grebes was observed by Steve Dinsmore at Eagle Lake in Hancock County, and in a subsequent visit on 12 July at least one adult was relocated that was tending two half-grown chicks on open water not far from where the nest was observed (S. J. Dinsmore 2014b). This species was not recorded during either of Iowa's atlases.

Horned Grebes are monogamous and usually breed in solitary pairs or in loose groups with adjacent territories (Stedman 2020). Courtship displays are elaborate and mostly mutual. Pairs nest on fresh to slightly brackish water areas that range from seasonal to permanent and vary in size from one-third acre to several hundred acres (Johnsgard 1979). Eagle Lake is an approximately 700-acre public Wildlife Management Area (WMA), of which about 230 acres are wetlands. According to S. J. Dinsmore (2014), it appeared that Pied-billed, Red-necked, Eared, and Western grebes were all also attempting to nest at Eagle Lake in the summer of 2014. The platform nest of Horned Grebes is built by both sexes, usually over dense beds of submerged vegetation, and is comprised of a mass of vegetation opportunistically constructed from plants that are most available. Clutch size is normally four or five white eggs, and both adults incubate them for 24–25 days (Johnsgard 1979). Egg-laying generally occurs from April to August (with a peak in June) throughout much of the breeding range (Stedman 2020). Young usually leave the nest at hatching and are borne on the backs of the adults for the next 10–14 days and are fed by the adults, with young fledging at 45–60 days (Stedman 2020).

Eurasian Collared-Dove

Eurasian Collared-Doves are monogamous and may mate for life. The male defends his territory from a high perch, gives advertising coos, and performs display flights. During courtship, the male approaches the female and performs a bowing display. A display coo accompanies the bowing display (Romagosa 2012).

Most Eurasian Collared-Doves mate in their second year of life. The male leads the female to potential nest sites and performs nest calls at each site. Nests typically are in areas near human habitation, wherever food is abundant and there are potential nesting sites. Nests are usually placed in trees. In Iowa during the BBA II, evergreens appeared to be favored sites for nesting (Ehresman pers. obs.). Occasionally nests are placed on buildings. The female usually builds the nest while the male gathers materials. The nest is a platform of twigs, stems, roots, and grasses, typically placed on a horizontal branch of a tree. In Iowa, egg-laying appears to begin in March and continues into September. Clutch size is 1–2 (typically 2), and the eggs are white. Incubation is by both adults and lasts 14–15 days. The young are altricial and remain in the nest for about 17 days, where they are fed by both adults. This dove can produce three to four broods in temperate climates and up to six broods per year in Europe (Cramp 1985 in Romagosa 2012). It is common for the female to begin laying the next clutch of eggs while there are young still in a previous nest. Eggs may be laid in the same nest more than once per year.

Black-necked Stilt

Black-necked Stilts' preferred breeding habitat is freshwater lakes and ponds, wet meadows, and shallow inland wetlands, and they show a strong tendency to nest on human-made impoundments (J. J. Dinsmore 1977). A pair of Black-necked Stilts with a one-week-old chick was discovered by Brandon Caswell on a sheet-water area in Hardin County on 7 August 2013, and the apparent same three-some was observed by Steve Dinsmore at Pintail Wetlands (about 1.5 miles distant) on 9 August 2013 (Caswell and S. J. Dinsmore 2014). This was Iowa's first nest record for this species. In recent decades Black-necked Stilt populations have moved steadily northward, both in the Great Plains and along the Mississippi River Valley (Robinson et al. 2020). With first-time nest records in states adjacent to Iowa noted in the early 1990s (Kent and Dinsmore 1996), stilts have by now nested in most states adjacent to Iowa (Caswell and S. J. Dinsmore 2014).

Stilts form pair bonds gradually, without elaborate associated displays. They typically nest in small colonies, usually 6–10 nests (Johnsgard 1979), and nests often are scrapes atop grass hummocks, close to shallow water foraging areas. Both sexes add materials to the nest throughout incubation. Clutch size normally is four eggs (buffy to sandy color with black blotches), and both parents incubate for 25–26 days (Johnsgard 1979). The precocial young leave the nest within 24 hours of hatching, and parents continue to brood them for about one week. Young are capable of sustained flight at 27–31 days post-hatching (Robinson et al. 2020). Family groups typically remain together well beyond the time when young can fly, with siblings or family groups sometimes migrating together (Robinson et al. 2020). Assuming the stilt chick was one week old, Caswell and S. J. Dinsmore (2014) estimated that the nest in Hardin County, Iowa was initiated on or about 2 July.

American Avocet

American Avocets may have historically nested in north-central or northwestern Iowa, although no concrete nesting evidence exists (Kent and Dinsmore 1996). Avocets nested in Faribault County in south-central Minnesota in 1977, near the Iowa border (Janssen 1987). Nesting behavior exhibited by a pair of avocets south of Sioux City in Woodbury Co. through June to 3 July 1986 (J. J. Dinsmore 1986) is the best evidence that avocets may have previously nested in Iowa. This species was reported in four BBA I blocks with no confirmed nesting (Jackson et al. 1996), and no records were collected during BBA II. On 12 June 2013, an American Avocet nest with four eggs was confirmed on Trumbull Lake in Clay County, making this the first confirmed nesting in Iowa (S. J. Dinsmore and Schoenewe 2013).

Avocets nest in loose colonies, and breeding in North Dakota is usually limited to areas of shallow water with exposed and sparsely vegetated shorelines (Johnsgard 1979). Breeding pairs, which are monogamous, engage in a complex sequence of displays leading to a bill-crossed run display following copulation. Both the male and female build the nest, a simple scrape with a lining of materials found very nearby. The nest is typically placed on a mud flat, sandbar, or island, slightly above the water surface. A typical clutch is four eggs (Ackerman et al. 2020). Eggs are colored buff to olive-buff with many dark spots. The nest discovered in Iowa with four eggs "consisted of a low mound of dead plant material resting on a recently exposed mudflat" (S. J. Dinsmore and Schoenewe 2013). Both parents incubate the eggs for about 24 days and then care for their precocial young, which feed themselves soon after hatching (Johnsgard 1979). Young fledge at 4–5 weeks, and one or both parents abandon the brood during the fledging period (Sordahl 1984). The Iowa nest at Trumbull Lake was unsuccessful because the nest site was flooded before the eggs hatched (S. J. Dinsmore and Schoenewe 2013), which is a common cause of nest failure for this species (Ackerman et al. 2020).

Neotropic Cormorant

Since Iowa's first record of Neotropic Cormorant in 1996 (S. J. Dinsmore 1997), reports of this species have been increasing, and three observations of this species were tallied during BBA II. Iowa's first nesting record occurred for this species on 27 June 2012, when a nest with four eggs was discovered by a team of biologists who were conducting a colonial bird nesting survey of three islands in Pool 13 of the Mississippi River in Clinton County (S. J. Dinsmore et al. 2012).

Neotropic Cormorant breeding habitat is primarily freshwater lakes and ponds and on coastal islands. These birds are gregarious and often nest in multispecies colonies, where they prefer to nest in small trees or large shrubs, typically four meters high or less (Telfair and Morrison 2020). This cormorant's platform nest in Iowa was situated about four meters above the ground in a mulberry tree, and the island where it nested contained nesting American White Pelicans, Double-crested Cormorants, Great Egrets, and Cattle Egrets (S. J. Dinsmore et al. 2012).

The male Neotropic Cormorant chooses a potential nest site, sometimes one used previously, where he vocalizes and displays (Johnsgard 1993). The male accepts or rejects the female when she is attracted. The territory of this species is confined to the nest site and the distance that a cormorant can reach with its bill (Telfair and Morrison 2020). This species is monogamous during breeding season, and individuals often change mates annually. The nest is a coarse platform of sticks, lined with twigs, green leaves, and coarse grass. The male gathers materials, and the female constructs the nest. May through August is the main breeding season, with egg-laying beginning in May at inland sites (Telfair and Morrison 2020). Average clutch size is four eggs (range 3–6), and both adults incubate the pale blue eggs for about 25 days (Baicich and Harrison 1979). The altricial young are fed by both parents for about 11 weeks after hatching, and young are independent by 12 weeks of age (Telfair and Morrison 2020).

American White Pelican

The only historical evidence that American White Pelicans once nested in Iowa is a citation by Shimek (1948) for 1882 in the territory north and northwest of Wright County where "pelican eggs could be collected in favored spots by the boat-load." Iowa's first official nesting record occurred for this species in mid-June 2007, when a breeding colony with an estimated 200 young pelicans was discovered on two islands by biologists who were conducting a colonial bird nesting survey in Pool 13 of the Mississippi River in Clinton County (J. J. Dinsmore 2007).

American White Pelican breeding habitat is primarily isolated and sparsely vegetated islands in lakes and reservoirs (Johnsgard 1979), and it is fitting that Iowa's nesting pelicans have found appropriate habitat on Mississippi River spoil islands. Pelicans often nest in multispecies colonies, and S. J. Dinsmore et al. (2012) reported it nesting with Neotropic Cormorants, Double-crested Cormorants, Great Egrets, and Cattle Egrets. Annual monogamous pair bonds appear to not be established until arrival at a breeding colony (Knopf and Evans 2020). A territory, the immediate vicinity of the nest, is established by the pair during late courtship and is defended by both birds with threat displays or jabs with the beak (Knopf and Evans 2020). Iowa's pelicans build mound nests on the ground, constructed primarily by reaching out from the nest site and pulling in materials with the side or tip of the bill (Johnsgard 1979).

Pelicans typically arrive in Iowa in late March (Kent and Dinsmore 1996). April through August is the breeding season in Iowa, and egg-laying appears to begin in April (Mike Griffin pers. comm.). Average clutch size is two eggs, and both adults incubate the dull white eggs for 30 days (Baicich and Harrison 1979). The semi-altricial young are fed by both parents in the nest until they are 2–3 weeks old, after which the young gather in larger groups or creches until about 10–11 weeks of age, when young begin flying and foraging on their own (Baicich and Harrison 1979, Knopf and Evans 2020).

Osprey

Ospreys begin to arrive in Iowa from their wintering grounds in March, and mated pairs typically return to the same nest site year after year, particularly if they successfully fledged young the year before. This raptor is usually monogamous and sometimes polygynous, and it is known to be loosely colonial in its nesting. Nest sites are typically near bodies of water that support its fish prey.

Nest-building in Iowa was documented during the second atlas by 8 April. Nests are generally at least one-foot deep and four-to-five feet wide, constructed primarily with sticks and lined with grass. In 2016, at least 13 of Iowa's 24 active nests were placed on cell towers, and most of the remaining nests were atop nesting platforms, mounted on power poles. Iowa BBA II records indicate that incubation of eggs begins in early May, with most young hatching in June and fledging in July and August. Clutch size ranges from three to four eggs, with three being typical. Eggs are pinkish-white, heavily blotched and streaked with reddish brown. Both male and female Ospreys take part in nest construction and incubation. Eggs are incubated for 34 to 40 days, and the chicks hatch asynchronously. The chicks are fed by the female, who doles out food items (fish) that are delivered to the nest by the foraging male. The chicks fledge after 49 to 56 days in the nest, and they remain in the parents' territory for a month or two (post-fledging) before departing on their own. Iowa DNR Wildlife Diversity Program records indicate that while many nests begin with three young in the nest, the average number of young that fledge is typically two. Since young hatch asynchronously, the youngest or smallest of the brood often does not survive the competition with its siblings.

Mississippi Kite

Mississippi Kites typically arrive in Iowa from their wintering grounds in May, according to records from Ottumwa and Des Moines (Iowa's two known consistent nesting areas). Pair bonds have usually been established before birds arrive at nesting areas, and nest-building occurs soon after arriving (Parker 1999). Nest-building was observed in Iowa at Ottumwa's Memorial Park on 4 June 2015 (Scheible pers. obs.). Nests sites in Iowa have usually been in the upper canopy of large sycamore or other large trees in or near riparian corridors. The nest is a compact saucer-shaped platform of sticks and twigs that is usually lined with green leaves, built by both sexes. Old nests are often refurbished and reused, and in Illinois, about 50% of nests are reused (Evans 1981). Eggs are laid soon after nest completion with an average clutch size of two dull white eggs. Incubation begins with the first egg laid, and the female does most of the incubation. Eggs hatch in 29–32 days, and young fledge at 30–35 days. Both parents feed and attend the young. Iowa records from nests in Des Moines and Ottumwa indicate that incubation of eggs occurs primarily in June, with most young hatching in July and fledging in August and September. Mississippi Kites often renest when early nests fail, so nesting dates can be quite variable.

Cooperative nesting occurs with this species, and while it has not been documented to occur in Iowa, the presence of three Mississippi Kites at several nest sites in Des Moines indicates it may be. One and sometimes two yearling kites were documented present and associated with 14 of 16 Illinois nests, where yearling birds were accepted or tolerated while assisting parent kites with nest defense and incubation (Evans 1981).

Merlin

The breeding habitat of the Merlin is generally semi-open terrain containing trees for nest sites and open areas for hunting. The male usually arrives at the breeding site first and begins calling, while flying perch to perch, and pair formation usually begins a few weeks before egg-laying. With Merlins routinely wintering in such places as Glendale Cemetery in Des Moines since 1999, it is unknown whether the Merlins that nest in Iowa winter here or not.

Either the male Merlin or both sexes select the nest site (Becker and Sieg 1985). This falcon is mainly monogamous and raises one brood each breeding season. It lays its eggs in the abandoned nests of crows or hawks, often located high in conifers. The known urban nest sites of Iowa Merlins have been in abandoned crow nests in conifers. Most courtship displays of the Merlin are similar to those of the Peregrine Falcon and include: flutter flight, high circling/soaring, slow landing display, food begging, and food transfers (Warkentin et al. 2005).

Based on four nests, egg-laying dates in Iowa appear to be from about mid-April (Caswell et al. 2016) to late May. Typically, five or six eggs (colored rusty- brown with chestnut markings) are laid, and incubation begins with the second egg laid. Both sexes incubate, and the incubation period is typically 28–32 days (Johnsgard 1979). The young fledge in 25 to 30 days and usually remain in the vicinity of the nest for one to four weeks (Becker and Sieg 1985), during which time the adults continue to feed them. Fledging dates in Iowa have been from mid-June (Caswell et al. 2016) to late July. While fledglings initially feed mostly on insects, like dragonflies, adult falcons feed primarily on small birds. James and Oliphant (1986) noted nest helpers (mostly yearling males) on at least 22 occasions at nest sites in Saskatoon, where these extra males participated in nest defense and transferring food.

Alder Flycatcher

Until the documentation of Alder Flycatcher nesting (S. J. Dinsmore 2009) during BBA II, this species has been known in Iowa as a late spring migrant, identified by its song (Kent and Dinsmore 1996). The nest in Dallas County was the first confirmed nesting record for Alder Flycatcher in Iowa, representing a significant range expansion south from known nesting areas in Minnesota and Wisconsin (S. J. Dinsmore 2009). This species typically arrives in Iowa from mid-May to mid-June. It apparently is monogamous, although there is no information on pair bond formation or courtship displays (Lowther 2020).

This flycatcher prefers shrubby wetland habitat and places its nest low in shrubs, averaging 62.5 cm above the ground in Connecticut (Gorski 1969 in Lowther 2020), with dogwood a favored shrub for nest placement in New York (Stein 1958 in Lowther 2020). The Alder Flycatcher nest documented in Iowa was in gray dogwood about two meters above ground (S. J. Dinsmore 2009). The cup-shaped nest is coarse and loosely constructed, mainly of grasses, with coarse grass streamers attached to the rim and base of the nest and finer grasses and rootlets lining the interior. Three or four eggs are normally laid, and the eggs are creamy white, sparsely marked with a ring of brown speckles. Egg-laying dates in Ontario were 15 June–22 July (Peck and James 1987 in Lowther 2020). Both sexes incubate the eggs (Gorski 1969), which hatch in ~11 days. The peak hatching period appears to be about mid-July in Ontario (Peck and James 1987). Both parents feed the young, which fledge when they are about 14 days old. In Iowa, the single juvenile Alder Flycatcher was observed to perhaps fledge prematurely from the nest on 16 July (S. J. Dinsmore 2009). Only one brood is produced per nesting season. There appears to be fidelity to the breeding site, and in Connecticut, three of three banded females and one of nine males returned to the same nesting areas the following year (Gorski 1969, Gorski 1970 in Lowther 2020). Alder Flycatcher nests are frequently parasitized by Brown-headed Cowbirds (Lowther 2020).

Black-billed Magpie

Iowa's Black-billed Magpies are permanent residents, and Scott Moats, who resides at TNC's Broken Kettle Grasslands (Plymouth County), reports that he sees the birds throughout the year. This species is gregarious and forms loose flocks. Pairs stay together year-around, and if a mate is lost, it is rapidly replaced. Male magpies exhibit long, continued courtship-feeding and help build nests and feed both the female and young. Courtship involves the male circling a female with his wings flashing and his tail held high and flared, tilting it toward the female. Extra-pair copulations can occur, especially with males over three years of age (Buitron 1983). Magpies often nest in groups, and Trost and Webb (1986) noted that magpies nesting in groups are more synchronous than those nesting more isolated from one another.

Nest building typically begins in early March, and these large (nearly three feet diameter in Iowa) domed structures of sticks typically require about 43 days for construction, until the first egg is laid (Erpino 1969). Each nest has a side entrance leading to an egg chamber that consists of a mud cup lined with rootlets, grass, and hair. Nests often are placed in thorny bushes and can last for years, as was apparent in Iowa where many used nests were observed in plum thickets (Ehresman pers. obs.). Buitron (1988) found that 25% of 56 nests in South Dakota were re-used in successive years. South Dakota egg dates are from 17 April to 28 June (Peterson 1995). Based on limited data from BBA II, egg dates seem similar for the magpies that nest in Plymouth County. Four to nine (typically six to seven) olive-brown and dark brown speckled eggs are typically laid, and incubation is only by the female. Incubation lasts about 18 days, and young fledge from 24 to 30 days after hatching. Once young are flying well, the entire family moves away from the nest site. Young depend on their parents for food for about six to eight weeks (Buitron 1988).

Red-breasted Nuthatch

The Red-breasted Nuthatch is primarily a nesting species of the boreal forest, with a strong preference for the fir and spruce component (Ghalambor and Martin 2020). The only Iowa nest record from BBA II came from a large cemetery in Hampton (Franklin County). The cemetery contains a large assemblage of conifers, especially spruce, fir, and cedars (both red and white). Courtship of this species involves the male lowering his wings, cocking his tail, holding his head high with crest-feathers raised, and puffing out the feathers of his lower back and rump. The male's unique courtship song often is sung while he sways from side to side.

During irruption years, it appears that most Red-breasted Nuthatch pairs form after they return to their breeding grounds in March or April (Ghalambor and Martin 2020). Females select the nesting location, which may be a previously used cavity, a natural existing cavity, or a cavity that mated pairs create together (Kilham 1973), where the female does most of the nest excavation (Ghalambor and Martin 2020). The nest cavity is usually lined with fur, feathers, hair, fine grass, and shredded bark. Typical clutch size is 5–6 eggs, and incubation lasts 12 days. The eggs are creamy-white, dotted with reddish-brown. Only the female incubates, while the male feeds her. Young fledge about a month after hatching and are independent about two weeks later. Both parents feed the young, including at the nest and after fledging. There were two nest records for Red-breasted Nuthatch within the same block at the Hampton cemetery during BBA II. The first was attending young on 17 July 2008. The second record was two recently fledged young observed on 8 August 2012, with an agitated adult male in their company (Ehresman pers. obs.). Using information from these two nest records, it appears that egg-laying occurred in late May-early June, incubation occurred in June, and fledging occurred in late July-early August.

Red Crossbill

Since the Red Crossbill is nomadic and can nest any month of the year, nesting dates are quite variable. The species is known to nest colonially (Johnsgard 1979), and there is little evidence of territoriality. Males sing from treetops and make display flights above the forest. This display includes a slow-flapping flight, while the bird is loudly singing (Bailey et al. 1953, Newton 1972). The male performs courtship feeding of the female and billing is common. The male closely accompanies the female after pairing, and it is unknown if the pair bond persists beyond the first nesting (Adkisson 1996).

