



THE IOWA WILDLIFE ACTION PLAN



Securing a Future for Fish and Wildlife

A Conservation Legacy for Iowans



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The Iowa Wildlife Action Plan

2025

Iowa Department of Natural Resources

Kayla Lyon, Director



To love a place is not enough. We must find ways to heal it.

— Robin Wall Kimmerer

Iowa Wildlife Action Plan

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Katy Fullin

Iowa Wildlife Action Plan Manager, 2025

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Chapter One

A Need for Comprehensive Wildlife Conservation

Required Element #8: Each State's provisions to provide the necessary public participation in the development, revision, and implementation of its Strategy.

Background

The North American Model of Wildlife Conservation

Wildlife conservation frameworks in the United States and Canada share several distinct features and were developed as a result of the unique circumstances of the establishment of these nations. Collectively these frameworks are referred to as the *North American Model of Wildlife Conservation* (hereafter referred to as the Model). The democratic principles that shaped the U.S. also extended to the realm of wildlife ownership and management as the European notion of a landowner also owning the wildlife inhabiting the land was discarded in favor of a belief that wildlife are held in the public trust. The history, foundational principles, challenges to, and future of the Model are thoughtfully presented in a technical review developed by The Wildlife Society and the Boone and Crockett Club (Organ et al. 2012). The Model is founded upon seven principles, or pillars (Box 1-1). The underlying foundation of the Model is the Public Trust Doctrine.

Box 1-1

Pillars of the North American Model of Wildlife Conservation

1. Wildlife resources are a public trust.
2. Markets for game are eliminated.
3. Allocation of wildlife is by law.
4. Wildlife can be killed only for legitimate purposes.
5. Wildlife is considered an international resource.
6. Science is the proper tool to discharge wildlife policy.
7. Democracy of hunting is standard.

The Public Trust Doctrine

The Public Trust Doctrine asserts the idea that certain resources, including wildlife, are owned by no one and are held in trust by the government for the benefit of present and future generations. This doctrine is at the root of this Plan. The Public Trust Doctrine stems from early Greek and Roman law, was reaffirmed by the English Magna Carta in 1215, and later redefined in English common law in 1641, which was subsequently applied to the 13 British Colonies (Batcheller et al. 2010). After U.S. independence, the Doctrine was first upheld by the U.S. Supreme Court in "Martin v. Waddell," an 1842 decision that declared that the public held a common right to certain resources. More recent case law has upheld and expanded the reach of the Doctrine, although its extent varies among states. For a review of the Public Trust Doctrine as it relates to wildlife conservation and management, see Batcheller et al. (2010).

In the U.S., fish and wildlife management responsibility is shared by the Federal government and State, Tribal, and Territorial governments. Through the Public Trust Doctrine, states are trustees of wildlife except in instances where the Constitution provided for federal oversight.

Traditional Funding Model for Wildlife Conservation in the U.S.

Since the development of modern-day wildlife management in the 1930s, the funding model for wildlife conservation in the U.S. has been heavily reliant upon sportsmen and women. This relationship is described by Organ et al. (2012):

"From the earliest days of active management and enforcement by nascent state fish and wildlife agencies, hunters, anglers, and trappers have funded restoration and conservation initiatives. License and permit fees, a motor boat fuels tax, and excise taxes on hunting, shooting sports, and angling products provide dedicated funding for habitat conservation, harvest management, research, restoration, and monitoring initiatives by state agencies. The excise tax programs have permanent, indefinite appropriation status, which means that the revenues are automatically distributed to the states each year and not subject to congressional whim."

To learn more about how conservation is funded in the U.S., please visit the [Association of Fish & Wildlife Agencies \(AFWA\)](#) webpage dedicated to the subject.

Efforts to Modernize the Funding Model for Wildlife Conservation

This funding model served wildlife conservation well for many decades and led to the successful restoration of many species of wildlife as well as the habitats upon which they depend. However, as participation in hunting and angling declines have been observed over the long term, it has become increasingly clear that the reliance upon sportsmen and women for conservation of all wildlife is insufficient and unsustainable. Furthermore, as all wildlife, not just game and sportfish species, are held in the public trust, the fairness of the funding system has been questioned.