The female Red Crossbill builds the nest, and the male sometimes assists by gathering materials. Nest-building takes about five days, and the first egg is laid about four days later. Clutch size is usually three eggs (colored pale greenish-white, splotched with brown and purple). The female incubates the eggs for 12 to 16 days. Young typically fledge at about 20 days. If a female lays a second clutch of eggs, the male continues to feed young in the first nest (Bailey et al. 1953). Fledglings are somewhat mobile one week after leaving the nest, although parents may feed the young as long as 33 days after fledging (Bailey et al. 1953). There is evidence of pairs nesting up to four times per year (Adkisson 1996). Young birds can breed the first year they are hatched (Johnsgard 1979). Multiple broods may result when a local seed crop is exceptionally large and when seed crops ripen at different times in different locations (Bailey et al. 1953, Newton 1972). Only two records of reproduction have occurred in Iowa, a pair feeding four young in Des Moines on 9 and 10 July 1986 (J. J. Dinsmore 1986), and an adult bird observed feeding two food-begging young in Hamilton County on 10 July 2010 (Hill pers. comm.).

Spotted Towhee

The Spotted Towhee has been considered a rare Iowa winter resident, found each year in small numbers from September to May (Kent and Dinsmore 1996). There were no Iowa atlas records, and the first (and only) Iowa nesting record for this species was documented by Joe Jungers on 20 June 2015 in Oak Grove County Park in Sioux County (Jungers 2015). In recent years more summer records of this species have come from western Iowa (Iowa Ornithologists' Union 2020), and it is known to breed eastward to northeastern Nebraska (Sharpe et al. 2001). In the northern Great Plains, this towhee occupies shrubby thickets along ravines, streams, and rivers, and inhabits brushy undergrowth in woodlands (Bartos and Greenlaw 2020).

Most Spotted Towhee nests are built by the female into the litter on the ground, and some nests are placed low in vegetation (Johnsgard 1979). The nest is an open cup structure with an outer framework of coarse plant materials (strips of bark, dead leaves, dry grass, etc.) and an inner lining of finer material, including rootlets and fine dead grass. Two to six eggs are laid (three or four eggs are typical), and the female incubates the eggs for 12–14 days (Johnsgard 1979). Egg color is generally white to pinkish white with fine reddish-brown speckling. Two broods are sometimes produced. Both parents feed the young, which remain in the nest for 9–11 days before fledging, and both parents continue to feed the young for about 30 days after fledging (Bartos and Greenlaw 2020). Fledging dates for Spotted Towhee from Colorado's first Breeding Bird Atlas were 28 May to 25 August (Kingery 1998), which is consistent for a species that produces more than one brood. Chace and Cruz (1996) reported that only two cases of Brown-headed Cowbird nest parasitism had been documented in Colorado, and it is interesting that Iowa's first documentation of Spotted Towhee nesting was confirmed by observing an adult male (from a pair of Spotted Towhees) feeding a food-begging fledgling cowbird (Jungers 2015).

Left: Black-necked Stilt with chick, Pintail Wetland, Hardin County, 8 August 2013

First Iowa nesting record

Photograph by Stephen J. Dinsmore

Right: American Avocet nest, Trumbull Lake, Clay County, 12 June 2013

First Iowa nesting record

Photograph by Stephen J. Dinsmore

BBA	Breeding Bird Atlas
BCA	Bird Conservation Area
BBS	Breeding Bird Survey
CBC	Christmas Bird Count
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CRP	Conservation Reserve Program
Iowa DNR	Iowa Department of Natural Resources
IOU	Iowa Ornithologists' Union
MNDNR	Minnesota Department of Natural Resources
MRRP	Missouri River Recovery Program, U.S. Army Corps of Engineering
NBCI	Northern Bobwhite Conservation Initiative
TNC	The Nature Conservancy
US-ACOE	U.S. Army Corps of Engineers
USGS	U.S. Geological Sutvey
WBBA	Wisconsin Breeding Bird Atlas
WDNR	Wisconsin Department of Natural Resources
WMA	Wildlife Management Area
WRP	Wetland Reserve Program

Literature Cited

Ackerman, J. T., J. M. Eadie, M. L. Szymanski, J. H. Caswell, M. P. Vrtiska, A. H. Raedeke, J. M. Checkett, A. D. Afton, T. G. Moore, F. D. Caswell, R. A. Walters, D. D. Humburg, and J. L. Yee. 2006. Effectiveness of spinning-wing decoys varies among dabbling duck species and locations. *J Wildl Manage* 70:799–804.

Ackerman, J. T., C. A. Hartman, M. P. Herzog, J. Y. Takekawa, J. A. Robinson, L. W. Oring, J. P. Skorupa, and R. Boettcher. 2020. American Avocet (*Recurvirostra americana*). In A. F. Poole (Ed.). Version 1.0. *Birds of the World.* Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.ameavo.01

Ackerman, R. A. and M. Platter-Reiger. 1979. Water loss by Pied-billed Grebe (*Podilymbus podiceps*) eggs (Abstract). *Am Zool* 19:921.

Adkisson, C. S. 1996. Red Crossbill (*Loxia curvirostra*). In A. F. Poole and F. B. Gill (Eds.). Version 1.0. *Birds of North America.* Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.256

Ambuel, B. and S. A. Temple. 1983. Area-dependent changes in the bird communities and vegetation of southern Wisconsin forests. *Ecology* 64:1057–1068.

American Ornithologists' Union. 1983. *Checklist of North American Birds*. 6th ed. American Ornithologists Union, Washington, D.C.

Anderson, R. M. 1907. The Birds of Iowa. *Proceedings of the Davenport Academy of Science* 11:125–417.

Anderson, S. J. and C. S. Robbins. 1981. Habitat size and bird community management. *Trans N Am Wildl Nat* 46:511–520.

Anderson, T. R. 1978. Population studies of European Sparrows in North America. *Occas Pap Mus Nat Hist Univ Kans* 70:1–58.

Andrews, R., D. Jackson, L. Jackson, T. Z. Riley, W. Suchy, and G. Zenner. 1993. *Trends in Iowa Wildlife Populations and Harvest:1992*. Iowa Department of Natural Resources, Des Moines.

Andrle, R. F. and J. R. Carroll. 1988. *The Atlas of Breeding Birds in New York State*. Cornell University Press, Ithaca, NY.

Annand, E. M. and F. R. Thompson III. 1997. Forest bird response to regeneration practices in central hardwood forests. *J Wildl Manage* 61:159–171.

Anonymous. 1991. *Pesticide spills: Are you ready or not?* Cooperative Extension Service Pm-1444, Iowa State University, Ames, IA.

Anteau, M. J. and A. D. Afton. 2004. Nutrient reserves of Lesser Scaup (*Aythya affinis*) during spring migration in the Mississippi Flyway: A test of the spring condition hypothesis. *Auk* 121:917–929.

Anteau, M. J., J. DeVink, D. N. Koons, J. E. Austin, C. M. Custer, and A. D. Afton. 2020. Lesser Scaup (*Aythya affinis*). In A. F. Poole (Ed.). Version 1.0. *Birds of the World*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.lessca.01

Apfelbaum, S. I. and P. Seelbach. 1983. Nest tree, habitat selection and productivity of seven North American raptor species based on the Cornell University nest record card program. *Raptor Res* 17:97–113.

Aquilana, S. M., T. E. Morreli and D. C. LeBlanc. 2003. Breeding bird communities in burned and unburned sites in a mature Indiana oak forest. *Proceedings of the Indiana Academy of Science* 112:186–191.

Arcese, P., M. K. Sogge, A. B. Marr, and M. A. Patten. 2002. Song Sparrow (*Melospiza melodia*). In A. F. Poole and F. B. Gill (Eds.). Version 2.0. *Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.704

Armstrong, E. A. and H. L. K. Whitehouse. 1977. Behavioural adaptations of the wren (*Troglodytes troglodytes*). *Biol Rev* 52:235–294.

Arterburn, J. W. and J. A. Grzybowski. 2003. Hybridization between Glossy and White-faced Ibises. *N Amer Birds* 57:136–139.

Artuso, C., C. S. Houston, D. G. Smith, and C. Rohner. 2013. Great Horned Owl (*Bubo virginianus*). In A. F. Poole (Ed.). Version 2.0. *Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.372

Askins, R. A. 2000. *Restoring North America's Birds: Lessons from Landscape Ecology*. Yale University Press, New Haven, CN.

Askins, R. A. and M. J. Philbrick. 1987. Effect of changes in regional forest abundance on the decline and recovery of a forest bird community. *Wilson Bull* 99:7–21.

Askins, R. A., J. F. Lynch, and R. Greenberg. 1990. Population declines in migratory birds in eastern North America. *Curr Ornithol* 7:1–57.

Aubry, K. B. and C. M. Raley. 2002. The Pileated Woodpecker as a keystone habitat modifier in the Pacific Northwest. Pp. 257–274. In J. P. Laudenslayer, P. J. Shea, B. E. Valentine, C. P. Weatherspoon, and T. E. Lisle, Jr. (Eds.). *Proceedings of the Symposium on the Ecology and Management of Dead Wood in Western Forests*. U.S. Department of Agriculture, Forest Service, Gen. Tech. Rep. PSW-GTR-181. Berkley, CA.

Audubon Minnesota. 2014a. Black Tern Minnesota Conservation Plan. http://mn.audubon.org/sites/default/files/black_tern_conservation_plan_10-21-2014.pdf

Audubon Minnesota. 2014b. Forster's Tern Minnesota Conservation Plan. http://mn.audubon.org/sites/default/files/forsters_tern_conservation_summary_12-31-2014.pdf

Audubon Minnesota. 2014c. Franklin's Gull Minnesota Conservation Plan. http://mn.audubon.org/sites/default/files/franklin_gull_conservation_plan_10-21-2014.pdf

Audubon Minnesota. 2014d. Upland Sandpiper Minnesota Conservation Plan. http://mn.audubon.org/sites/default/files/upland_sandpiper_conservation_plan_10-23-2014_1.pdf

Augenfeld, K. H., S. B. Franklin, and D. H. Snyder. 2008. Breeding bird communities of upland hardwood forest 12 years after shelterwood logging. *Forest Ecol Manage* 255:1271–1282.

Badyaev, A. V., V. Belloni, and G. E. Hill. 2012. House Finch (*Haemorhous mexicanus*). In A. F. Poole (Ed.) Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.46

Baicich, P. J. and C. J. O. Harrison. 1979. *Nests, Eggs, and Nestlings of North American Birds*. Princeton University Press, Princeton and Oxford. 347 pp.

Baicich, P. J. and C. J. O. Harrison. 1997. *A Guide to the Nests, Eggs, and Nestlings of North American Birds*. Second Edition. Natural World Academic Press, San Diego, CA. 347 pp.

Baicich, P. J. and C. J. O. Harrison. 2005. *A Guide to the Nests, Eggs and Nestlings of North American Birds*. Princeton University Press, Princeton, NJ.

Bailey, A. M., R. J. Niedrach, and A. L. Baily. 1953. The Red Crossbills of Colorado. *Mus. Pictorial No. 9.* Denver Museum of Natural History. Denver, CO.

Bailey, R. H. 1918. The raptorial birds of Iowa. *Iowa Geol Surv Bull* 6:174–177.

Bailey, W. 1915. The Plum Island night herons. *Auk* 32:424–441.

Bakermans, M. H., A. D. Rodewald, and A. C. Vitz. 2012. Influence of forest structure on density and nest success of mature forest birds in managed landscapes. *J Wildl Manage* 76:1225–1234.

Baldassarre, G. A. and E. G. Bolen. 1994. *Waterfowl Ecology and Management*. John Wiley and Sons, NY.

Bannor, B. K. and E. Kiviat. 2002. Common Gallinule (*Gallinula galeata*). A. F. Poole and F. B. Gill (Eds.). In Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.685

Barclay, J. H. and T. J. Cade. 1983. Restoration of the Peregrine Falcon in the eastern United States. *Bird Conserv* 1:3–37.

Barlow, J. C. 1980. Patterns of ecological interactions among migrant and resident vireos on the wintering grounds. Pp. 79–107. In A. Keast and E. S. Morton (Eds.). *Migrant Birds in the Neotropics: Ecology, Behavior, Distribution, and Conservation*. Smithsonian Inst Press, Washington, D.C.

Barlow, J. C. and S. N. Leckie. 2000. Eurasian Tree Sparrow (*Passer montanus*). In A. F. Poole and F. B. Gill (Eds.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.560

Barrows, W. B. 1889. The English Sparrow in North America, especially in its relations to agriculture. USDA, *Div Econ Ornithol Mammal Bull* 1:1–405.

Bart, J., B. Andres, S. Brown, G. Donaldson, B. Harrington, V. Johnston, S. Jones, R. I. G. Morrison, and S. K. Skagen. 2005. The program for regional and international shorebird monitoring (PRISM). Pp. 893–901. In C. J. Ralph and T. D. Rich (Eds.). *Bird conservation implementation and integration in the Americas.* Vol. 2. USDA Forest Service General Technical Report PSW-GTR-191. Pacific Southwest Research Station, Albany, California, USA.

Bartos, S. and J. S. Greenlaw. 2020. Spotted Towhee (*Pipilo maculatus*). In P. G. Rodewald (Ed.). Version 1.0. *Birds of the World*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.spotow.01

Baynard, E. O. 1913. Home life of the Glossy Ibis (*Plegadis autumnolis*). *Wilson Bull* 20:103–117.

Beal, F. E. L. 1911. Food of the woodpeckers of the United States. U.S. Department of Agriculture. *Biol Survey Bull* 37.

Beal, F. E. L. 1922. Some common birds useful to the farmer. *U.S.D.A. Farmers' Bull* 630.

Beason, R. C. 1995. Horned Lark (*Eremophila alpestris*). In A. F. Poole and F. B. Gill (Eds.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.195

Beason, R. C. and E. C. Franks. 1974. Breeding behavior of the Horned Lark. *Auk* 91:65–74.

Bechard, M. J., C. S. Houston, J. H. Saransola, and A. S. England. 2010. Swainson's Hawk (*Buteo swainsoni*). In A. F. Poole (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.265

Beck, G. G., A. R. Couturier, C. M. Francis, and S. Leckie. 2018. *North American Ornithological Atlas Committee Handbook: A Guide for Managers on the Planning and Implementation of a Breeding Bird Atlas Project*. Bird Studies Canada, Port Rowan, Ontario. 148 pp.

Becker, D. M. and C. H. Sieg. 1985. Breeding chronology and reproductive success of Richardson's Merlins in Southeastern Montana. *Raptor Res* 19:52–55.

Bednarz, J. C. 1979. I. Productivity, nest sites, and habitat of Red-shouldered and Red-tailed Hawks in Iowa, and II. Status, habitat utilization, and management of Red-shouldered Hawks in Iowa. Ph.D. Diss., Iowa State University, Ames, IA.

Bednarz, J. C. and J. J. Dinsmore. 1981. Status, habitat use, and management of Red-shouldered Hawks in Iowa. *J Wildl Manage* 45:236–241.

Bednarz, J. C. and J. J. Dinsmore. 1982. Nest sites and habitat of Red-shouldered Hawks (*Buteo lineatus*) and Red-tailed Hawks (*Buteo jamaicensis*) in Iowa, USA. *Wilson Bull* 94:31–45.

Beissinger, S. R. and D. R. Osborne. 1982. Effects of urbanization on avian community organization. *Condor* 84:75–83.

Belles-Isles, J. C. and J. Picman. 1986. House Wren nest-destroying behavior. *Condor* 88:190–193.

Bellrose, F. C. 1980. *Ducks, Geese, and Swans of North America*. Rev. ed. Stackpole Books, Harrisburg, PA.

Bellrose, F. C. and D. J. Holm. 1994. *Ecology and Management of the Wood Duck*. Stackpole Books, Harrisburg, PA.

Belthoff, J. R. and G. Ritchison. 1990. Nest-site selection by Eastern Screech-Owls in central Kentucky. *Condor* 92:982–990.

Benkman, C. W. 1990. Foraging rates and the timing of crossbill reproduction. *Auk* 107:376–386.

Bennett, L. J. 1934. Notes on nesting waterfowl and other marsh nesting birds in northwest Iowa. *Oologist* 51:101–104.

Bennett, L. J. 1937. Canvasback breeding in Iowa. *Auk* 54:534.

Bennett, L. J. 1938. Redheads and Ruddy Ducks nesting in Iowa. *Transactions of the North American Wildlife Conference* 3:647–650.

Bent, A. C. 1926. Life histories of North American marsh birds. *U.S. Natl Mus Bull* 135.

Bent, A. C. 1937. Life histories of North American birds of prey, Pt. 1. *U.S. Natl Mus Bull* 167.

Bent, A. C. 1948. Life histories of North American nuthatches, wrens, thrashers, and their allies. *U.S. Natl Mus Bull* 195.

Bergman, R. D., P. Swain, and M. W. Weller. 1970. A comparative study of nesting Forster's and Black terns. *Wilson Bull* 82:435–444.

Best, L. B. and D. F. Stauffer. 1980. Factors affecting nesting success in riparian bird communities. *Condor* 82:149–157.

Best, L. B. and D. F. Stauffer. 1986. Factors confounding evaluation of bird-habitat relationships. Pp. 209–216. In J. Verner, M. L. Morrison, and C. J. Ralph (Eds.). *Wildlife 2000: Modeling Habitat Relationships of Terrestrial Vertebrates*. University of Wisconsin Press, Madison.

Best, L. B., H. Campa III, K. E. Kemp, R. J. Robel, M. R. Ryan, J. A. Savidge, H. P. Weeks, Jr., and S. R. Winterstein. 1997. Bird abundance and nesting in CRP fields and cropland in the Midwest: A regional approach. *Wildl Soc Bull* 25:864–877.

Bierregaard, R. O., A. F. Poole, M. S. Martell, P. Pyle, and M. A. Patten. 2016. Osprey (*Pandion haliaetus*). In P. G. Rodewald (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.683

Bildstein, K. L. and K. D. Meyer. 2000. Sharp-shinned Hawk (*Accipiter striatus*). In A. F. Poole and F. B. Gill (Eds.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.482

Bird, D. M. and R. S. Palmer. 1988. American Kestrel. In Palmer, R. S. (Ed.). Pp. 253–290. *Handbook of North American Birds*. Vol. 5. Diurnal Raptors. Pt. 2. Yale University Press, New Haven, CT.

BirdLife International. 2016. *Ardea herodias*. The IUCN Red List of Threatened Species 2016: e.T22696998A93597223. http://dx.doi.org/10.2305/IUCN.UK.2016-3.RLTS.T22696998A93597223.en

Bishop, R. 1978. Giant Canada Geese in Iowa. *Iowa Conservationist* 37:5–12.

Bishop, R. A. 1981. Iowa's wetlands. *Proc Iowa Acad Sci* 88:11–16.

Blake, J. G. and J. R. Karr. 1984. Species composition of bird communities and the conservation benefit of large versus small forests. *Biolog Conserv* 30:173–187.

Blokpoel, H. and G. D. Tessier. 1987. Control of Ring-billed Gull colonies at urban and industrial sites in southern Ontario, Canada. *Proceedings of the 3rd Eastern Wildlife Damage Control Conference,* Gulf Shores, AL

Bloom, P. H. 1994. The biology and current status of the Long-eared Owl in coastal southern California. *Bull S CA Acad Sci* 93:1–12.

Boal, C. W. and R. W. Mannan. 1999. Comparative breeding ecology of Cooper's Hawks in urban and exurban areas of southeastern Arizona. *J Wildl Manage* 63:77–84.

Bock, C. E. and L. W. Lepthien. 1976. Synchronous eruptions of boreal seed-eating birds. *Am Nat* 110:559–579.

Bock, C. E. and B. Webb. 1984. Birds as grazing indicator species in southeastern Arizona. *J Wildl Manage* 48:1045–1049.

Boe, J. S. 1992. Wetland selection by Eared Grebes, *Podiceps nigricollis*, Minnesota. *Can Field-Nat* 106:480–488.

Boe, J. S. 1993. Colony site selection by Eared Grebes in Minnesota. *Colon Waterbird* 16:28–38.

Boe, J. S. 1994. Nest site selection by Eared Grebes in Minnesota. *Condor* 96:19–35.Bogenschutz, T. (Ed.). 2013. Upland Wildlife. 2013. *Trends in Iowa wildlife populations and harvest: 2012*. Iowa Department of Natural Resources, Des Moines.

Bogenschutz, T. (Ed.). 2013. Upland Wildlife. 2013. Trends in Iowa wildlife populations and harvest: 2012. Iowa Department of Natural Resources, Des Moines.

Bogner, H. E. and G. A. Baldassarre. 2002. The effectiveness of call-response surveys for detecting Least Bitterns. *J Wildl Manage* 66:976–984.

Bohlen, H. D. 1989. *The Birds of Illinois*. Indiana University Press, Bloomington, IN.
Bolen, E. G. 1967. The ecology of the Black-bellied Whistling-Duck in southern Texas. Ph.D. Diss., Utah State University, Logan, UT.
Bolen, E. G. 1971. Pair bond tenure in Black-bellied Tree Duck. *J Wildl Manage* 35:385–388.
Bolen, E. G. and B. W. Cain. 1968. Mixed wood duck-tree duck clutch in Texas. *Condor* 70:389–390.
Bolen, E. G., B. McDaniel, and C. Cottam. 1964. Natural History of the Black-bellied Whistling-Duck (*Dendrocygna autumnalis)* in southern Texas. *Southwest Nat* 9:78–88.
Bollinger, E. K. and T. A. Gavin. 1992. Eastern Bobolink populations: Ecology and conservation in an agricultural landscape. Pp. 497–506. In J. M. Hagan III and D. W. Johnston (Eds.). *Ecology and Conservation of Neotropical Migrant Landbirds*. Smithsonian Institute Press, Washington, D.C.
Bonar, R. L. 2000. Availability of Pileated Woodpecker cavities and use by other species. *J Wildl Manage* 64:52–59.
Bonney, R. E. 1988. Rose-breasted Grosbeak. Pp. 430–431. In R. F. Anderle and J. R. Carroll (Eds.). *The Atlas of Breeding Birds in New York State*. Cornell University Press, Ithaca, NY.
Bosakowski, T., R. Kane, and D. G. Smith. 1989. Status and management of Long-eared Owl in New Jersey. *Rec New Jersey Birds* 15:42–46.
Brackbill, H. 1970. Tufted Titmouse breeding behavior. *Auk* 87:522–536.
Brawn, J. D. 1998. Effects of Oak Savannah restoration on avian populations and communities in Illinois. Final Report, *Illinois Natural History Survey*. University of Illinois, Urbana-Champaign, IL
Brawn, J. D. and S. K. Robinson. 1996. Source-sink population dynamics may complicate the interpretation of long-term census data. *Ecology* 77:3–12.
Brees, A. 2003. Iowa Christmas bird count, 2002–2003. *Iowa Bird Life* 73:39–44.
Brenowitz, E. A., K. Lent, and D. E. Kroodsma. 1995. Brain space for learned song in birds develops independently of song learning. *J Neurosci* 15:6281–6286.
Brewer, R. 1963. Ecological and reproductive relationships of Black-capped and Carolina Chickadees. *Auk* 80:9–47.
Brewer, R., G. A. McPeek, and R. J. Adams. 1991. *The Atlas of Breeding Birds of Michigan*. Michigan State University Press, East Lansing.
Brigham, R. M., J. Ng, R. G. Poulin, and S. D. Grindal. 2011. Common Nighthawk (*Chordeiles minor*). In A. F. Poole (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.213
Brittingham, M. C. and S. A. Temple. 1983. Have cowbirds caused forest songbirds to decline? *BioScience* 33:31–35.
Brown, C. R. and M. B. Brown. 1995. Cliff Swallow (*Petrochelidon pyrrhonota*). In A. F. Pool and F. B. Gill (Eds.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.149
Brown, C. R. and M. B. Brown. 1999. Barn Swallow (*Hirundo rustica*). In A. F. Pool and F. B Gill (Eds.). Version 1.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.452
Brown, C. R. and S. Tarof. 2013. Purple Martin (*Progne subis*). In A. F. Poole (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.287
Brown, M. and J. J. Dinsmore. 1986. Implications of marsh size and isolation for marsh bird management. *J Wildl Manage* 50:392–397.
Brown, W. H. 1956. Yellow-crowned Night-Heron nesting in the city of Des Moines. *Iowa Bird Life* 26:57–59.
Brown, W.H. 1961. Yellow-crowned Night Heron in Iowa. *Iowa Bird Life* 31:26–27.
Brown, W. H. 1971. An annotated list of the birds of Iowa. *Iowa State J Sci* 34:387–469.
Brua, R. B. 2020. Ruddy Duck (*Oxyura jamaicensis*). In P. G. Rodewald (Ed.). Version 1.0. *Birds of the World*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.rudduc.01
Brush, T. 1994. Effects of competition and predation on Prothonotary Warblers and House Wrens nesting in eastern Iowa. *J Iowa Acad Sci* 101:28–30.
Bryant, A. A. 1986. Influence of selective logging on Red-shouldered Hawks, *Buteo lineatus*, in Waterloo region, Ontario, 1953–1978. *Can Field-Naturalist* 100:520–525.
Buehler, D. A. 2000. Bald Eagle (*Haliaeetus leucocephalus*). In A. F. Poole and F. B. Gill (Eds.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.506
Buehler, D. A., P. B. Hamel, and T. Boves. 2013. Cerulean Warbler (*Setophaga cerulea*). In A. F. Poole (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.511
Buitron, D. 1983. Extra-pair courtship in Black-billed Magpies. *Anim Behav* 31:211–220.

Buitron, D. 1988. Female and male specialization in parental care and its consequences in Black-billed Magpies. *Condor* 90:29–39.
Bull, E. L. and J. A. Jackson. 2011. Pileated Woodpecker (*Dryocopus pileatus*). In A. F. Poole (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.148
Bull, E. L., C. G. Parks, and T. R. Torgersen. 1997. Trees and logs important to wildlife in the interior Columbia River basin. *For Serv Gen Tech Rep.* U.S. Department of Agriculture, Portland, OR.
Burger, J. and M. Gochfeld. 2020. Franklin's Gull *(Leucophaeus pipixcan*). In A. F. Poole (Ed.). Version 1.0. *The Birds of the World*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.fragul.01
Burhans, D. E. and F. R. Thompson III. 1999. Habitat patch size and nesting success of Yellow-breasted Chats. *Wilson Bull* 111:210–215.
Burke, D. M. and E. Nol. 2000. Landscape and fragment size effects on reproductive success of forest-breeding birds in Ontario. *Ecolog Applic* 10:1749–1761.
Burns, J. T. 1982. Nests, territories, and reproduction of Sedge Wrens (*Cistothorus platensis*). *Wilson Bull* 94:338–349.
Burns, J. T. 1983. Mate switching in House Wrens. Ph.D. Diss., University of Minnesota, Minneapolis.
Butts, W. K. 1931. A study of the chickadee and White-breasted Nuthatch by means of marked individuals. Part III: The White-breasted Nuthatch (*Sitta carolinensis cookei*). *Bird Banding* 2:59–76.
Byers, B. E., M. Richardson, and D. W. Brauning. 2013. Chestnut-sided Warbler (*Setophaga pensylvanica*). In A. F. Poole (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.190
Cade, T. J., J. H. Enderson, C. G. Thelander, and C. M. White. 1988. Peregrine Falcon populations: Their management and recovery. *The Peregrine Fund, Inc.* Boise, ID.
Cade, T. J., M. Martell, P. Redig, G. Septon, and H. B. Tordoff. 1996. Peregrine Falcons in urban North America. Pages 3–13. In D. M. Bird, D. E. Varlan, and J. J. Negro (Eds.). *Raptors in Human Landscapes*. Academic Press, London, U.K.
Carey, M., D. E. Burhans, and D. A. Nelson. 2008. Field Sparrow (*Spizella pusilla*). In A. F. Poole (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.103
Carroll, J. P. 1992. A model of Gray Partridge (*Perdix perdix*) population dynamics in North Dakota. Pp. 337–349. *Perdix VI, First International Partridge, Quail, and Francolin Symposium*. Vol. 9. Gibier Faune Sauvage, Fordingbridge, England.
Carroll, J. P. 1993. Gray Partridge (*Perdix perdix*). In A. F. Poole and F. B. Gill (Eds.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.58
Carroll, J. P. and R. D. Crawford. 1991. Roadside nesting by Gray Partridge in north-central North Dakota. *Wildl Soc Bull* 19:286–291.
Carroll, J. P., R. D. Crawford, and J. W. Schulz. 1990. Nesting and brood-rearing ecology of Gray Partridge in North Dakota. Pp. 272–294. In *Perdix V: Gray Partridge and Ring-necked Pheasant Workshop*. Kansas Department of Wildlife and Parks, Emporia, KS.
Castrale, J. S., E. M. Hopkins, and C. E. Keller. 1998. *Atlas of Breeding Birds of Indiana*. Indiana Department of Natural Resources, Indianapolis.
Caswell, B. and S. J. Dinsmore. 2014. First nesting record for Black-necked Stilt in Iowa. *Iowa Bird Life*. 84:50–52.
Caswell, B., T. Schilke, and S. J. Dinsmore. 2016. Merlins nesting in eastern Iowa. *Iowa Bird Life* 86:135–137.
Cecil, R. 1985. Prairie Warbler in Lee County. *Iowa Bird Life* 55:98.
Cecil, R. 1988. Double-brooding by Worm-eating Warbler in Lee County. *Iowa Bird Life* 58:60.
Cecil, R. I. 1999. Field Reports—Winter 1998–1999. *Iowa Bird Life* 69:63–72.
Cecil, R. I. 2004. The Glendale Cemetery Merlins. *Iowa Bird Life* 74:31–33.
Cecil, R. I. and A. M. Johnson. 2000. Field reports—Winter 1999–2000. *Iowa Bird Life* 70:90–101.
Cecil, R. I. and J. P. Sandrock. 1985. Possible Iowa nesting of Worm-eating Warbler. *Iowa Bird Life* 55:96–98.
Chace, J. F. and A. Cruz. 1996. Knowledge of the Colorado host relations of the parasitic Brown-headed Cowbird (*Molothrus ater*). *J Colorado Field Ornithol* 30:67–81.
Chesser, R. T., K. J. Burns, C. Cicero, J. L. Dunn, A. W. Kratter, I. J. Lovette, P. C. Rasmussen, J. V. Remsen, Jr., J. D. Rising, D. F. Stotz and K. Winker. 2017. Fifty-eighth supplement to the American Ornithological Society's Checklist of North American Birds. *Auk* 134:751-773.
Chesser, R. T., S. M. Billerman, K. J. Burns, C. Cicero, J. L. Dunn, A. W. Kratter, I. J. Lovette, N. A. Mason, P. C. Rasmussen, J. V. Remsen, Jr., D. F. Stotz, and K. Winker. 2020. Check-list of North American Birds (online). American Ornithological Society. http://checklist.americanornithology.org/taxa
Chiver, I., L. J. Evans Ogden, and B. J. Stutchbury. 2011. Hooded Warbler (*Setophaga citrina*). In A. F. Poole (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.110

Cimprich, D. A., F. R. Moore, and M. P. Guilfoyle. 2000. Red-eyed/Chivi Vireo (*Vireo olivaceus/chivi*). In A. F. Poole and F. B. Gill (Eds.). Version 1.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.527

Cink, C. L. 2002. Eastern Whip-poor-will (*Antrostomus vociferus*). In A. F. Poole and F. B. Gill (Eds.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA.

Clark, R. G., J. P. Fleskes, K. L. Guyn, D. A. Haukos, J. E. Austin, and M. R. Miller. 2020. Northern Pintail (*Anas acuta*). In S. M. Billerman (Ed.). Version 1.0. *Birds of the World*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.norpin.01

Colwell, M. A. and J. R. Jehl, Jr. 2020. Wilson's Phalarope (*Phalaropus tricolor*). In A. F. Poole and F. B. Gill (Eds.). Version 1.0. *Birds of the World*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.wilpha.01

Conner, R. N. and C. S. Adkisson. 1977. Principal component analysis of woodpecker nesting habitat. *Wilson Bull* 89:122–129.

Conner, R. N., J. G. Dickson, B. A. Locke, and C. A. Segelquist. 1983. Vegetation characteristics important to common songbirds in East Texas USA. *Wilson Bull* 95:349–361.

Conroy, M. J. and R. T. Eberhardt. 1983. Variation in survival and recovery rates of Ring-necked Ducks. *J Wildl Manage* 47:127–137.

COSEWIC. 2006. COSEWIC assessment and update status report on the Louisiana Waterthrush *Seiurus motacilla* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 26 pp. www.sararegistry.gc.ca/status/status_e.cfm

Cramp, S. 1985. *The Birds of the Western Palearctic Vol. 4: Terns to Woodpeckers*. Oxford University Press, Oxford, U.K.

Crawford, H. S., R. G. Hooper, and R. W. Titterington. 1981. Songbird population response to silvicultural practices in central Appalachian hardwoods. *J Wildl Manage* 45:680–692.

Crawford, R. D. 1977. Polygynous breeding of Short-billed Marsh Wrens. *Auk* 94:359–362.

Crocoll, S. T. and J. W. Parker. 1989. The breeding biology of Broad-winged and Red-shouldered hawks in western New York. *J Raptor Res* 23:125–139.

Crooks, M. P. and G. O. Hendrickson. 1953. Field Sparrow life history in central Iowa. *Iowa Bird Life* 23:10–13.

Cullen, S. A., J. R. Jehl, Jr. and G. L. Nuechterlein. 1999. Eared Grebe (*Podiceps nigricollis*). In A. F. Poole and F. B. Gill (Eds.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.433

Cunningham, M. A. 2000. Grassland birds do better on private lands than public lands. *CURA Reporter* 30(2):1–9.

Curtis, O. E., R. N. Rosenfield, and J. Bielefeldt. 2006. Cooper's Hawk (*Accipiter cooperii*). In A. F. Poole (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.75

Cutright, N. J., B. R. Harriman, and R. W. Howe. 2006. *Atlas of the Breeding Birds of Wisconsin*. Wisconsin Society for Ornithology, Saukville, WI. 602 pp.

Dahl, T. E. 1990. Wetlands—Losses in the United States, 1780s to 1980s. U.S. Fish and Wildlife Service Report to Congress. Washington, D.C. 13 pp.

Dahl, T. E. and C. E. Johnson. 1991. Status and trends of wetlands in the conterminous United States, mid-1970s to mid-1980s. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C.

Dale, B. C., P. A. Martin, and P. S. Taylor. 1997. Effects of hay management on grassland songbirds in Saskatchewan. *Wildlife Soc Bull* 25:616–626.

Danz, N. P., G. J. Niemi, J. Lind, and J. M. Hanowski. 2007. *Birds of Western Great Lakes Forests*. http://www.nrri.umn.edu/mnbirds

Darden, C. W. 1962. Further observations of the Yellow-crowned Night-Heron. *Raven* 32:3–6.

Davis, S. K. 2004. Area sensitivity in grassland passerines: Effects of patch size, patch shape, and vegetation structure on bird abundance and occurrence in southern Saskatchewan. *Auk* 121:1130–1145.

Davis, S. K. and W. E. Lanyon. 2008. Western Meadowlark (*Sturnella neglecta*). In A. F. Poole (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.104

Davis, W. E., Jr. and J. A. Kushlan. 1994. Green Heron (*Butorides virescens*). In A. F. Poole and F. B. Gill (Eds.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.129

Davis, W. E., Jr. and J. C. Kricher. 2020. Glossy Ibis (*Plegadis falcinellus*). In S. M. Billerman (Ed.). Version 1.0. *Birds of the World*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.gloibi.01

Dawson, W. R. 2014. Pine Siskin (*Spinus pinus*). In A. F. Poole (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.280

DeCalesta, D. S. 1994. Effect of white-tailed deer on songbirds within managed forests in Pennsylvania. *J Wildl Manage* 58:711–718.

Dechant, J. A., M. L. Sondreal, D. H. Johnson, L. D. Igl, C. M. Goldade, B. D. Parkin, and B. R. Euliss. 1999. *Effects of Management Practices on Grassland Birds: Field Sparrow*. Northern Prairie Wildlife Research Center, Jamestown, ND.

Dechant, J. A., M. L. Sondreal, D. H. Johnson, L. D. Igl, C. M. Goldade, M. P. Nenneman, and B. R. Euliss. 2003a. *Effects of Management Practices on Grassland Birds: Short-eared Owl*. Northern Prairie Wildlife Research Center, Jamestown, ND. http://www.npwrc.usgs.gov/resource/literatr/grasbird/seow/seow.htm (Version 12DEC2003)

Dechant, J. A., M. L. Sondreal, D. H. Johnson, L. D. Igl, C. M. Goldade, A. L. Zimmerman, and B. R. Euliss. 2003b. *Effects of Management Practices on Grassland Birds: Bobolink*. Northern Prairie Wildlife Research Center, Jamestown, ND. Northern Prairie Wildlife Research Center Online.

DeGeus, D. W. 1990. Productivity and habitat preferences of Loggerhead Shrikes inhabiting roadsides in a midwestern agro-environment. M.S. Thesis, Iowa State University. Ames.

De Jong, M. J. 1996. Northern Rough-winged Swallow (*Stelgidopteryx serripennis*). In A. F. Poole and F. B. Gill (Eds.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.234

Del Hoyo, J., A. Elliott, and J. Sargatal (Eds.). 1992. *Handbook of the Birds of the World.* Vol. 1. Lynx Edicions, Barcelona, Spain. 696 pp.

Delisle, J. M. and J. A. Savidge. 1997. Avian use and vegetation characterization of conservation program fields. *J Wildl Manage* 61:318–325.

DellaSala, D. A. and D. L. Rabe. 1987. Response of Least Flycatchers *Empidonax minimus* to forest disturbances. *Biol Conserv* 41:291–299.

Delphy, P. J. and J. J. Dinsmore. 1993. Breeding bird communities of recently restored and natural prairie potholes. *Wetlands* 13:200–206.

Dennis, D. G., N. R. North, and H. G. Lumsden. 2000. Range expansion and population growth of Giant Canada Geese in southern Ontario: Benefits, drawbacks, and management techniques. Pp. 159–165. In K. M. Dickson (Ed.). Toward Conservation of the Diversity of Canada Geese (Branta candensis). Can Wildl Serv Occas Pap No.103.

Dennis, J. V. 1948. Observations on the Orchard Oriole in the lower Mississippi Delta. *Bird Banding* 19:12–21.

De Smet, K. D. 1983. Breeding ecology and productivity of Red-necked Grebes in Turtle Mountain Provincial Park, Manitoba. M.S. Thesis, University of North Dakota, Grand Forks.

Devore, J. E. 1968. December nesting of the Carolina Wren. *Migrant* 39:62.

Dhondt, A. A., K. V. Dhondt, D. M. Hawley, and C. S. Jennelle. 2007. Experimental evidence for transmission of *Mycoplasma gallisepticum* in House Finches by fomites. *Avian Pathol* 36:205–208.

Dickson (Ed.). *Toward Conservation of the Diversity of Canada Geese (Branta candensis).* Can Wildl Serv Occas Pap No.103.

Dingle, E. 1942. Rough-winged Swallow. Pp 424–433. In A. C. Bent (Ed.). Life histories of North American flycatchers, larks, swallows, and their allies. *U.S. Natl Mus Bull* 179.

Dinsmore, J. J. 1977. Notes on avocets and stilts in Tampa Bay, Florida. *Florida Field Natur* 5:25–30.

Dinsmore, J. J. 1986. Field reports—Summer 1986. *Iowa Bird Life* 56:119.

Dinsmore, J. J. 1988. Field Reports—Summer 1988. *Iowa Bird Life* 58:104–113.

Dinsmore, J. J. 1992. Field Reports—Summer 1992. *Iowa Bird Life* 62:104–112.

Dinsmore, J. J. 1993. Field reports—Summer 1993. *Iowa Bird Life* 63:93–100.

Dinsmore, J. J. 1994. *A Country So Full of Game*. University of Iowa Press, Iowa City. 249 pp.

Dinsmore, J. J. 1996. Field Reports—Summer 1996. *Iowa Bird Life* 66:129–136.

Dinsmore, J. J. 1998. Field Reports—Summer 1998. *Iowa Bird Life* 68:123–131.

Dinsmore, J. J. 2001. Field reports—Summer 2001. *Iowa Bird Life* 71:163–177.

Dinsmore, J. J. 2002. Field Reports—Summer 2002. *Iowa Bird Life* 72:207–221.

Dinsmore, J. J. 2003. Field Reports—Summer 2003. *Iowa Bird Life* 73:128–141.

Dinsmore, J. J. 2004. Field Reports—Summer 2004. *Iowa Bird Life* 74:136–150.

Dinsmore, J. J. 2007. Field Reports—Summer 2007. *Iowa Bird Life* 77:159–173.

Dinsmore, J. J. 2008. Field Reports—Summer 2008. *Iowa Bird Life* 78:167–180.