Sustainable Funding Initiatives

Since the 1980s, state fish and wildlife agencies have struggled to meet an increasing number of constituent demands while facing larger and more complex threats to the natural world, while relying on a funding model which was developed in large part to restore populations of sportfish and game. As the scientific fields of Wildlife and Fisheries Management, Conservation Biology, Landscape Ecology, Global Change Biology and Human Dimensions of Wildlife Conservation advanced and matured, the complexity of the conservation issues faced by State Fish and Wildlife Agencies was increasingly recognized. The need for management attention to nongame species and to functioning ecosystems became increasingly apparent. In the 1990s, in response to these increased challenges, the Association of Fish and Wildlife Agencies (AFWA) initiated the Teaming With Wildlife (TWW) coalition on behalf of State Fish and Wildlife Agencies. This coalition sought sustainable, dedicated funding for fish and wildlife conservation at the national level. In the 1990s, the coalition focused on the creation of an excise tax on birding, hiking, camping, and other recreational equipment, one that would mirror and build from the success of long established excise taxes for hunting, shooting sports, and angling equipment. However, some members of the outdoor recreation industry opposed the effort and it failed to gain support in Congress.

Starting in 1996, the TWW coalition made a second large-scale attempt to find dedicated funding for all wildlife, this time based on the use of offshore oil and gas lease funds. The Conservation and Reinvestment Act (CARA) would have generated \$350 million annually for wildlife conservation nationwide; approximately \$4.5 million would have been Iowa's share. In 2001, CARA was passed in the House and had widespread support in the Senate. Ultimately, however, the measure failed. Instead, a vastly smaller, one-time appropriation for state wildlife diversity programs was enacted, called the Wildlife Conservation and Restoration Program (WCRP). Beginning in 2002, a similar program was enacted, called the State and Tribal Wildlife Grant Program, which has received annual appropriations ever since.

In 2015, AFWA established the Blue Ribbon Panel on Sustaining America's Diverse Fish & Wildlife Resources to develop recommendations on a sustainable funding model for conservation of the full array of the nation's fish & wildlife. Panel members included representatives of the outdoor recreation retail and manufacturing sector, the energy and automotive industries, private landowners, educational institutions, conservation organizations, sportsmen's groups and state and federal fish and wildlife agencies. The Blue Ribbon Panel made two recommendations:

- Congress dedicate up to \$1.3 billion annually in existing revenue from the development of energy and mineral resources on federal lands and waters to the Wildlife Conservation Restoration Program.
- The Blue Ribbon Panel will examine the impact of societal changes on the relevancy of fish and wildlife conservation and make recommendations on how programs and agencies can transform to engage and serve broader constituencies.

The first recommendation led to legislation known as Recovering America's Wildlife Act, which was introduced in 2021 in the 117th Congress, and again in 2023 in the 188th Congress. Despite considerable bipartisan support for the Act, it was not passed. The second recommendation led to the development of a [Relevancy Roadmap](#) for Fish and Wildlife Agencies, as well as a [Community of Practice](#).

State and Tribal Wildlife Grants Program

Appropriations titled *State and Tribal Wildlife Grants (STWG)* have been passed annually since 2002, though the program is subject to yearly Congressional debate. The program's annual allocations have averaged approximately \$67.8 million. These grants, managed by the U.S. Fish and Wildlife Service, have required non-federal matching funds that vary from 25% to 50% depending on the year and type of program. Iowa DNR has received approximately \$17 million in WCRP and SWG funds from 2001-2025, with an average annual appropriation of ~\$686,300. These funds have been

used to implement this Plan through increased research, habitat protection, and management for Species of Greatest Conservation Need designated in the Plan. Iowa must match the SWG income with non-federal funds and many partners have worked together to leverage the federal funds in order to most effectively conserve the species and habitats that were identified as priorities within this Plan. Projects using SWG funds must benefit Species of Greatest Conservation Need identified in a State's Wildlife Action Plan.

Other Funding Initiatives

In an effort to diversify and strengthen the funding needed to carry out wildlife conservation, States have attempted to direct funding to wildlife conservation from a variety of sources, such as lottery funds, general fund appropriations, special license plates, and tax checkoffs. A few state fish and wildlife agencies, including Minnesota, Missouri and Arkansas, have obtained broad-based funding to augment their traditional funding sources. In 2010, Iowa voters approved the creation of the Natural Resources and Outdoor Recreation Trust Fund, to be funded through a portion of the next sales tax increase. However, in 2025, Iowa still awaits the sales tax increase necessary to supply that Trust Fund with money.