Dinsmore, J. J. 2010. Field Reports—Summer 2010. *Iowa Bird Life* 80:140–159.

Dinsmore, J. J. 2012. Field Reports—Summer 2012. *Iowa Bird Life* 82:150–170.

Dinsmore, J. J. 2014. Field Reports—Summer 2014. *Iowa Bird Life* 84:148–168.

Dinsmore, J. J. 2015. Field Reports—Summer 2015. *Iowa Bird Life* 85:122–143.

Dinsmore, J. J. 2016. Field Reports—Summer 2016. *Iowa Bird Life* 86:138–158.

Dinsmore, J. J. 2018. Field Reports—Summer 2018. *Iowa Bird Life* 88:142–160.

Dinsmore, J. J., S. J. Dinsmore, and D. L. Howell. 1999. Least Terns and Piping Plovers in Iowa: Persistence of marginal populations. Pp. 51–55. In K. G. Higgins, M. R. Brashier, and C. D. Kruse (Eds.). *Proceedings of the Piping Plovers and Least Terns of the Great Plains and Nearby,* South Dakota State University, Brookings. 132 pp.

Dinsmore, J. J., S. J. Dinsmore, and D. L. Howell. 2004. Piping Plovers and Least Terns in Iowa: Dependence on fly-ash deposits. Pp. 51–55. In K. F. Higgins, M. R. Brashier, and C. Fleming (Eds.). *Proceedings of the Third Missouri River and North American Piping Plover and Least Tern Habitat Workshop/Symposium*. WFS1–05. South Dakota State University. Brookings.

Dinsmore, J. J., T. H. Kent, D. Koenig, P. C. Peterson, and D. M. Roosa. 1984. *Iowa Birds*. Iowa State University Press, Ames. 356 pp.

Dinsmore, S. J. 1997. First record of a Neotropic Cormorant for Iowa. *Iowa Bird Life* 67:131–132.

Dinsmore, S. J. 2006. Least Terns nesting in central Iowa. *Iowa Bird Life* 76:210–211.

Dinsmore, S. J. 2009. Alder Flycatcher nesting in Dallas County: First nesting record for Iowa. *Iowa Bird Life* 79:211–212.

Dinsmore, S. J. 2014. Horned Grebe nesting at Eagle Lake. *Iowa Bird Life* 84:169.

Dinsmore, S. J. and J. J. Dinsmore. 1986. White-faced Ibis nesting in Dickinson County. *Iowa Bird Life* 56:120–121.

Dinsmore, S. J. and M. Griffin. 2010. Herring Gull nesting at Pool 13, Clinton Co.: First Iowa nesting record. *Iowa Bird Life* 80:160–161.

Dinsmore, S. J. and P. C. Petersen. 1986. First House Finches nesting in Iowa. *Iowa Bird Life* 56:122.

Dinsmore, S. J. and L. A. Schoenewe. 2013. American Avocet nesting at Trumbull Lake, Clay County. *Iowa Bird Life* 83:156–157.

Dinsmore, S. J., J. J. Dinsmore, and D. L. Howell. 1993. Least Terns feeding on fly-ash deposits. In K. F. Higgins and M. R. Brashier (Eds.). *Proceedings of the Missouri River and its Tributaries: Piping Plover and Least Tern Symposium*, South Dakota State University, Brookings.

Dinsmore, S. J., M. Griffen, T. M. Harms, R. Ellingson, and C. Kemmerer. 2012. Neotropic Cormorant nesting at Pool 13, Clinton County. *Iowa Bird Life* 82:171–172.

Dix, Mrs. R. S. 1937. The nesting of the American Magpie (*Pica pica hudsonia*) in Bremer County, Iowa, summer of 1937. *Iowa Bird Life* 7:34.

Dix, Mrs. R. S. 1938. American Magpies nest in Bremer County, Iowa, the second successive year. *Iowa Bird Life* 8:56.

Dobkin, D. S. 1994. *Conservation and Management of Neotropical Migrant Landbirds in the Northern Rockies and Great Plains.* University of Idaho Press, Moscow.

Doherty, P. F. and T. C. Grubb. 2002. Survivorship of permanent-resident birds in a fragmented forested landscape. *Ecology* 83:844–857.

Donahoe, S. B. 1987. The effect of forest defoliation, food abundance, and forest structure on the foraging and territorial behavior of the Red-eyed Vireo (*Vireo olivaceus*). M.S. Thesis, University of West Virginia, Morgantown.

Donnelly, R. and J. M. Marzluff. 2006. Relative importance of habitat quantity, structure, and spatial pattern to birds in urbanizing environments. *Urban Ecosystems* 9:99–117.

Donovan, T. M. and C. M. Stanley. 1995. A new method of determining Ovenbird age on the basis of rectrix shape. *J Field Ornithol* 66:247–252.

Dorr, B. S., S. L. Hanisch, P. H. Butchko, and D. G. Fielder. 2012. Management of Double-crested Cormorants to improve sport fisheries in Michigan: Three case studies. *Human-Wildlife Interactions* 6:155–168.

Dorr, B. S., J. J. Hatch, and D. V. Weseloh. 2020. Double-crested Cormorant (*Phalacrocorax auritus*). In A. F. Poole (Ed.). *Birds of the World*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.doccor.01

Drewien, R. C., J. T. Herbert, T. W. Aldrich, and S. H. Bouffard. 1999. Detecting Trumpeter Swans harvested in Tundra Swan hunts. *Wildlife Soc Bull* 27:95–102.

Drilling, N. 2012. *South Dakota Breeding Bird Atlas II*. Rocky Mountain Bird Observatory, CO. Technical Report #M-SDBBA2-06.

Drilling, N. E. and C. F. Thompson. 1988. Natal and breeding dispersal in House Wrens (*Troglodytes aedon*). *Auk* 105:480–491.

Drilling, N., R. D. Titman, and F. McKinney. 2020. Mallard (*Anas platyrhynchos*). In S. M. Billerman (Ed.). Version 1.0. *Birds of the World*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.mallar3.01

Droege, S. and J. R. Sauer. 1990. North American breeding bird survey annual summary 1989. *Biol Rept* 90(8).

Dubowy, P. J., C. Carboneras, and G. M. Kirwan. 2020. Northern Shoveler (*Spatula clypeata*). In S. M. Billerman (Ed.). Version 1.0. *Birds of the World*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.norsho.01

Ducks Unlimited. 2012. Living Lakes Initiative: Conserving Minnesota and Iowa's wetlands and shallow lakes. https://www.ducks.org/Conservation/DU-Conservation-Initiatives/Living-Lakes-Initiative

Ducks Unlimited. 2018. Prairie Pothole Region. Level I conservation priority area, the most important and threatened waterfowl habitat in North America. https://www.ducks.org/conservation/where-ducks-unlimited-works/prairie-pothole-region

Duebbert, H. F. and J. T. Lokemoen. 1977. Upland nesting of American Bitterns, Marsh Hawks, and Short-eared Owls. *Prairie Nat* 9:33–40.

Duerr, A. E., T. M. Donovan, and D. E. Capen. 2007. Management-induced reproductive failure and breeding dispersal in Double-crested Cormorants on Lake Champlain. *J Wildl Manage* 71:2565–2574.

Dugger, B. D., K. M. Dugger, and L. H. Fredrickson. 2020. Hooded Merganser (*Lophodytes cucullatus*). In A. F. Poole (Ed.). Version 1.0. *Birds of the World*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.hoomer.01

DuMont, P. A. 1933. A revised list of the birds of Iowa. *University of Iowa Studies in Natural History* 15(5).

DuMont, P. A. 1935. The 1934–1935 magpie invasion into Iowa. *Iowa Bird Life* 5:46.

Dury, C. 1877. Fecundity of the Carolina Wren (*Thryothorus ludovicianus*). *Bull Nuttall Ornithol Club*.

Dykstra, C. R., J. L. Hays, and S. T. Crocoll. 2008. Red-shouldered Hawk (*Buteo lineatus*). In A. F. Poole (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.107

Eckerle, K. P. and C. F. Thompson. 2001. Yellow-breasted Chat (*Icteria virens*). In A. F. Poole and F. B. Gill (Eds.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.575

Eddleman, W. R., R. E. Flores, and M. Legare. 1994. Black Rail (*Laterallus jamaicensis*). In A. F. Poole and F. B. Gill (Eds.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.123

Edwards, C. 1995. Prairie Warblers nesting in Johnson County. *Iowa Bird Life* 65:105.

Elliott-Smith, E and S. M. Haig. 2020. Piping Plover (*Charadrius melodus*). In A. F. Poole (Ed.). Version 1.0. *Birds of the World*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.pipplo.01

Ellison, W. G. 1991. The mechanism and ecology of range expansion by the Blue-gray Gnatcatcher. M.S. Thesis, University of Connecticut, Storrs.

Erpelding, R., R. O. Kimmel, and D. J. Lockman. 1986. Foods and feeding behavior of young Gray Partridge in Minnesota. *Minnesota Wildlife Report No. 2*. Minnesota Department of Natural Resources, St. Paul, MN.

Erpelding, R., R. O. Kimmel, and D. J. Lockman. 1987. Foods and behavior of young Gray Partridge in Minnesota. Pp. 17–30. In R. O. Kimmel, J. W. Schulz, and G. J. Mitchell (Eds.). Proceedings of Perdix IV: Gray Partridge Workshop. Minnesota Department of Natural Resources, Madeley.

Erpino, M. J. 1969. Seasonal cycle of reproductive physiology in the Black-billed Magpie. *Condor* 71:267–279.

Errington, P. L. 1932. Food habits of southern Wisconsin raptors: Part 1. Owls. *Condor* 34:176–186.

Erskine, A. J. 1992. *Atlas of Breeding Birds of the Maritime Provinces*. Nimbus Publications and Nova Scotia Museum, Halifax.

Evans, S. A. 1981. Ecology and behavior of the Mississippi Kite (*Ictinia mississipensis*) in southern Illinois. M.S. Thesis, Southern Illinois University, Carbondale.

Fair, J. M., P. L. Kennedy, and L. C. McEwen. 1995. Effects of carbaryl grasshopper control on nesting Killdeer in North Dakota. *Environ Toxicol Chem* 14:881–890.

Fairbairn, S. E. 1998. Red-necked Grebes nest in Iowa. *Iowa Bird Life* 68:134–135.

Farris, A. L., E. D. Klonglan, and R. C. Nomsen. 1977. *The Ring-necked Pheasants in Iowa*. Iowa Conservation Commission. Des Moines.

Finch, D. M. 1990. Effects of predation and competitor interference on nesting success of House Wrens and Tree Swallows. *Condor* 92:674–687.

Fisk, E. J. 1976. A deadly rain of robins. *Florida Naturalist* 49:13–14.

Flashpohler, D. J. 1996. Nesting success of the Prothonotary Warbler in the upper Mississippi river bottomlands. *Wilson Bull* 108:457–466.

Fleskes, J. P., J. A. Guthrie, and G. L. Welp. 1990. Raising Wood Ducks on a prairie marsh: The story of Union Slough. In L. H. Fredrickson, G. V. Burger, S. P. Havera, D. A. Graber, R. E. Kirby, and T. S. Taylor (Eds.). *Proceedings of the 1988 North American Wood Duck Symposium*.

Fowler, N. E. and R. W. Howe. 1987. Birds of remnant riparian forests in northeastern Wisconsin. *Western Birds* 18:77–83.

Freemark, K. and B. Collins. 1992. Landscape ecology of birds breeding in temperate forest fragments. Pp. 443–454. In J. M. Hagan III and D. W. Johnston (Eds.). *Ecology and Conservation of Neotropical Migrant Landbirds*. Smithsonian Institute Press, Washington, D.C.

Friedmann, H. 1963. Host relations of the parasitic cowbirds. *U.S. Natl Mus Bull* No. 233.

Fritzell, P. 2017. *Trends in Iowa Wildlife Populations and Harvest, 2016–2017*. Iowa Department of Natural Resources, Des Moines.

Fritzell, P., T. Litchfield, T. Gosselink, V. Evelsizer, O. Jones, T. Bogenschutz, P. Schlarbaum, B. Ehresman, D. Hoffman, S. Shepherd, and C. Jennelle. 2013. *Trends in Iowa wildlife populations and harvest, 2012*. Iowa Department of Natural Resources, Des Moines.

Galatowitsch, S. M. and A. G. van der Valk. 1994. *Restoring Prairie Wetlands: An Ecological Approach*. Iowa State University Press, Ames, IA, USA.

Gardali, T. and G. Ballard. 2000. Warbling Vireo (*Vireo gilvus*). In A. F. Poole and F. B. Gill (Eds.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.551

Garner, L. A. 1991. *Intra- and interspecific aggression by Red-necked Grebes*. M.S. Thesis, North Dakota State University, Fargo.

Garrison, B. A. 1999. Bank Swallow (*Riparia riparia*). In A. F. Poole and F. B. Gill (Eds.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.414

Gauthier, G. 2020. Bufflehead (*Bucephala albeola*). In A. F. Poole (Ed.). Version 1.0. *Birds of the World*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.buffle.01

Gavin, T. A. and E. K. Bollinger. 1988. Reproductive correlates of breeding-site fidelity in Bobolinks (*Dolichonyx oryzivorus*). *Ecology* 69:96–103.

Geisthardt, E., J. Gautsch, and B. Harland. 2013. *Shallow Lakes Summary Report*. Iowa Department of Natural Resources, Watershed Monitoring and Assessment Section, Des Moines, IA. 65 pp.

Germaine, S. S., S. H. Vessey, and D. E. Capen. 1997. Effects of small forest openibreeding bird community in a Vermont hardwood forest. *Condor* 99:708–718.

Ghalambor, C. K. and T. E. Martin. 2020. Red-breasted Nuthatch (*Sitta canadensis*). In A. F. Poole and F. B. Gill (Eds.). Version 1.0. *Birds of the World*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.rebnut.01

Gibbs, J. P. and J. Faaborg. 1990. Estimating the viability of Ovenbird and Kentucky Warbler populations in forest fragments. *Conserv Biol* 4:193–196.

Gill, F. B., R. A. Canterbury, and J. L. Confer. 2001. Blue-winged Warbler (*Vermivora cyanoptera*). In A. F. Poole and F. B. Gill (Eds.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.584

Gillespie, M. K. 2013. Bird and bat responses to wind energy development in Iowa. M.S. Thesis, Iowa State University, Ames.

Gilmer, D. S. and R. E. Stewart. 1984. Swainson's Hawk nesting ecology in North Dakota. *Condor* 86:12–18.

Giudice, J. H. and J. T. Ratti. 2001. Ring-necked Pheasant (*Phasianus colchicus*). In A. F. Poole and F. B. Gill (Eds.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.572

Goguen, C. B. and N. E. Mathews. 1996. Nest desertion by Blue-gray Gnatcatchers in association with Brown-headed Cowbird parasitism. *Animal Behav* 52:613–619.

Goodrich, L. J., S. T. Crocoll, and S. E. Senner. 2014. In A. F. Poole (Ed.). Broad-winged Hawk (*Buteo platypterus*). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.218

Gorski, L. J. 1969. Systematics and ecology of sibling species of Traill's Flycatcher. Ph.D. Diss., University of Connecticut, Storrs.

Gorski, L. J. 1970. Banding the two songforms of Traill's Flycatcher. *Bird-Banding* 41:204–206.

Gosselink, T. 2013. Wild Turkeys. In Fritzell, P., T. Litchfield, T. Gosselink, V. Evelsizer, O. Jones, T. Bogenschutz, P. Schlarbaum, B. Ehresman, D. Hoffman, S. Shepherd, and C. Jennelle (Eds.). 2013. *Trends in Iowa Wildlife Populations and Harvest: 2012*. Iowa Department of Natural Resources, Des Moines.

Graber, J. W. and R. R. Graber. 1979. Severe winter weather and bird populations in southern Illinois. *Wilson Bull* 91:88–103.

Graber, J. W., R. R. Graber, and E. L. Kirk. 1977. Illinois birds: Picidae. *Illinois Nat Hist Surv Biol Notes* No. 102. Champaign.

Graber, J. W., R. R. Graber, and E. L. Kirk. 1983. Illinois birds: wood warblers. *Illinois Nat Hist Surv Biol Notes* No. 118. Champaign.

Graber, R. R. and J. W. Graber. 1963. A comparative study of bird populations in Illinois, 1906–1909 and 1956–1958. *Illinois Nat Hist Surv Bull* 28:383–528.

Graber, R. R., J. W. Graber, and E. L. Kirk. 1972. Illinois birds: Hirundinidae. *Illinois Nat Hist Surv Biol Notes* No. 80. Champaign. 36 pp.

Graber, R. R., J. W. Graber, and E. L. Kirk. 1974. Illinois birds: Tyrannidae. *Illinois Nat Hist Surv Biol Notes* No. 86. Champaign.

Graber, R. R., J. W. Graber, and E. L. Kirk. 1978. Illinois birds: Ciconiiformes. *Illinois Nat Hist Surv Biol Notes* No. 109. Champaign. 80 pp.

Gram, W. K., P. A. Porneluzi, R. L. Clawson, J. Faaborg, and S. C. Richter. 2003. Effects of experimental forest management on density and nesting success of bird species in Missouri Ozark forests. *Conserv Biol* 17:1324–1337.

Greenberg, R., P. Bichier, A. Cruz Angon, and R. Reitsma. 1997. Bird populations in shade and sun coffee plantations in central Guatemala. *Conserv Biol* 11:448–459.

Greene, E., V. R. Muehter, and W. Davison. 2014. Lazuli Bunting (*Passerina amoena*). In A. F. Poole (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.232

Greenlaw, J. S. 2015. Eastern Towhee (*Pipilo erythrophthalmus*). In P. G. Rodewald (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.262

Grubb, T. C., Jr. and C. L. Bronson. 2001. On cognitive conservation biology: Why chickadees leave a patch of woodland. *J Avian Biol* 32:372–376.

Grubb, T. C., Jr. and V. V. Pravosudov. 2008. White-breasted Nuthatch (*Sitta carolinensis*). In A. F. Poole (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.54

Grzybowski, J. A. and W. Ross Silcock. 2008. Nesting season: Northern Great Plains. *N Amer Birds* 61:607–609.

Gullion, G. W. 1984. *Grouse of the North Shore*. Willow Creek Press, Oshkosh, WI.

Guzy, M. J. and G. Ritchison. 1999. Common Yellowthroat (*Geothlypis trichas*). In A. F. Poole and F. B. Gill (Eds.). *The Birds of North America*, No. 448. Cornell Lab of Ornithology, Ithaca, NY.

Halkin, S. L. and S. U. Linville. 1999. Northern Cardinal (*Cardinalis cardinalis*). In A. F. Poole and F. B. Gill (Eds.). Version 1.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.440

Hamas, M. J. 1994. Belted Kingfisher (C*eryle alcyon*). In A. F. Poole and F. B. Gill (Eds.). *The Birds of North America*, No. 84. The Academy of Natural Sciences, Philadelphia and The American Ornithologist's Union, Washington, D.C.

Hamel, P. B. 2000. Cerulean Warbler (*Dendroica cerulea*). In A. F. Poole and F. B. Gill (Eds.). *The Birds of North America*, No. 511. Cornell Lab of Ornithology, Ithaca, NY.

Hamerstrom, F. 1986. *Harrier, Hawk of the Marsh: The Hawk That Is Ruled by a Mouse*. Smithsonian Institute Press, Washington, D.C. 171 pp.

Hamerstrom, F., F. N. Hamerstrom, and C. J. Burke. 1985. Effect of voles on mating systems in a central Wisconsin population of harriers. *Wilson Bull* 97:332–346.

Hamerstrom, F. N., Jr. and F. Hamerstrom. 1949. Daily and seasonal movements of Wisconsin prairie chickens. *Auk* 66:313–337.

Hamerstrom,F. N., Jr. and F. Hamerstrom. 1973. The prairie chicken in Wisconsin-highlights of a 22-year study of counts, behavior, movements, turnover, and habitat. *Wisconsin Dep Nat Res Tech Bull* 64.

Hanson, K. C., T. L. DeVault, and S. J. Dinsmore. 2010. Increased abundance of Neotropic Cormorants on the Alluvial Plain of Mississippi. *Southeastern Naturalist* 9:385–394.

Harms, T. M. 2017. Field reports—Spring 2017. *Iowa Bird Life* 87:128.

Harms, T. M. and S. J. Dinsmore. 2012. Density and abundance of secretive marsh birds in Iowa. *Waterbirds* 35:208–216.

Harr, D. 1999. Burrowing Owl nest in Lyon County. *Iowa Bird Life* 69:76–77.

Harrap, S. and D. Quinn. 1996. *Chickadees, Tits, Nuthatches, and Treecreepers*. Princeton University Press, Princeton, NJ.

Harrison, C. 1978. *A Field Guide to the Nests, Eggs and Nestlings of North American Birds*. Collins, Glasgow.

Hayworth, A. M. and W. W. Weathers. 1984. Temperature regulation and climatic adaption in Black-billed and Yellow-billed Magpies. *Condor* 86:19–26.

Healy, W. M. and E. S. Nenno. 1985. Effects of weather on Wild Turkey poult survival. *Proc Natl Wild Turkey Symp* 5:91–101.

Heath, H. 1920. The nesting habits of the Alaska Wren. *Condor* 22:49–55.

Heath, S. R., E. H. Dunn, and D. J. Agro. 2020. Black Tern (*Chlidonias niger*). In S. M. Billermann (Ed.). Version 1.0. *Birds of the World*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.blkter.01

Hejl, S. J., J. A. Holmes, and D. E. Kroodsma. 2002. Winter Wren (*Troglodytes hiemalis*). In A. F. Poole and F. B. Gill (Eds.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.623

Henny, C. J. and J. K. Bennett. 1990. Comparison of breaking strength and shell thickness as evaluators of White-faced Ibis eggshell quality. *Environ Toxicol Chem* 9:797–805.

Hepp, G. R. and F. C. Bellrose. 2020. Wood Duck (*Aix sponsa*). In A. F. Poole (Ed.). Version 1.0. *Birds of the World*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.wooduc.01

Herkert, J. R. 1991. Prairie birds of Illinois: Population response to two centuries of habitat change. *Illinois Nat Hist Surv Bull* 34:393–399.

Herkert, J. R. 1994a. Breeding bird communities of midwestern prairie fragments: The effects of prescribed burning and habitat-area. *Nat Areas J* 14:128–135.

Herkert, J. R. 1994b. The effects of habitat fragmentation on midwestern grassland bird communities. *J Ecol Appl* 4:461–471.

Herkert, J. R., R. E. Szafoni, V. M. Kleen, and J. E. Schwegman. 1993. Habitat establishment, enhancement and management for forest and grassland birds in Illinois. Illinois Department of Conservation, Division of Natural Heritage, *Natural Heritage Technical Publication 1*, Springfield, IL. 20 pp.

Herkert, J. R., D. W. Sample, and R. E. Warner. 1996. Management of grassland landscapes for the conservation of migratory birds. Pp 89–116. In F. R. Thompson III (Ed.). *Managing Midwest Landscapes for the Conservation of Neotropical Migratory Birds*. U.S. Forest Service, Gen Tech Rep NC–87. North Central Forest Experiment Station, St. Paul, MN.

Herkert, J. R., S. A. Simpson, R. L. Westemeier, T. L. Esker, and J. W. Walk. 1999. Response of Northern Harriers and Short-eared Owls to grassland management in Illinois. *J Wildl Manage* 63:517–523.

Herkert, J. R., P. D. Vickery, and D. E. Kroodsma. 2002. In A. F. Poole and F. B. Gill (Eds.). Henslow's Sparrow (*Centronyx henslowii*). Version 1.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.672

Hespenheide, H. A. 1971. Flycatcher habitat selection in the eastern deciduous forest. *Auk* 88:61–74.

Hess, G. K., R. L. West, M. V. Barnhill III, and L. M. Fleming. 2000. *Birds of Delaware*. University of Pittsburgh Press, Pittsburgh, PA.

Hill, S. R. and J. E. Gates. 1988. Nesting ecology and microhabitat of the Eastern Phoebe in the central Appalachians. *Am Midl Nat* 120:313–324.

Hobson, K. A. and E. Bayne. 2000. The effects of stand age on avian communities in aspen-dominated forests of central Saskatchewan, Canada. *Forest Ecol Manage* 136:121–134.

Hoffman, S. W. and J. P. Smith. 2003. Population trends of migratory raptors in western North America, 1977–2001. *Condor* 105:397–419.

Hollis, R. J. 1986. The 1985 Iowa feeder survey. *Iowa Bird Life* 56:11–16.

Holmes, R. T. and T. W. Sherry. 2001. Thirty-year bird population trends in an unfragmented temperate deciduous forest: Importance of habitat change. *Auk* 118:589–609.

Hopp, S. L., A. Kirby, and C. A. Boone. 1995. White-eyed Vireo (*Vireo griseus*). In A. F. Poole and F. B. Gill (Eds.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.168

Hothem, R. L., B. E. Brussee, and W. E. Davis, Jr. 2010. Black-crowned Night-Heron (*Nycticorax nycticorax*). In A. F. Poole (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.74

Houston, C. S. 1977. Changing patterns of Corvidae on the prairies. *Blue Jay* 35:149–156

Houston, C. S., C. Jackson, and D. E. Bowen, Jr. 2020. Upland Sandpiper (*Bartramia longicauda*). In A. F. Poole (Ed.). Version 1.0. *Birds of the World*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.uplsan.01

Hughes, J. M. 2001. Black-billed Cuckoo (*Coccyzus erythropthalmus*). In A. F. Poole and F. B. Gill (Eds.). Version 1.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.587

Hughes, J. M. 2015. Yellow-billed Cuckoo (*Coccyzus americanus*). In P. G. Rodewald (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.418

Hull, S. D. 2003. Effects of management practices on grassland birds: Eastern Meadowlark. Northern Prairie Wildlife Research Center, Jamestown, ND. http://www.npwrc.usgs.gov/resource/literatr/grasbird/eame/eame.htm (Version 12DEC2003).

Ingold, D. J. 1991. Nest-site fidelity in Red-headed and Red-bellied woodpeckers. *Wilson Bull* 103:118–122.

Iowa Department of Agriculture and Land Stewardship. 2020. Climatology Bureau—Iowa weather and climate records. https://iowaagriculture.gov/climatology-bureau.

Iowa Department of Natural Resources Bureau of Forestry. 2009. *Stephens State Forest Management Plan 2009–2028*. https://www.iowadnr.gov/Portals/idnr/uploads/forestry/stephens_managementplan.pdf

Iowa Department of Natural Resources. 2015. K. Reeder and J. Clymer (Eds.). *Iowa's Wildlife Action Plan: Securing a Future for Fish and Wildlife.* Iowa Department of Natural Resources, Des Moines, Iowa, USA.

Iowa Department of Natural Resources. 2017. High Resolution Land Cover of Iowa in 2009. On-line: https://geodata.iowa.gov/dataset/high-resolution-land-cover-iowa-2009.

Iowa Department of Natural Resources. 2019. Wildlife Diversity Program Report, 2019. Osprey Restoration in Iowa 2018 Nesting Report. https://www.iowadnr.gov/Portals/idnr/uploads/Wildlife Stewardship/YearlyReport_Osprey.pdf

Iowa Department of Natural Resources. 2020a. *Bird conservation areas.* Available on-line: https://www.iowadnr.gov/conservation/bird-conservation-areas.

Iowa Department of Natural Resources. 2020b. *Trumpeter Swan restoration*. Available on-line: https://www.iowadnr.gov/Conservation/Iowas-Wildlife/Wildlife-Species-Restoration

Iowa Ornithologists' Union. 2013. *Iowa Bird Records*. https://iowabirdrecords.org/Documents/RecordsTo1999.pdf

Iowa Ornithologists' Union. 2019. https://iowabirds.org/Birds/DataSets.aspx

Iowa Ornithologists' Union. 2020. *Summer records*. https://iowabirds.org/Birds/DataSets.aspx

Iowa State University Extension and Outreach. 2019. Sycamore (*Plantanus occidentalis*). https://naturalresources.extension.iastate.edu/forestry/iowa_trees/trees/sycamore.html

Jackson, B. J. and J. A. Jackson. 2020. Killdeer (*Charadrius vociferus*). In A. F. Poole and F. B. Gill (Eds.). Version 1.0. *Birds of the World*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.killde.01

Jackson, J. A. and H. R. Ouellet. 2018. Downy Woodpecker (*Dryobates pubescens*). In P. G. Rodewald (Ed.). Version 1.1. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.dowwoo.01.1

Jackson, J. A., H. R. Ouellet, and B. J. Jackson. 2018. Hairy Woodpecker (*Dryobates villosus*). In P. G. Rodewald (Ed.). Version 1.1. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.haiwoo.01.1

Jackson, L. S., C. A. Thompson, and J. J. Dinsmore (Eds.). 1996. *The Iowa Breeding Bird Atlas*. University of Iowa Press, Iowa City. 484 pp.

Jacobs, B. and J. D. Wilson. 1997. *Missouri Breeding Bird Atlas: 1986–1992*. Natural History Series, No. 6. Missouri Department of Conservation, Jefferson City. 430 pp.

Jacobs, J. 2006. Red-shouldered Hawk. In N. J. Cutright, B. R. Harriman, and R. W. Howe (Eds.). *Atlas of the Breeding Birds of Wisconsin*. The Wisconsin Society for Ornithology, Inc. 602 pp.

Jacobs, J. P. and E. A. Jacobs. 2002. Conservation assessment for Red-shouldered Hawk (*Buteo lineatus*). National Forests of North Central States. USDA Forest Service Eastern Region, Milwaukee, WI.

James, J. D. and J. E. Thompson. 2020. Black-bellied Whistling-Duck (*Dendrocygna autumnalis*). In A. F. Poole and F. B. Gill (Eds.). Version 1.0. *Birds of the World*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.bbwduc.01

James, P. C. and L. W. Oliphant. 1986. Extra birds and helpers at the nests of Richardson's Merlin. *Condor* 88:533–534.

Janssen, R. B. 1987. *Birds in Minnesota*. University of Minnesota Press, Minneapolis, MN.

Jaster, L. A., W. E. Jensen, and W. E. Lanyon. 2012. Eastern Meadowlark (*Sturnella magna*). In A. F. Poole (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.160

Johnsgard, P. A. 1979. *Birds of the Great Plains: Breeding Species and Their Distribution*. University of Nebraska Press, Lincoln. 539 pp.

Johnsgard, P. A. 1993. *Cormorants, Darters, and Pelicans of the World*. Smithsonian Institution Press, Washington, D.C.

Johnsgard, P. A. 2001. *Prairie Birds: Fragile Splendor in the Great Plains.* Pp. 141–153. University Press of Kansas, Lawrence.

Johnson, J. A., M. A. Schroeder, and L. A. Robb. 2011. Greater Prairie-Chicken (*Tympanuchus cupido*). In A. F Poole (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.36

Johnson, K. and B. D. Peer. 2001. Great-tailed Grackle (*Quiscalus mexicanus*). In A. F. Poole and F. B. Gill (Eds.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.576

Johnson, K., C. Carboneras, D. A. Christie, and G. M. Kirwan. 2020. Green-winged Teal (*Anas crecca*). In S. M. Billerman (Ed.). Version 1.0. *Birds of the World*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.gnwtea.01

Johnson, L. S. and L. H. Kermott. 1991. Effect of nest-site supplementation on polygynous behavior in the House Wren (*Troglodytes aedon*). *Condor* 93:784–787.

Johnson, R. G. and S. A. Temple. 1990. Nest predation and brood parasitism of tallgrass prairie birds. *J Wildl Manage* 54:106–111.

Jones, L. 1889. A list of birds found in eastern Jasper and western Poweshiek Counties, Iowa. *Curlew* 1:50–53, 57–60.

Jones, S. L. and J. E. Cornely. 2002. Vesper Sparrow (*Pooecetes gramineus*). In A. F. Poole and F. B. Gill (Eds.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.624

Jorgensen, J. G. and W. R. Silcock. 2015. First nesting record and status review of the Glossy Ibis in Nebraska. *Nebr Bird Rev* 83:139–149.

Jorgensen, J. G., J. P. McCarty, and L. L. Wolfenbarger. 2009. Killdeer *Charadrius vociferus* breeding abundance and habitat use in the Eastern Rainwater Basin, Nebraska. *Wader Study Group Bull* 116:65–68.

Joyner, D. E. 1973. Interspecific nest parasitism by ducks and coots in Utah. *Auk* 90:692–693.

Jungers, J. 2015. First nesting record for Spotted Towhee in Iowa. *Iowa Bird Life* 85:121.

Kahl, R. B., T. S. Baskett, J. A. Ellis, and J. N. Burroughs. 1985. *Characteristics of summer habitats of selected nongame birds in Missouri*. Agric Exp Sta, University of Missouri, Columbia.

Kaiser, M. S. and E. K. Fritzell. 1984. Effects of river recreationists on Green-backed Heron behavior. *J Wildl Manage* 48:561–567.

Kale, H. W., II. 1965. Ecology and bioenergetics of the Long-billed Marsh Wren *Telmatodytes palustris griseus* (Brewster) in Georgia salt marshes. *Publ Nuttall Ornithol Club*, No. 5.

Kalmbach, E. R. 1939. The crow in its relation to agriculture. *U.S. Dept Agric Farmers Bull* No. 1102.

Kear, J. (Ed.). 2005. *Ducks, Geese and Swans*. Oxford University Press, Oxford, UK.

Kelley, J., S. Williamson, and T. R. Cooper. 2008. *American Woodcock Conservation Plan: A Summary of and Recommendations for Woodcock Conservation in North America*. U.S. Fish and Wildlife Service, Washington. D.C. No 430.

Kelly, J. F., E. S. Bridge, and M. J. Hamas. 2009. Belted Kingfisher (*Megaceryle alcyon*). In A. F. Poole (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.84

Kendall, R. J., L. W. Brewer, R. R. Hitchcock, and J. R. Mayer. 1992. American Wigeon mortality associated with turf application of Diazinon AG500. *J Wildlife Dis* 28:263–267.

Kendeigh, S. C. 1941a. Birds of a prairie community. *Condor* 43:165–174.

Kendeigh, S. C. 1941b. Territorial and mating behavior of the House Wren. *Illinois Biol Monogr* 18:11–20.

Kenne, M. 1994. Glossy Ibis in Kossuth County. *Iowa Bird Life* 64:83–84.

Kenne, M. 2000. Field reports—Spring 2000. *Iowa Bird Life* 70:132–143.

Kennedy, E. D. and D. W. White. 1996. Interference competition from House Wrens as a factor in the decline of Bewick's Wrens. *Conserv Biol* 10:281–284.

Kennedy, E. D. and D. W. White. 2013. Bewick's Wren (*Thryomanes bewickii*). In A. F. Poole (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.315

Kent, T. H. 1982. Field reports—Spring 1982. *Iowa Bird Life* 52:62.

Kent, T. H. 1997. Field reports—Spring 1997. *Iowa Bird Life* 67:89.

Kent, T. H. 1998a. Field reports—Fall 1997. *Iowa Bird Life* 68:9–18.

Kent, T. H. 1998b. Field Reports—Spring 1998. *Iowa Bird Life* 68:89–98.

Kent, T. H. 1999. Field reports—Fall 1998. *Iowa Bird Life* 69:30–40.

Kent, T. H. and J. J. Dinsmore. 1996. *Birds in Iowa*. Published by the authors. Iowa City and Ames, Iowa. 391 pp.

Kent, T. H., G. Walsh, and C. Edwards. 1994. Breeding birds of the Coralville Reservoir area. *Iowa Bird Life* 64:89–105.

Keran, D. 1978. Nest site selection by the Broad-winged Hawk in north-central Minnesota and Wisconsin. *Raptor Res* 12:15–20.

Kermott, L. H., L. S. Johnson, and M. S. Merkle. 1991. Experimental evidence for the function of mate replacement and infanticide by males in a north-temperate population of House Wrens. *Condor* 93:630–636.

Kershner, E. L. and W. G. Ellison. 2012. Blue-gray Gnatcatcher (*Polioptila caerulea*). In A. F. Poole (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.23

Keyes, C. R. and H. S. Williams. 1888. Preliminary annotated catalogue of the birds of Iowa. *Proc Davenport Acad Sci* 5:113–161.

Kilgore, J. C., R. A. Sargent, K. V. Miller, and B. R. Chapman. 1996. Nest sites of Kentucky Warblers in bottomland hardwoods of South Carolina. *J Field Ornithol* 67:300–306.

Kilham, L. 1965. Differences in feeding behavior of male and female Hairy Woodpeckers. *Wilson Bull* 77:134–145.

Kilham, L. 1968. Reproductive behavior of White-breasted Nuthatches: I. Distraction display, bill-sweeping, and nest-hole defense. *Auk* 85:477–492.

Kilham, L. 1971. Reproductive behavior of Yellow-bellied Sapsuckers. I. Preference for nesting in *Fomes*-infected aspens and nest hole interrelations with flying squirrels, raccoons, and other animals. *Wilson Bull* 83:159–171.

Kilham, L. 1972. Reproductive behavior of White-breasted Nuthatches: II. Courtship. *Auk* 89:115–129.

Kilham, L. 1973. Reproductive behavior of three Red-breasted Nuthatch: 1. Courtship. *Auk* 90:597–609.

Kilham, L. 1975. Association of Red-breasted Nuthatches with chickadees in a hemlock cone year. *Auk* 92:160–162.

Kingery, H. E. (Ed.). 1998. *Colorado Breeding Bird Atlas*. Colorado Bird Atlas Partnership and Colorado Division of Wildlife, Denver.

Kirk, D. A. and C. Hyslop. 1998. Population status and recent trends in Canadian raptors: A review. *Biol Conserv* 83:91–118.

Kirk, D. A. and M. J. Mossman. 1998. Turkey Vulture (*Cathartes aura*). In A. F. Poole and F. B. Gill (Eds.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.339

Kirsch, L. M. 1974. Habitat management considerations for prairie chickens. *Wildl Soc Bull* 2:124–129.

Klaas, E. E. 1970. A population study of the Eastern Phoebe and its social relationships with the Brown-headed Cowbird. Ph.D. Diss., University of Kansas, Lawrence.

Kleen, V. M., L. Cordle, and R. A. Montgomery. 2004. *The Illinois Breeding Bird Atlas*. Illinois Natural History Survey Special Publication No. 26. 459 pp.

Klimkiewicz, M. K. and J. K. Solem. 1979. The breeding bird atlas of Montgomery and Howard Counties, Maryland. *Maryland Birdlife* 34:3–39.

Klute, D. S., L. W. Ayers, M. T. Green, W. H. Howe, S. L. Jones, J. A. Shaffer, S. R. Sheffield, and T. S. Zimmerman. 2003. *Status Assessment and Conservation Plan for the Western Burrowing Owl in the United States*. U.S. Department of Interior, Fish and Wildlife Service, Biological Technical Publication FWS/BTP-R6001-2003, Washington, D.C.

Knapton, R. W. 1979. Breeding ecology of the Clay-colored Sparrow. *Living Bird* 17:137–158.

Knopf, F. L. 1996. Prairie legacies—birds. Pp. 135–148. In F. B. Samson and F. L. Knopf (Eds.). *Prairie Conservation: Preserving North America's Most Endangered Ecosystem*. Island Press, Covelo, CA.

Knopf, F. L. and R. M. Evans. 2020. American White Pelican (*Pelecanus erythrorhynchos*). In A. F. Poole (Ed.). Version 1.0. *Birds of the World*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.amwpel.01

Knutson, M. G., G. Butcher, J. Fitzgerald, and J. Shieldcastle. 2001. *Partners in Flight Bird Conservation Plan for The Upper Great Lakes Plain (Physiographic Area 16)*. USGS Upper Midwest Environmental Sciences Center in Cooperation with Partners in Flight. La Crosse, Wisconsin.

Koenig, D. 1979. Nesting of Northern Parula in Iowa. *Iowa Bird Life* 49:116–117.

Kollasch, R. P. 2004. *Land Cover of the State of Iowa in the Year 2002*. Iowa Geological and Water Survey, Iowa Department of Natural Resources, Iowa City, IA.

Kramer, J. L. and P. T. Redig. 1997. Sixteen years of lead poisoning in eagles, 1980–1995: An epizootiologic view. *J Raptor Res* 31:327–332.

Kricher, J. C. 2014. Black-and-white Warbler (*Mniotilta varia*). In A. F. Poole (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.158

Kridelbaugh, A. L. 1983. Nesting ecology of the Loggerhead Shrike in central Missouri. *Wilson Bull* 95:303–308.

Kroodsma, D. E. 1974. Song learning, dialects, and dispersal in the Bewick's Wren. *Z Tierpsychol* 35:352–380.

Kroodsma, D. E. and J. Verner. 1978. Complex singing behaviors among *Cistothorus* wrens. *Auk* 95:703–716.

Kroodsma, R. L. 1975. Hybridization in buntings (*Passerina*) in North Dakota and eastern Montana. *Auk* 92:66–80.

Kroodsma, R. L. 1982. Bird community ecology on power-line corridors in east Tennessee. *Biol Conserv* 23:79–94.

Kruse, K. L., J. A. Dubovsky, and T. R. Cooper. 2012. Status and harvests of sandhill cranes: Mid-Continent, Rocky Mountain, Lower Colorado River Valley and Eastern Populations. Administrative Report, U.S. Fish and Wildlife Service, Denver, Colorado. 14 pp.

Kus, B., S. L. Hopp, R. R. Johnson, and B. T. Brown. 2010. Bell's Vireo (*Vireo bellii*). In A. F. Poole (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.35

LaDeau, S. L., A. M. Kilpatrick, and P. P. Marra. 2007. West Nile virus emergence and large-scale declines of North American bird populations. *Nature* 447:710–713.

Lanyon, W. 1995. Eastern Meadowlark (*Sturnella magna*). In A Poole and F. B. Gill (Eds.). *The Birds of North America*. No. 160. The Birds of North America, Inc., Philadelphia, PA.

Laskey, A. R. 1948. Some nesting data on the Carolina Wren at Nashville, Tennessee. *Bird-Banding* 19:101–121.

Latham, R. 1958. Factors affecting distribution and abundance of Wild Turkeys in Pennsylvania. Ph.D. Diss., Pennsylvania State University, University Park.

Laughlin, S. B., D. P. Kibbe, and P. F. J. Eagles. 1982. Atlasing for breeding birds in North America: An idea whose time has come. *American Birds* 36:6–19.

Leatherberry, E. C., W. K. Moser, C. Perry, C. Woodall, E. Jepsen, S. Pennington, and A. Flickinger. 2006. Iowa's forests 1999–2003 (Part A). *Resour Bull NC-266A*. U.S. Department of Agriculture, Forest Service, North Central Research Station, St. Paul, MN. 84 pp.

Leschack, C. R., S. K. McKnight, and G. R. Hepp. 2020. Gadwall (*Mareca strepera*). In S. M. Billerman (Ed.). Version 1.0. *Birds of the World*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.gadwal.01.

Levad, R. 1998. Red Crossbill. Pp. 530–531. In H. E. Kingery (Ed). *Colorado Breeding Bird Atlas*. Colorado Bird Atlas Partnership and Colorado Division of Wildlife.

Linz, G. M. and D. C. Blixt. 1997. Black Terns benefit from cattail management in the northern Great Plains. *Colon Waterbird* 20:617–621.

Littlefield, C. D. and S. P. Thompson. 1981. History and status of the Franklin's Gull on Malheur National Wildlife Refuge, Oregon. *Great Basin Naturalist* 41:440–444.

Longcore, J. R., D. G. McAuley, G. R. Hepp, and J. M. Rhymer. 2020. American Black Duck (*Anas rubripes*). In A. F. Poole and F. B. Gill (Eds.). Version 1.0. *Birds of the World*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.amb-duc.01

Low, J. B. 1941. Gadwall and Franklin's Gull nesting in Iowa. *Iowa Bird Life* 11:31–32.

Lowther, P. E. 1993a. Brown-headed Cowbird (*Molothrus ater*). In A. F. Poole and F. B. Gill (Eds.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.47

Lowther, P. E. 1993b. Tallgrass prairie I. *J Field Ornithol* 64:103.

Lowther, P. E. 2020. Alder Flycatcher (*Empidonax alnorum*). In A. F. Poole and F. B. Gill (Eds.). Version 1.0. *Birds of the World*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.aldfly.01

Lowther, P. E. and C. L. Cink. 2006. House Sparrow (*Passer domesticus*). In A. F. Poole (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.12

Lowther, P. E. and R. F. Johnston. 2014. Rock Pigeon (*Columba livia*). In A. F. Poole (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.13

Lowther, P. E., C. Celada, N. K. Klein, C. C. Rimmer, and D. A. Spector. 1999. Yellow Warbler (*Setophaga petechia*). In A. F. Poole and F. B. Gill (Eds.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.454

Luukkonen, D. R. 1987. Status and breeding ecology of the Loggerhead Shrike in Virginia. M.S. Thesis, Virginia Polytechnic Institute and State University, Blacksburg.

Madden, E. M., R. K. Murphy, A. J. Hansen, and L. Murray. 2000. Models for guiding management of prairie bird habitat in northwestern North Dakota. *Amer Midland Natur* 144:377–392.

Marks, J. S. 1986. Nest-site characteristics and reproductive success of Long-eared Owls in southwestern Idaho. *Wilson Bull* 98:547–560.

Marks, J. S., D. L. Evans, and D. W. Holt. 1994. Long-eared Owl (*Asio otus*). In A. F. Poole and F. B. Gill (Eds.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.133

Marti, C. D. 1976. A review of prey selection by the Long-eared Owl. *Condor* 78:331–336.

Marti, C. D., J. S. Marks, T. H. Craig, and E. H. Craig. 1986. Long-eared Owl diet in northwestern New Mexico. *Southwest Nat* 31:416–419.

Martin, S. G. and T. A. Gavin. 1995. Bobolink (*Dolichonyx oryzivorus*). In A. F. Poole and F. B. Gill (Eds.). *The Birds of North America*. No. 176. The Academy of Natural Sciences, Philadelphia, and The American Ornithologists' Union, Washington, D.C.

Martin, J. W. and J. R. Parrish. 2000. Lark Sparrow (*Chondestes grammacus*). In A. F. Poole and F. B. Gill (Eds.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.488

Martz, G. F. 1967. Effects of nesting cover removal on breeding puddle ducks. *J Wildl Manage* 31:236–247.

Matthews, S., R. O'Connor, L. R. Iverson, and A. M. Prasad. 2004. Atlas of climate change effects in 150 bird species of the Eastern United States. GTR-NE-318. USDA Forest Service, Northeastern Research Station. Newtown Square, PA. 340 pp. https://www.treesearch.fs.fed.us/pubs/751

Mattsson, B. J. and R. J. Cooper. 2006. Louisiana Waterthrushes (*Seiurus motacilla*) and habitat assessments as cost-effective indicators of instream biotic integrity. *Freshwater Biol* 51:1941–1958.

Mattsson, B. J., T. L. Master, R. S. Mulvihill, and W. D. Robinson. 2009. Louisiana Waterthrush (*Parkesia motacilla*). In A. F. Poole (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.151

May, R. M. and S. K. Robinson. 1985. Population dynamics of avian brood parasitism. *Amer Nat* 126:475–494.

Mayfield, H. F. 1965. The Brown-headed Cowbird, with old and new hosts. *Living Bird* 4:13–28.

Mazur, K. M. and P. C. James. 2000. Barred Owl (*Strix varia*). In A. F. Poole and F. B. Gill (Eds.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.508

McAuley, D. G. 1986. Ring-necked Duck productivity in relation to wetland acidity: Nest success, duckling diet, and survival. M.S. Thesis, University of Maine, Orono.

McAuley, D. G., D. M. Keppie, and R. M. Whiting, Jr. 2020. American Woodcock (*Scolopax minor*). In A. F. Poole (Ed.). Version 1.0. *Birds of the World*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.amewoo.01

McCabe, R. A. 1991. *The Little Green Bird: Ecology of the Willow Flycatcher*. Rusty Rock Press, Madison, WI.

McDonald, M. V. 2013. Kentucky Warbler (*Geothlypis formosa*). In A. F. Poole (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.324

McGraw, K. J. and A. L. Middleton. 2009. American Goldfinch (*Spinus tristis*). In A. F. Poole (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.80

McKay, B. and G. A. Hall. 2012. Yellow-throated Warbler (*Setophaga dominica*). In A. F. Poole (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.223

McLachlin, R. A. 1983. Dispersion of the Western Winter Wren (*Troglodytes troglodytes*) in the coastal western hemlock forest at the University of British Columbia Research Forest in southwestern British Columbia. Ph.D. Diss., University of British Columbia, Vancouver.

McNicholl, M. K., P. E. Lowther, and J. A. Hall. 2020. Forster's Tern *(Sterna forsteri*). In A. F. Poole and F. B. Gill (Eds.). Version 1.0. *Birds of the World*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.forter.01

McRoberts, J. T., M. C. Wallace, and S. W. Eaton. 2014. Wild Turkey (*Meleagris gallopavo*). In A. F. Poole (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.22

Mechlin, L., S. Clubine, J. Dillard, L. Domke, T. French, G. Hartman, R. Thom, and T. Toney. 1991. *Species management plan for the Greater Prairie-Chicken in Missouri*. Missouri Department of Natural Resources, Jefferson City.

Middleton, A. L. 1998. Chipping Sparrow (*Spizella passerina*). In A. F. Poole and F. B. Gill (Eds.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.334

Miller, K. E. and W. E. Lanyon. 2020. Great Crested Flycatcher (*Myiarchus crinitus*). In A. F. Poole (Ed.). Version 1.0. *Birds of the World*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.grcfly.01

Miller, K. E., D. L. Leonard, Jr., C. E. Shackelford, R. E. Brown, and R. N. Conner. 2019. Red-bellied Woodpecker (*Melanerpes carolinus*). In P. G. Rodewald (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.rebwoo.02

Miller, M. R. and D. C. Duncan. 1999. The Northern Pintail in North America: Status and conservation needs of a struggling population. *Wildlife Soc Bull* 27:788–800.

Mini, A. E., E. R. Harrington, E. Rucker, B. D. Dugger, and T. B. Mowbray. 2020. American Wigeon (*Mareca americana*). In A. F. Poole (Ed.). Version 1.0. *Birds of the World*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.amewig.01

Minnesota Breeding Bird Atlas. 2019. Northern Parula (*Setophaga americana*). https://mnbirdatlas.org/species/northern-parula/

Minnesota Department of Natural Resources. 2013. *Red-necked Grebe: Minnesota DNR*. http://www.dnr.state.mn.us/forestlegacy/koochiching_washington/redneckedgrebe.html

Minnesota Department of Natural Resources. 2017. Northern Parula (*Setophaga americana*). *Minnesota Biological Survey: Breeding Bird Locations*. http://files.dnr.state.mn.us/eco/mcbs/birdmaps/northern_parula_map.pdf

Minock, M. E. and J. R. Watson. 1983. Red-winged and Yellow-headed Blackbird nesting habitat in a Wisconsin marsh. *J Field Ornithol* 54:324–326.

Mitchell, C. D. and M. W. Eichholz. 2020. Trumpeter Swan (*Cygnus buccinator*). In P. G. Rodewald (Ed.). Version 1.0. *Birds of the World*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.truswa.01

Moldenhauer, R. R. and D. J. Regelski. 2012. Northern Parula (*Setophaga americana*). In A. F. Poole (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.215

Mollhoff, W. J. 2001. *The Nebraska Breeding Bird Atlas, 1984–1989*. Nebraska Game and Parks Commission, Lincoln. 233 pp.

Mollhoff, W. J. 2016. *The Second Nebraska Breeding Bird Atlas*. Bulletin of the University of Nebraska State Museum, Volume 29. 320 pp.

Moore, F. L. 2012. Field reports—Winter 2011–2012. *Iowa Bird Life* 82:69.

Morgan, K. and B. Freedman. 1986. Breeding bird communities in a hardwood forest succession in Nova Scotia. *Can Field-Nat* 100:506–519.

Morse, D. H. 1989. *American Warblers: An Ecological and Behavioral Perspective*. Harvard University Press, Cambridge, MA.

Morton, E. S. 1982. Grading, discreteness, redundancy, and motivation-structural rules. Pp. 183–212. In D. E. Kroodsma and E. H. Miller (Eds.). *Acoustic Communication in Birds*. Vol. 1. Academic Press, New York.

Morton, J. M., J. W. Laker, T. Eskelin, and T. Bailey. 2016. *Trumpeter Swan Population Response to Management on the Kenai Peninsula, Alaska: A Historical Perspective*. The Trumpeter Swan Society 24th Conference.

Mossman, M. J. 1988. Birds of southern Wisconsin floodplain forests. *Pass Pigeon* 50:321–337.

Mossman, M. J. and K. I. Lange. 1982. *Breeding Birds of the Baraboo Hills, Wisconsin: Their History, Distribution and Ecology*. Wisconsin Department of Natural Resources and Wisconsin Society of Ornithology, Madison.

Mowbray, T. B. 1997. Swamp Sparrow (*Melospiza georgiana*). In A. F. Poole and F. B. Gill (Eds.). Version 1.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.279

Mowbray, T. B. 1999. Scarlet Tanager (*Piranga olivacea*). In A. F. Poole and F. B. Gill (Eds.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.479

Mowbray, T. B. 2020. Canvasback (*Aythya valisineria*). In A. F. Poole and F. B. Gill (Eds.). Version 1.0. *Birds of the World*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.canvas.01

Mowbray, T. B., C. R. Ely, J. S. Sedinger, and R. E. Trost. 2020. Canada Goose *(Branta canadensis*). In P. G. Rodewald (Ed.). Version 1.0. *Birds of the World*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.cangoo.01

Mueller, A. J., C. R. Loesch, D. J. Twedt. 1999. Development of management objectives for breeding birds in the Mississippi Alluvial Valley. In *Proceedings of the Partners in Flight International Workshop*, Cape May, NJ, 1–5 October 1995.

Mueller, H. 2020. Wilson's Snipe (*Gallinago delicata*). In A. F. Poole and F. B. Gill (Eds.). Version 1.0. *Birds of the World*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.wilsni1.01

Muller, M. J. and R. W. Storer. 1999. Pied-billed Grebe (*Podilymbus podiceps*). In A. F. Poole and F. B. Gill (Eds.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.410

Mulvihill, R. S., F. L. Newell, and S. C. Latta. 2008. Effects of acidification on the breeding ecology of a stream-dependent songbird, the Louisiana Waterthrush (*Seiurus motacilla*). *Freshwater Biol* 53:2158–2169.

Mumford, R. E. and C. E. Keller. 1984. *The Birds of Indiana*. Indiana University Press, Bloomington.

Murphy, M. T. and P. Pyle. 2020. Eastern Kingbird (*Tyrannus tyrannus*). In P. G. Rodewald (Ed.). Version 1.0. *Birds of the World*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.easkin.01

Murray, N. and D. Stauffer. 1995. Nongame bird use of habitat in central Appalachian riparian forests. *J Wildl Manage* 59:78–88.

National Oceanographic and Atmospheric Administration. 2020. National Centers for Environmental Information. https://www.ncdc.noaa.gov/cag/national/time-series

Natural Resources Conservation Service. 2005. *Restoring Iowa Wetlands: A snapshot of Iowa's wetland types, benefits, restoration processes and programs for land users*. NRCS Bulletin. 8 pp. Des Moines, IA.

Newton, I. 1972. *Finches*. Collins, London.

Nichols, J. D. and F. A. Johnson. 1990. Wood Duck population dynamics: A review. Pp. 83–105. In L. H. Frederickson, G. V. Burger, S. P. Havera, D. A. Graber, R. E. Kirby and T. S. Taylor (Eds.). *Proceedings of the 1988 North American Wood Duck Symposium*, St. Louis, MO.

Nickell, W. P. 1956. Vertical nest placement in the Blue-gray Gnatcatcher. *Wilson Bull* 68:159–160.

Nickell, W. P. 1966. The nesting of the Black-crowned Night Heron and its associates. *Jack Pine Warbler* 44:130–139.

Nigus, T. A. 977. A marsh nesting colony of Black-crowned Night-Herons. *Iowa Bird Life* 47:108–109.

Nolan, V., Jr. and C. F. Thompson. 1975. The occurrence and significance of anomalous reproductive activities in two North American nonparasitic cuckoos *Coccyzus* spp. *Ibis* 117:496–503.

Nolan, V., Jr., E. D. Ketterson, and C. A. Buerkle. 2014. Prairie Warbler (*Setophaga discolor*). In A. F. Poole (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.455

Norris, D. R. and B. J. M. Stutchbury. 2001. Extraterritorial movements of a forest songbird in a fragmented landscape. *Conserv Biol* 15:729–736.

Nuechterlein, G. L. and R. W. Storer. 1982. The pair formation displays of the Western Grebe. *Condor* 84:351–369.

Nyboer, R. W., J. R. Herkert, and J. E. Ebinger. 2006. *Endangered and Threatened Species of Illinois: Status and Distribution*. *Vol 2: Animals*. Illinois Endangered Species Protection Board, Springfield, Illinois.

Odell, E. A. and R. L. Knight. 2001. Songbird and medium-sized mammal communities associated with exurban development in Pitkin County, Colorado. *Conserv Biol* 15:1143–1150.

Offerdahl, S. D. and A. J. Fivizzano. 1987. The development of thermoregulation in Gray Partridge chicks. Pp. 125–128. In R. O. Kimmel, J. W. Schulz, and G. J. Mitchell (Eds.). In *Proceedings of Perdix IV: Gray Partridge Workshop*, Minnesota Department of Natural Resources, Madeley.

Otis, D. L., J. H. Schulz, D. Miller, R. E. Mirarchi, and T. S. Baskett. 2008. Mourning Dove (*Zenaida macroura*). In A. F. Poole (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.117

Palmer, R. S. 1962. *Handbook of North American Birds*. Vol. 1. Yale University Press, New Haven, CT.

Palmer-Ball, B. L., Jr. 1996. *The Kentucky Breeding Bird Atlas*. University Press of Kentucky, Lexington, KY.

Parker, J. W. 1999. Mississippi Kite (*Ictinia mississippiensis*). In A. F. Poole and F. B. Gill (Eds.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.402

Parker, J. W. and J. C. Ogden. 1979. The recent history and status of the Mississippi Kite. *American Birds* 33:119–129.

Parsons, K. C. 1994. The Arthur Kill oil spills: Biological effects to birds. Pp. 215–237. In J. Burger (Ed.). *Before and After an Oil Spill: The Arthur Kill*. Rutgers University Press, New Brunswick, NJ.

Patten, M. A. and G. W. Lasley. 2000. Range Expansion of the Glossy Ibis in North America. *North American Birds* 54:241–247.

Patterson, M. P. and L. B. Best. 1996. Bird abundance and nesting success in Iowa CRP fields: The importance of vegetation and structure and composition. *Amer Midland Natur* 135:153–167.

Payne, R. B. 1991. Alder Flycatcher. Pp. 284–285. In R. Brewer, G. A. McPeek, and R. J. Adams, Jr. (Eds.). *The Atlas of Breeding Birds of Michigan*. Michigan State University Press, East Lansing.

Payne, R. B. 1992. Indigo Bunting (*Passerina cyanea*). In A. F. Poole, P. Stettenheim, and F. B. Gill (Eds.). *The Birds of North America.* No. 4. The Academy of Natural Sciences, Philadelphia, and The American Ornithologists' Union, Washington, D.C.

Payne, R. B. 2006. Indigo Bunting (*Passerina cyanea*). In A. F. Poole (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.4

Peak, R. G. and F. R. Thompson III. 2006. Factors affecting avian species richness and density in riparian areas. *J Wildl Manage* 70:173–179.

Peck, G. K. and R. D. James. 1983. *Breeding Birds of Ontario: Nidiology and Distribution*. Vol. 1: Nonpasserines. Miscellaneous Publications of the Royal Ontario Museum, Toronto, ON, Canada.

Peck, G. K. and R. D. James. 1987. *Breeding Birds of Ontario: Nidiology and Distribution*. Vol. 2: Passerines. Miscellaneous Publications of the Royal Ontario Museum, Toronto, ON, Canada.

Peer, B. D. and E. K. Bollinger. 1997. Common Grackle (*Quiscalus quiscula*). In A. F. Poole and F. B. Gill (Eds.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.271

Peterjohn, B. G. and D. L. Rice. 1991. *The Ohio breeding bird atlas*. Department of Natural Resources, Columbus, Ohio.

Peterjohn, B. G. and J. R. Sauer. 1999. Population status of North American grassland birds from the North American Breeding Bird Survey, 1966–1996. *Stud Avian Biol* 19:27–44.

Peterjohn, B. G., J. R. Sauer, and W. A. Link. 1994. The 1992 and 1993 summary of the North American Breeding Bird Survey. *Bird Popul* 2:46–61.

Petersen, L. 1979. Ecology of great Horned Owls and Red-tailed hawks in southeastern Wisconsin. *Wisc Dep Nat Resource Tech Bull No. 111*.

Peterson, R. A. 1995. *The South Dakota Breeding Bird Atlas*. The South Dakota Ornithologists' Union, Aberdeen, SD.

Petit, L. J. 1999. Prothonotary Warbler (*Protonotaria citrea*). In A. F. Poole and F. B. Gill (Eds.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.408

Phillips, J. C. 1926. *A Natural History of the Ducks*, 4 Vol. Houghton Mifflin Co., Boston and New York. Reprinted (1986) as 2 Vol., Dover Publications, Inc., Mineola, NY.

Picman, J. and A. K. Picman. 1980. Destruction of nests by the Short-billed Marsh Wren. *Condor* 82:176–179.

Picman, J., M. L. Milks, and M. Leptich. 1993. Patterns of predation on passerine nests in marshes: Effects of water depth and distance from edge. *Auk* 110:89–94.

Pinkston, D. R. 1994. Northern Parula nest in Van Buren County. *Iowa Bird Life* 64:19–20.

Pollet, I. L., D. Shutler, J. W. Chardine, and J. P. Ryder. 2020. Ring-billed Gull *(Larus delawarensis*). In A. F. Poole (Ed.). Version 1.0. *Birds of the World*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.ribgul.01

Porneluzi, P., M. A. Van Horn, and T. M. Donovan. 2011. Ovenbird (*Seiurus aurocapilla*). In A. F. Poole (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.88

Poulin, J., É. D'Astous, M. Villard, S. J. Hejl, K. R. Newlon, M. E. McFadzen, J. S. Young, and C. K. Ghalambor. 2013. Brown Creeper (*Certhia americana*). In A. F. Poole (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.669

Poulin, R. G., L. D. Todd, E. A. Haug, B. A. Millsap, and M. S. Martell. 2011. Burrowing Owl (*Athene cunicularia*). In A. F. Poole (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.61

Praeger, W. E. 1925. The birds of the Des Moines Rapids. *Auk* 42:563–577.

Preston, C. R. and R. D. Beane. 2009. Red-tailed Hawk (*Buteo jamaicensis*). In A F. Poole (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.52

Prior, J. C. 1991. *Landforms of Iowa*. University of Iowa Press, Iowa City: For the Iowa Department of Natural Resources. xi, 153 pp.

Pruitt, L. 1996. *Henslow's Sparrow Status Assessment*. U.S. Fish and Wildlife Service, Bloomington Field Office, Bloomington, IN.

Raftovich, R. V., K. K. Fleming, S. C. Chandler, and C. M. Cain. 2019. *Migratory Bird Hunting Activity and Harvest During the 2017–18 and 2018–19 Hunting Seasons*. U.S. Fish and Wildlife Service, Laurel, Maryland, USA.

Ramsay, A. O. 1987. Thermal adaptions of the Carolina Wren. *N Am Bird Bander* 12:64.

Rands, M. R. W. 1986. Effect of hedgerow characteristics on partridge breeding densities. *J Appl Ecol* 23:479–487.

Raphael, M. G. and M. White. 1984. Use of snags by cavity-nesting birds in the Sierra Nevada. *Wildlife Monogr* 86:1–66.

Reed, J. M., L. W. Oring, and E. M. Gray. 2020. Spotted Sandpiper (*Actitis macularius*). In A. F. Poole (Ed.). Version 1.0. *Birds of the World*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.sposan.01

Reinking, D. L. 2004. *Oklahoma Breeding Bird Atlas*. University of Oklahoma Press, Norman, OK, USA.

Renfrew, R., A. M. Strong, N. G. Perlut, S. G. Martin, and T. A. Gavin. 2015. Bobolink (*Dolichonyx oryzivorus*). In P. G. Rodewald (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.176

Rising, J. D. 1987. Vesper Sparrow. Pp. 446–447. In M. D. Cadman, P. F. J. Eagles, and F. M. Helleiner (Eds.). *Atlas of the Breeding Birds of Ontario*. University of Waterloo Press, Waterloo, ON.

Rising, J. D. 1996. *A Guide to the Identification and Natural History of the Sparrows of the United States and Canada*. Academic Press, San Diego, CA.

Rising, J. D. and N. J. Flood. 1998. Baltimore Oriole (*Icterus galbula*). In A. F. Poole and F. B. Gill (Eds.). Version 1.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.384

Riske, M. E. 1976. *Environmental and human impacts on grebes breeding in central Alberta*. Ph.D. Diss., University of Calgary, Calgary.

Robbins, C. S. 1979. Effect of forest fragmentation on bird populations. Pp. 198–212. In R. M. DeGraaf and K. E. Evans (Eds.). *Management of North Central and Northeastern Forests for Nongame Birds*. U.S. Forest Service General Technical Report NC-51.

Robbins, C. S. 1980. Effect of forest fragmentation on breeding bird populations in the piedmont of the mid-Atlantic region. *Atlantic Naturalist* 33:31–36.

Robbins, C. S., D. D. Dawson, and B. A. Dowell. 1989. Habitat area requirements of breeding forest birds of the Middle Atlantic States. *Wildlife Monogr* 103:1–34.

Robbins, C. S., J. W. Fitzpatrick, P. B. Hamel. 1992. A warbler in trouble: *Dendroica cerulea*. Pp. 549–562. In J. M. Hagan III and D. W. Johnston (Eds.). *Ecology and Conservation of Neotropical Migrant Landbirds*. Smithsonian Institute Press, Washington, D.C.

Robbins, M. B. 2018. *The Status and Distribution of Birds in Missouri*. University of Kansas Biodiversity Institute, Lawrence, Kansas.

Robbins, M. B. and D. A. Easterla. 1992. *Birds of Missouri: Their Distribution and Abundance*. University of Missouri Press, Columbia, Missouri.

Robbins, S. D., Jr. 1991. *Wisconsin Birdlife: Population and Distribution, Past and Present*. University of Wisconsin Press, Madison, Wisconsin.

Roberts, C. and C. J. Norment. 1999. Effects of plot size and habitat characteristics on breeding success of Scarlet Tanagers. *Auk* 116:73–82.

Roberts, T. S. 1932. *The Birds of Minnesota*. Vol. 2. University of Minnesota Press, Minneapolis.

Robinson, J. A., J. M. Reed, J. P. Skorupa, and L. W. Oring. 2020. Black-necked Stilt (*Himantopus mexicanus*). In A. F. Poole and F. B. Gill (Eds.). Version 1.0. *Birds of the World*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.bknsti.01

Robinson, S. K., F. R. Thompson III, T. M. Donovan, D. R. Whitehead, and J. Faaborg. 1995. Regional forest fragmentation and the nesting success of migratory birds. *Science* 267:1987–1990.

Robinson, W. D. 1996. *Southern Illinois Birds: An Annotated List and Site Guide*. Southern Illinois University Press, Carbondale and Edwardsville.

Robinson, W. D. 2012. Summer Tanager (*Piranga rubra*). In A. F. Poole (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.248

Rodewald, P. G. and R. D. James. 2011. Yellow-throated Vireo (*Vireo flavifrons*). In A. F. Poole (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.247

Rodewald, P. G. and S. N. Matthews. 2005. Landbird use of riparian and upland forest stopover habitats in an urban landscape. *Condor* 107:259–268.

Rodewald, P. G., J. H. Withgott, and K. G. Smith. 2013. Pine Warbler (*Setophaga pinus*). In A. F. Poole (Ed.). Version 2.0. *The Birds of North America.* Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.438

Rohwer, F. C., W. P. Johnson, and E. R. Loos. 2020. Blue-winged Teal (*Spatula discors*). In A. F. Poole and F. B. Gill (Eds.). Version 1.0. *Birds of the World*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.buwtea.01

Romagosa, C. M. 2012. Eurasian Collared-Dove (*Streptopelia decaocto*). In A. F. Poole (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.630

Roosa, D. M. and J. Stravers 1989. Nesting of raptors uncommon in Iowa: Summary and new records. *J Iowa Acad Sci* 96:41–49.

Root, R. B. 1969. The behavior and reproductive success of the Blue-gray Gnatcatcher. *Condor* 71:16–31.

Rosenberg, K. V., J. D. Lowe, and A. A. Dhondt. 1999. Effects of forest fragmentation on breeding tanagers: a continental perspective. *Conserv Biol* 13:568–583.

Rosenberg, K. V., J. A. Kennedy, R. Dettmers, R. P. Ford, D. Reynolds, J. D. Alexander, C. J. Beardmore, P. J. Blancher, R. E. Bogart, G. S. Butcher, A. F. Camfield, A. Couturier, D. W. Demarest, W. E. Easton, J. J. Giocomo, R. H. Keller, A. E. Mini, A. O. Panjabi, D. N. Pashley, T. D. Rich, J. M. Ruth, H. Stabins, J. Stanton, and T. Will. 2016. *Partners in Flight Landbird Conservation Plan: 2016 Revision for Canada and Continental United States*. Partners in Flight Science Committee.

Rosenfield, R. N. 1984. Nesting biology of Broad-winged Hawks in Wisconsin. *Raptor Res* 18:6–9.

Rosenfield, R. N., J. Bielefeldt, R. K. Anderson, and J. M. Papp. 1991. Status Reports: Accipiters. Pp. 42–49 In B. G. Pendleton (Ed.). *Proceedings of the Midwest Raptor Management Symposium and Workshop, National Wildlife Federation*, Washington, D.C.

Rosenfield, R. N., J. Bielefeldt, L. J. Rosenfield, S. J. Taft, R. K. Murphy, and A. C. Stewart. 2002. Prevalence of *Tricomoniasis gallinea* in nestling Cooper's Hawks among three North American populations. *Wilson Bull* 114:145–147.

Roy, C. L., C. M. Herwig, W. L. Hohman, and R. T. Eberhardt. 2020. Ring-necked Duck (*Aythya collaris*). In A. F. Poole (Ed.). Version 1.0. *Birds of the World*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.rinduc.01

Rush, S. A. and B. J. M. Stutchbury. 2008. Survival of fledgling Hooded Warblers (*Wilsonia citrina*) in small and large forest fragments. *Auk* 125:183–191.

Rusch, D. H., R. A. Malecki and R. E. Trost. 1995. Canada Geese in North America. Pp. 26–28. In E. T. Laroe, G. S. Farris, C. E. Pukett, P. D. Doran, and M. J. Mae (Eds.). *Our Living Resources*. U.S. Department of the Interior, National Biological Services, Washington, D.C.

Rusch, D. H., S. Destefano, M. C. Reynolds, and D. Lauten. 2000. Ruffed Grouse (*Bonasa umbellus*). In A. F. Poole and F. B. Gill (Eds.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.515

Ryder, R. A. and D. E. Manry. 2020. White-faced Ibis (*Plegadis chihi*). In A. F. Poole and F. B. Gill (Eds.). Version 1.0. *Birds of the World*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.whfibi.01

Sample, D. W. and M. J. Mossman. 1997. *Managing Habitat for Grassland Birds—A Guide for Wisconsin*. Wisconsin Department of Natural Resources, Madison, WI. PUBL-SS-925-97.

Sauer, J. R. and J. B. Bortner. 1991. Population trends from the American Woodcock singing-ground survey, 1970–88. *J Wildl Manage* 55:300–312.

Sauer, J. R., J. E. Hines, and J. Fallon. 2005. *The North American Breeding Bird Survey, Results and Analysis 1966–2004*. Version 2005.2. USGS Patuxent Wildlife Research Center, Laurel, MD.

Sauer, J. R., J. E. Hines, J. E. Fallon, K. L. Pardieck, D. J. Ziolkowski, Jr., and W. A. Link. 2012. *The North American Breeding Bird Survey, Results and Analysis 1966–2011*. Version 07.03.2013. USGS Patuxent Wildlife Research Center, Laurel, MD.

Sauer, J. R., D. K. Niven, J. E. Hines, D. J. Ziolkowski, Jr., K. L. Pardieck, J. E. Fallon, and W. A. Link. 2017. *The North American Breeding Bird Survey, Results and Analysis 1966–2015*. Version 2.07.2017. USGS Patuxent Wildlife Research Center, Laurel, MD.

Scharf, W. C. 1981. The significance of deteriorating man-made island habitats to Common Tern and Ring-billed Gulls in the St. Mary's River, Michigan. *Colon Waterbird* 4:155–159.

Scharf, W. C. and J. Kren. 2010. Orchard Oriole (*Icterus spurius*). In A. F. Poole (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.255

Schramm, P., D. S. Schramm, and S. G. Johnson. 1986. Seasonal phenology and habitat selection of the Sedge Wren *Cistothorus platensis* in a restored tallgrass prairie. *Proceedings of the North America Prairie Conference* 9:95–99.

Schroeder, M. A. and C. E. Braun. 1993. Partial migration in a population of Greater Prairie-Chickens in northeastern Colorado. *Auk* 110:21–28.

Schroeder, R. L. 1985. *Habitat suitability index models: Pine Warbler*. U.S. Fish and Wildlife Service Biological Report 82.

Schulz, J. H., X. Gao, J. J. Millspaugh, and A. J. Bermudez. 2009. Acute lead toxicosis and experimental lead pellet ingestion in Mourning Doves. Extended abstract in R. T. Watson, M. Fuller, M. Pokras, and W. G. Hunt (Eds.). *Ingestion of Lead from Spent Ammunition: Implications for Wildlife and Humans*. The Peregrine Fund, Boise, Idaho, USA. DOI 10.4080/ilsa.2009.0203

Sedgwick, J. A. 1997. Sequential cavity use in a cottonwood bottomland. *Condor* 99:880–887.

Sedgwick, J. A. 2000. Willow Flycatcher (*Empidonax traillii*). In A. F. Poole and F. B. Gill (Eds.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.533

Sedgwick, J. A. and W. M. Iko. 1999. Costs of Brown-headed Cowbird parasitism to Willow Flycatchers. *Stud Avian Biol* 18:167–181.

Sedgwick, J. A. and F. L. Knopf. 1990. Habitat relationships and nest site characteristics of cavity-nesting birds in cottonwood floodplains. *J Wildl Manage* 54:112–124.

Shake, C. S., C. E. Moorman, J. D. Riddle, and M. R. Burchell II. 2012. Influence of patch size and shape on occupancy by shrubland birds. *Condor* 114:268–278.

Sharpe, R. S., W. R. Silcock, and J. G. Jorgensen. 2001. *Birds of Nebraska: Their Distribution and Temporal Occurrence*. The University of Nebraska Press, Lincoln.

Shepherd, S. 2013. Greater Prairie Chicken Restoration. Pp. 27–54. In P. Fritzell, T. Litchfield, T. Gosselink, V. Evelsizer, O. Jones, T. Bogenschutz, P. Schlarbaum, B. Ehresman, D. Hoffman, S. Shepherd, and C. Jennelle. *Trends in Iowa Wildlife Populations and Harvest: 2012*. Iowa Department of Natural Resources, Des Moines.

Sherman, A. R. 1952. The home life of the Chimney Swift. Pp. 40–61. In *Birds of an Iowa Dooryard*. Christopher Publishing House, Boston, MA.

Sherry, T. W., R. T. Holmes, P. Pyle, and M. A. Patten. 2016. American Redstart (*Setophaga ruticilla*). In P. G. Rodewald (Ed.). Version 3.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.amered.03

Shimek, B. 1948. The plant geography of Iowa. *Univ Iowa Studies Nat Hist* 18(4).

Sieh, J. 1962. Bufflehead breeding in Iowa. *Iowa Bird Life* 32:85.

Silcock, W. R. 1984. First nesting of Cattle Egret and Little Blue Heron for Iowa. *Iowa Bird Life* 54:101–103.

Silcock, W. R. 2020. First Iowa Breeding Record of Black-bellied Whistling Duck. *Iowa Bird Life* 90:1–3.

Silcock, W. R., and J. G. Jorgensen. 2018. Northern Parula (*Setophaga americana*). Version 1.0. In Birds of Nebraska—Online. www.BirdsofNebraska.org

Silcock, W. R. and J. G. Jorgensen. 2019. Birds of Nebraska—Online. www.BirdsofNebraska.org

Skagen, S. K. and F. L. Knopf. 1993. Towards conservation of midcontinental shorebird migrations. *Conserv Biol* 7:533–541.

Skinner, R. M. 1975. Grassland use patterns and prairie bird populations in Missouri. Pp. 171–180. In M. K. Wali (Ed.). *Prairie: A Multiple View*. University of North Dakota Press, Grand Forks.

Smallwood, J. A. and D. M. Bird. 2002. American Kestrel (*Falco sparverius*). In A. F. Poole and F. B. Gill (Eds.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.602

Smith, C. R. 1992. Henslow's Sparrow, *Ammodramus henslowii*. Pp. 315–330. In K. J. Schneider and D. M. Pence (Eds.). *Migratory nongame birds of management concern in the Northeast*. U.S. Fish and Wildlife Service, Newton Corner, Massachusetts.

Smith, C. R., D. M. Pence, and R. J. O'Connor. 1993. Status of neotropical migratory birds in the northeast: A preliminary assessment. Pp. 172–188. In D. M. Finch and P. W. Stangel (Eds.). *Status and Management of Neotropical Migratory Birds*. U.S. Forest Service General Technical Report RM-229, Fort Collins, CO.

Smith, K. G. 1986. Winter population dynamics of three species of mast-eating birds in the eastern United States. *Wilson Bull* 98:407–418.

Smith, K. G. and D. R. Petit. 1988. Breeding birds and forestry practices in the Ozarks: Past, present, and future relationships. *Bird Conserv* 3:23–49

Smith, K. G., K. A. Tarvin, and G. E. Woolfenden. 2013. Blue Jay (*Cyanocitta cristata*). In A. F. Poole (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.469

Smith, K. G., J. H. Withgott, and P. G. Rodewald. 2000. Red-headed Woodpecker (*Melanerpes erythrocephalus*). No. 518. In A. F. Poole and F. B. Gill (Eds.). *The Birds of North America*. The Birds of North America, Inc., Philadelphia, PA.

Smith, K. G., S. R. Wittenberg, R. B. Macwhirter, and K. L. Bildstein. 2011. Hen/Northern Harrier (*Circus cyaneus/hudsonius*). In A. F. Poole (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.210

Smith, S. M. 1991. *The Black-capped Chickadee: Behavioral Ecology and Natural History*. Cornell University Press, Ithaca, NY.

Sodhi, N. S., P. C. James, I. G. Warkentin, and L. W. Oliphant. 1992. Breeding ecology of urban Merlins (*Falco columbarius*). *Can J Zool* 70:1477–1483.

Sordahl, T. A. 1984. Observations on breeding site fidelity and pair formation in American Avocets and Black-necked Stilts. *North American Bird Bander* 9:8–11.

South Dakota Game, Fish and Parks. 2020. *South Dakota Breeding Bird Atlas II*. https://gfp.sd.gov/breeding-bird-atlas/

Stallman, H. R. and L. B. Best. 1996. Bird use of an experimental strip intercropping system in northeast Iowa. *J Wildl Manage* 60:354–362.

Staudt, A. 2016. *Wetlands: By the Numbers*. Iowa Learning Farms. https://iowalearningfarms.wordpress.com/2016/05/17/wetlands-by-the-numbers/

Stedman, S. J. 2020. Horned Grebe (*Podiceps auritus*). In S. M. Billerman (Ed.). Version 1.0. *Birds of the World*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.horgre.01

Steeves, T. K., S. B. Kearney-McGee, M. A. Rubega, C. L. Cink, and C. T. Collins. 2014. Chimney Swift (*Chaetura pelagica*). In A. F. Poole (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.646

Stein, R. C. 1958. The behavioral, ecological, and morphological characteristics of two populations of the Alder Flycatcher, *Empidonax traillii* (Audubon). *N.Y. State Mus Sci Serv Bull* 371.

Stempel, M. E. and S. Rodgers, Jr. 1961. History of prairie chickens in Iowa. *Proc Iowa Acad Sci* 68:314–322.

Stephens, T. C. 1930. Bird records of two winters, 1920–1922, in the upper Missouri valley. *Proc Iowa Acad Sci* 37:357–366.

Stoner, D. 1922. On the eastward movement of magpies. *Wilson Bull* 34:44–45.

Stout, B. E. and G. L. Nuechterlein. 1999. Red-necked Grebe (*Podiceps grisegena*). In A. F. Poole and F. B. Gill (Eds.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.465

Straight, C. A. and R. J. Cooper. 2012. Chuck-will's-widow (*Antrostomus carolinensis*). In A. F. Poole (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.499

Stravers, J. W. 1989. *Report on the Status of the Red-shouldered Hawk in Iowa*. Unpublished Nongame Report, Iowa Department of Natural Resources, Des Moines.

Stravers, J. W. 1992. *Surveys for nesting Red-shouldered Hawks within Pools 9–11 and 16–19 of the Upper Mississippi River Valley*. Unpublished Nongame Report. Iowa Department of Natural Resources, Des Moines.

Stutchbury, B. J. 1994. Competition for winter territories in a Neotropical migrant: The role of age, sex and color. *Auk* 111:63–69.

Svedarsky, W. D. 1988. Reproductive ecology of female Greater Prairie-Chickens in Minnesota. Pp. 193–239. In A. T. Bergerud and M. W. Gratson (Eds.). *Adaptive Strategies and Population Ecology of Northern Grouse*. Vol. I. University of Minnesota Press, Minneapolis.

Svingen, P. H. 2001. Western Great Lakes Region. *North American Birds* 55:435–438.

Tarbell, A. T. 1983. A yearling helper with a Tufted Titmouse brood. *J Field Ornithol* 54:89.

Tarof, S. and J. V. Briskie. 2008. Least Flycatcher (*Empidonax minimus*). In A. F. Poole (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.99

Tarof, S. A., B. J. M. Stutchbury, W. H. Piper, and R. C. Fleischer. 1998. Does breeding density covary with extra-pair fertilizations in Hooded Warblers? *J Avian Biol* 29:145–154.

Tate, G. R. 1992. Short-eared Owl (*Asio flammeus*). Pp. 171–189. In K. J. Schneider and D. M. Pence (Eds.). *Migratory Nongame Birds of Management Concern in the Northeast*. U.S. Fish and Wildlife Service, Newton Corner, MA.

Telfair, R. C., II. 2019. Cattle Egret (*Bubulcus ibis*). In P. G. Rodewald (Ed.). Version 3.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.categr.03

Telfair, R. C., II and M. L. Morrison. 2020. Neotropic Cormorant (*Phalacrocorax brasilianus*). In P. G. Rodewald and B. K. Keeney (Eds.). Version 2.0. *Birds of the World*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.neocor.02

Temple, S. A. 2002. Dickcissel (*Spiza americana*). In A. F. Poole and F. B. Gill (Eds.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.703

Temple, S. A. 2006a. Blue-winged Warbler. In N. J. Cutright, B. R. Harriman, and R. W. Howe (Eds.). *Atlas of the Breeding Birds of Wisconsin*. The Wisconsin Society for Ornithology, Inc. 602 pp.

Temple, S. A. 2006b. Yellow-bellied Sapsucker. In N. J. Cutright, B. R. Harriman, and R. W. Howe (Eds.). *Atlas of the Breeding Birds of Wisconsin*. The Wisconsin Society for Ornithology, Inc. 602 pp.

Tewksbury, J. J., S. J. Hejl, and T. E. Martin. 1998. Breeding productivity does not decline with increasing fragmentation in a western landscape. *Ecology* 79:2890–2903.

The Loess Hills Alliance. 2011. *The Loess Hills of Western Iowa: Common Vision and Comprehensive Plan*.

The Trumpeter Swan Society. 2015. *Trumpeter Swan Restoration*. https://www.trumpeterswansociety.org/file_download/inline/be524e6d-e5b2-4b09-905f-dfbdd9179c2c

Thompson, B. C., J. A. Jackson, J. Burger, L. A. Hill, E. M. Kirsch, and J. L. Atwood. 2020. Least Tern (*Sternula antillarum*). In A. F. Poole and F. B. Gill (Eds.). Version 1.0. *Birds of the World*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.leater1.01

Thompson, C. F. and V. Nolan, Jr. 1973. Population biology of the Yellow-breasted Chat (*Icteria virens L.*) in southern Indiana. *Ecol Monogr* 43:145–171.

Thompson, F. R., III, M. B. Robbins, and J. A. Fitzgerald. 2012. Landscape-level forest cover is a predictor of Cerulean Warbler abundance. *Wilson J Ornithol* 124:721–727.

Thompson, F. R., III, S. J. Lewis, J. Green, and D. Ewert. 1993. Status of Neotropical migrant landbirds in the Midwest: Identifying species of management concern. Pp. 145–158. In D. M. Finch and P. W. Stangel (Eds.). *Status and Management of Neotropical Birds*. U.S. Department of Agriculture Forest Service General Technical Report RM–229.

Thompson, F. R., III, S. K. Robinson, D. R. Whitehead, and J. D. Brawn. 1996. Management of central hardwood landscapes for the conservation of migratory birds. Pp. 117–143. In F. R. Thompson III (Ed.). *Management of Midwestern Landscapes for the Conservation of Neotropical Migratory Birds*. U.S. Department of Agriculture General Technical Report NC–187.

Toland, B. 1983. The ecology and biology of the American Kestrel. M.S. Thesis, University of Missouri–Columbia. 181 pp.

Toland, B. 1985. Nest site selection, productivity, and food habits of Northern Harriers in southwest Missouri. *Nat Areas J* 5:22–27.

Trost, C. H. 1999. Black-billed Magpie (*Pica hudsonia*). In A. F. Poole and F. B. Gill (Eds.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.389

Trost, C. H. and C. L. Webb. 1986. Egg moving by two species of corvid. *Anim Behav* 34:294–295.

Tuttle, R. M. 1991. Analysis of the interspecific competition of Eastern Bluebirds, Tree Swallows, and House Wrens in Delaware State Park, Delaware, Ohio, 1979–1986. *Sialia* 13:3–13.

Twedt, D. J. and R. D. Crawford. 1995. Yellow-headed Blackbird (*Xanthocephalus xanthocephalus*). In A. F. Poole and F. B. Gill (Eds.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.192

Tyler, W. M. 1948. Red-breasted Nuthatch. Pp. 22–35. In A. C. Bent (Ed.) Life histories of North American nuthatches, wrens, thrashers, and their allies. *U.S. Natl Mus Bull* 195.

Ubias, R., C. W. Lundy, and S. J. Dinsmore. 2014. Least Terns nesting in southwestern Iowa. *Iowa Bird Life* 84:145–147.

U.S. Army Corps of Engineers. 2020. Missouri River Recovery Program. https://www.nwo.usace.army.mil/MRRP/

U.S. Department of Agriculture. 1996. Iowa agricultural statistics. Des Moines, Iowa. www.usda.gov/nass/

U.S. Department of Agriculture. 2012. National Agricultural Statistics Service. Quick Stats 2.0. http://quickstats.nass.usda.gov/ (August 2013)

U.S. Fish and Wildlife Service. 1994. 1994 update to the North American Waterfowl Management Plan. U.S. Department of the Interior, Washington, D.C. 47 pp.

U.S. Fish and Wildlife Service. 2007. Migratory bird hunting activity and harvest during the 2005 and 2006 hunting seasons: Preliminary estimates. U.S. Dept. of the Interior, Washington, D.C.

U.S. Geological Survey. 1999. Ecological status and trends of the Upper Mississippi River System 1998: A report of the Long-Term Resource Monitoring Program. U.S. Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse, Wisconsin. April 1999. LTRMP 99–T001. 236 pp.

U.S. Geological Survey. 2020. North American Breeding Bird Survey. Patuxent Wildlife Research Center, Laurel, MD. https://www.pwrc.usgs.gov/bbs/.

U.S. Shorebird Conservation Plan Partnership. 2016. U.S. Shorebirds of Conservation Concern—2016. http://www.shorebirdplan.org/science/assessment-conservation-status-shorebirds/

Van Horn, M. A., R. M. Gentry, and J. Faaborg. 1995. Patterns of Ovenbird (*Seiurus aurocapillus*) pairing success in Missouri forest tracts. *Auk* 112:98–106.

Van Rees-Siewert, K. L. and J. J. Dinsmore. 1996. Influence of wetland age on bird use of restored wetlands in Iowa. *Wetlands* 16:577–582.

Varland, D. E. and T. M. Loughin. 1993. Reproductive success of American Kestrels nesting along an interstate highway in central Iowa. *Wilson Bull* 105:465–474.

Varland, D. E., E. E. Klaas, and T. M. Loughin. 1991. Development of foraging behavior in the American Kestrel. *J Raptor Res* 25:9–17.

Verbeek, N. A. and C. Caffrey. 2002. American Crow (*Corvus brachyrhynchos*). In A. F. Poole and F. B Gill (Eds.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.647

Verner, J. 1964. Evolution of polygamy in the Long-billed Marsh Wren. *Evolution* 18:252–261.

Verner, J. 1965. Breeding biology of the Long-billed Marsh Wren. *Condor* 67:6–30.

Verner, J. 1975. Interspecific aggression between Yellow-headed Blackbirds and Long-billed Marsh Wrens. *Condor* 77:328–331.

Verner, J. and G. H. Engelsen. 1970. Territories, multiple nest building, and polygyny in the Long-billed Marsh Wren. *Auk* 87:557–567.

Vickery, P. D. 1996. Grasshopper Sparrow (*Ammodramus savannarum*). In A. F. Poole and F. B. Gill (Eds.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.239

Villard, M. A., M. K. Trzcinski, and G. Merriam. 1999. Fragmentation effects on forest birds: Relative influence of woodland cover and configuration on landscape occupancy. *Conserv Biol* 13:774–783.

Vitz, A. C., L. A. Hanners, and S. R. Patton. 2013. Worm-eating Warbler (*Helmitheros vermivorum*). In A. F. Poole (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.367

Walk, J. W. nd T. L. Esker. 2001. Coming soon to a town near you…Eurasian Collared-Doves are showing up in towns throughout Illinois. *Illinois Audubon* Summer 2001:4–7.

Walk, J. W., A. Mankowski, T. L. Esker, M. Cole, and M. G. Alessi. 2010a. *The Illinois Barn Owl Recovery Plan*. USFWS State Wildlife Grant Program Report T-35-P-1.

Walk, J. W., M. P. Ward, T. J. Benson, J. L. Deppe, S. A. Lischka, S. D. Bailey, and J. D. Brawn. 2010b. *Illinois Birds: A century of change.* Illinois Natural History Survey Publication 31.

Walkinshaw, L. H. 1966. Summer observations of the Least Flycatcher in Michigan. *Jack-Pine Warbler* 44:150–168.

Walkinshaw, L. H. 1978. *Life history of the eastern Field Sparrow in Calhoun County, Michigan*. University Microfilm International, Ann Arbor, MI.

Walkinshaw, L. H. 1983. Kirtland's Warbler: The natural history of an endangered species. *Cranbrook Inst Sci* 58.

Wallendorf, M. J., P. A. Porneluzi, N. K. Gram, R. L. Clawson, and J. Faaborg. 2007. Bird response to clear cutting in Missouri Ozark Forests. *J Wildl Manage* 71:1899–1905.

Walsh, P. J. 1996. Notes on a Mississippi Kite nest in central Iowa. *Iowa Bird Life* 66:1-10.

Walters, E. L., E. H. Miller, and P. E. Lowther. 2002. Yellow-bellied Sapsucker (*Sphyrapicus varius*). In A. F. Poole and F. B. Gill (Eds.). *The Birds of North America*. No. 662. The Birds of North America, Inc., Philadelphia, PA.

Waltz, T. J. 1994. Ring-billed Gulls nesting in Dickinson County. *Iowa Bird Life* 64:117.

Ward, M. P. 2005. The role of immigration in the decline of an isolated migratory bird population. *Conserv Biol* 19:1528–1536.

Warkentin, I. G., N. S. Sodhi, R. H. M. Espie, A. F. Poole, L. W. Oliphant, and P. C. James. 2005. Merlin (*Falco columbarius*). In A. F. Poole (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.44

Warnock, N. and S. E. Schwarzbach. 1995. Incidental kill of Dunlin and Killdeer by strychnine. *J Wildl Dis* 31:566–569.

Warters, M. E. 1960. Red-breasted Nuthatches nest in Des Moines. *Iowa Bird Life* 30:17.

Watts, B. D. 1996. Landscape configuration and diversity hotspots in wintering sparrows. *Oecologia* 108:512–517.

Watts, B. D. 2011. Yellow-crowned Night-Heron (*Nyctanassa violacea*). In A. F. Poole (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.161

Weatherhead, P. J. and J. R. Bider. 1979. Management options for blackbird problems in agriculture. *Phytoprotection* 60:145–155.

Webster, J. D. 1986. *Certhia americana* Bonaparte. Pp. 195–212. In A. R Phillips (Ed.). *The Known Birds of North and Middle America*. A. R. Phillips, Denver, CO.

Wedgwood, J. A. 1991. *Common Nighthawks in Saskatoon*. Saskatchewan Natural History Society. Regina.

Weidensaul, S., T. R. Robinson, R. R. Sargent, and M. B. Sargent. 2013. Ruby-throated Hummingbird (*Archilochus colubris*). In A. F. Poole (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.204

Weller, M. W. 1959. Parasitic egg laying in Redhead (*Aythya americana*) and other North American Anatidae. *Ecol Monogr* 29:333–365.

Weller, M. W., L. H. Fredrickson, and F. W. Kent. 1963. Small mammal prey of some owls wintering in Iowa. *Iowa State J Sci* 38:151–160.

Wells, J. V. 2007. *Birder's Conservation Handbook: 100 North American Birds at Risk*. Princeton University Press, Princeton, NJ.

Welter, W. A. 1935. The natural history of the Long-billed Marsh Wren. *Wilson Bull* 47:3–34.

Wenny, D. G., R. L. Clawson, J. Faaborg, and S. L. Sheriff. 1993. Population density, habitat selection, and minimum area requirements of three forest interior warblers in central Missouri. *Condor* 95:968–979.

Wheelwright, N. T. and J. D. Rising. 2008. Savannah Sparrow (*Passerculus sandwichensis*). In A. F. Poole (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.45

Whitcomb, B. L., R. F. Whitcomb, and D. Bystrak. 1977. Long-term turnover and effects of selective logging on the avifauna of forest fragments. *American Birds* 31:17–23.

Whitcomb, R. F., C. S. Robbins, J. F. Lynch, M. K. Klimkiewicz, B. L. Whitcomb, and D. Bystrak. 1981. Effects of forest fragmentation on avifauna of the eastern deciduous forest. Pp. 125–206. In R. L. Burgess and D. M. Sharp (Eds.). *Forest Island Dynamics in Man-dominated Landscapes*. Ecol Stud No. 41. Springer-Verlag, NY.

White, C. M., N. J. Clum, T. J. Cade, and W. G. Hunt. 2002. Peregrine Falcon (*Falco peregrinus*). In A. F. Poole and F. B. Gill (Eds.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.660

Whitehead, D. R. and T. Taylor. 2002. Acadian Flycatcher (*Empidonax virescens*). In A. F. Poole and F. B. Gill (Eds.). Version 1.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.614

Widman, O. 1907. *A Preliminary Catalog of the Birds of Missouri*. Academy of Science, St. Louis, Missouri. 288 pp.

Wiebe, K. L. and W. S. Moore. 2017. Northern Flicker (*Colaptes auratus*). In P. G. Rodewald (Ed.). Version 2.1. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.norfli.02.1

Wiedenfeld, D. A. and M. M. Swan. 2000. *Louisiana Breeding Bird Atlas*. Louisiana State University, Louisiana Sea Grant College Program, Baton Rouge, LA.

Wiens, J. A. 1969. An approach to the study of ecological relationships among grassland birds. *Ornithol Monogr* No. 8.

Wiens, J. A. 1973. Inter-territorial habitat variation in Grasshopper and Savannah Sparrows. *Ecology* 54:877–884.

Wiggins, D. A., D. W. Holt, and S. M. Leasure. 2006. Short-eared Owl (*Asio flammeus*). In A. F. Poole (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.62

Wilcove, D. 1990. A quiet exit. *Living Bird* 9:10–11.

Willson, M. F. 1967. Notes on the interspecific behavior relationships of marsh-nesting passerines. *Auk* 84:118–120.

Wilson, B. L., L. Padelford, and B. Padelford. 1983. Piping Plover nests in Pottawattamie Co. *Iowa Bird Life* 53:69–70.

Wilson, L. K., J. E. Elliott, K. M. Langelier, A. M. Scheuhammer, and V. Bowes. 1998. Lead poisoning of Trumpeter Swans, *Cygnus buccinator*, in British Columbia, 1976–1994. *Canadian Field-Naturalist* 112:204–211.

Wilson, S. G. 1985. Summer distribution of Whip-poor-wills in Minnesota. *Loon* 57:6–8.

Winkler, D. W., K. K. Hallinger, D. R. Ardia, R. J. Robertson, B. J. Stutchbury, and R. R. Cohen. 2011. Tree Swallow (*Tachycineta bicolor*). In A. F. Poole (Ed.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.11

Wisconsin Department of Natural Resources. 2005. *Wisconsin's Strategy for Wildlife Species of Greatest Conservation Need: A State Wildlife Action Plan*. Madison, WI. http://www.dnr.state.wi.us/org/land/er/wwap/explore/

Wisconsin Society for Ornithology. 2020. *Wisconsin Breeding Bird Atlas II*. https://wsobirds.org/what-we-do/atlas

Woodin, M. C. and T. C. Michot. 2020. Redhead (*Aythya americana*). In A. F. Poole and F. B. Gill (Eds.). Version 1.0. *Birds of the World*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.redhea.01

Woodward, P. W. 1983. Behavioral ecology of fledgling Brown-headed Cowbirds and their hosts. *Condor* 85:151–163.

Wright, C. K. and M. C. Wimberly. 2013. Recent land use change in the western corn belt threatens grasslands and wetlands. *Proc Natl Acad Sci* 110:4134–4139.

Wunderle, J. M., Jr. and R. B. Waide. 1993. Distribution of overwintering Nearctic migrants in the Bahamas and Greater Antilles. *Condor* 95:904–933.

Wyatt, V. E. and C. M. Francis. 2002. Rose-breasted Grosbeak (*Pheucticus ludovicianus*). In A. F. Poole and F. B. Gill (Eds.). Version 2.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.692

Yahner, R. H. 2003. Responses of bird communities to early successional habitat in a managed landscape. *Wilson Bull* 115:292–298.

Yasukawa, K. and W. A. Searcy. 1995. Red-winged Blackbird (*Agelaius phoeniceus*). In A. F. Poole and F. B. Gill (Eds.). Version 1.0. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.184

Yeager, L. E. 1955. Two woodpecker populations in relation to environmental change. *Condor* 57:148–153.

Yosef, R. 1996. Loggerhead Shrike (*Lanius ludovicianus*). In A. F. Poole and F. B. Gill (Eds.). Version 2.0. The *Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.231

Young, H. G., S. J. Tonge, and J. P. Hume. 1997. Review of Holocene wildfowl extinctions. *Wildfowl* 47:166–180.

Youngworth, W. 1930. Breeding of the Least Tern in Iowa. *Wilson Bull* 42:102–103.

Youngworth, W. 1959. The Lazuli Bunting along the western border of Iowa: A summary. *Iowa Bird Life* 29:3–5.

Zaletel, L. R. F. and J. J. Dinsmore. 1985. Breeding bird populations of Iowa, 1968–1990. *Proc Iowa Acad Sci* 92:85–94.

Zenner, G. G. and T. G. LaGrange. 1991. Land of the giants. *Iowa Conserv* 50:28–31.

Zimmerman, J. L. and E. J. Finck. 1989. Philopatry and correlates of territory fidelity in male Dickcissels. *N Am Bird Bander* 14:83–85.
Ziolkowski, D., Jr., K. Pardieck, and J. R. Sauer. 2010. On the road again for a bird survey that counts. *Birding* 42:32-40.
Zohrer, J. J. 2005. Securing a future for fish and wildlife: A conservation legacy for Iowans. *The Iowa Wildlife Action Plan*. Iowa Department of Natural Resources, Des Moines, IA. 344 pp.
Zurdeeg, W. 2007. Burrowing Owl in Scott County. *Iowa Bird Life* 77:36–37.

Nest of Gray Catbird
Photo: Wolfgang Oesterreich

Eastern Bluebird Fledgling
Photo: Wolfgang Oesterreich

Brown Thrasher Fledgling
Photo: Wolfgang Oesterreich

Nest of Brown Thrasher
Photo: Wolfgang Oesterreich

2008-2012

BREEDING BIRD ATLAS II

BBA II Artwork by Christopher Caster
Henslow's Sparrows
Indiangrass Hills, Iowa County