In Iowa other efforts to diversify funding sources have been successful, but funding for wildlife conservation remains at levels vastly outmatched by the need. For example, Iowa's Chickadee Checkoff program currently generates approximately \$150,000 annually. The Resource Enhancement and Protection (REAP) Natural Resource License Plate funds have also provided a boost to DNR's ability to conserve a diverse array of wildlife, providing roughly \$400,000/year. In 2024, Natural Resource License Plates accounted for approximately 0.7% of all Iowa license plates. When compared to roughly \$38 million generated by hunters and anglers, these funding sources are relatively small. When this Plan was initially developed in 2005, it was estimated that the annual shortfall in funds needed for implementation was \$39,375,000. That annual shortfall has now risen to roughly \$80 million (Table 10-1). Thus, despite several successful efforts to increase funds dedicated to wildlife conservation, the existing funding remains far short of the need.

State Wildlife Action Plans

In 2003, as a requirement to maintain eligibility for State Wildlife Grant funds, all states, territories and tribes which received SWG appropriations were required by Congress to develop Comprehensive Wildlife Conservation Strategies, now generally referred to as [State Wildlife Action Plans \(SWAPs\)](#). All 50 States and five U.S. territories developed a SWAP in 2005.

State Wildlife Action Plans outline the steps that are needed to conserve wildlife and habitat before they become too rare or costly to restore. Taken as a whole, these proactive plans present a national action agenda for preventing wildlife from becoming endangered.

State Wildlife Action Plans conserve wildlife and natural places. They assess the health of each state's wildlife and habitats, identify the problems they face, and outline the actions that are needed to conserve them over the long term.

The Eight Required Elements of State Wildlife Action Plans

As a condition of receiving SWG funds, Congress mandated that state fish and wildlife agencies develop a *Comprehensive Wildlife Conservation Plan* (State Wildlife Action Plan) by October 1, 2005, and review and revise the plan every 10 years thereafter. Congress directed that the plans must identify and be focused on the species in greatest need of conservation yet address the full array of wildlife and wildlife-related issues. Congress identified eight required elements to be addressed in each State's Plan:

1. Information on the distribution and abundance of wildlife, including low and declining populations as each State Fish and Wildlife agency [DNR] deems to be appropriate, that are indicative of the diversity and health of wildlife of the State. Low and declining populations of fish and wildlife are defined in the Plan as Species of Greatest Conservation Need (SGCN).
2. Locations and relative conditions of key habitats and community types essential to conservation of SGCN.

3. Descriptions of problems which may adversely affect SGCN or their habitats and priority research and survey efforts needed to identify factors that may assist in restoration and improved conservation of SGCN and their habitats.
4. Descriptions of conservation actions necessary to conserve SGCN and their habitats and establish priorities for implementing such actions.
5. Provisions for periodic monitoring of SGCN and their habitats, for monitoring the effectiveness of conservation actions, and for adapting these conservation actions as appropriate to respond to new information or changing conditions.
6. Each State's provisions to review its Strategy [Plan] at intervals not to exceed ten years.
7. Each State's provisions for coordination during the development, implementation, review, and revision of its Strategy [Plan] with Federal, State, and local agencies and Indian Tribes that manage significant areas of land water within the State, or administer programs that significantly affect the conservation of SGCN or their habitats.
8. Each State's provisions to provide the necessary public participation in the development, revision, and implementation of its Strategy [Plan].

The Plan must utilize the best available knowledge on the distribution and abundance of wildlife, historical documentation and other references to identify Iowa's wildlife conservation needs. The Plan must address the needs of all wildlife, but focus primarily on SGCN and their habitats as determined by DNR.

Iowa's Wildlife Action Plan

Iowa's Plan was initially approved in 2006, modified in 2012, and fully revised in 2015 and 2025. This version represents the second comprehensive revision of Iowa's Plan.

Framework Outlined in Initial Plan

The Steering Committee which first developed Iowa's Plan made several decisions which have left a lasting imprint upon this first comprehensive revision.

1. The IWAP would be a wildlife plan; plants are not specifically addressed except as an integral component of wildlife habitat.
2. The IWAP would have a 25-year focus. Long-term continuity is needed to accomplish ambitious objectives, but achievements are needed to be accomplished in a time frame that can be appreciated by Plan supporters.
3. The IWAP would be strategic in nature. Operational plans to implement the visions and strategies would be crafted later to fit the unique missions and capabilities of conservation organizations and individuals interested in Plan Implementation.

To assure the Plan would involve a diversity of conservation viewpoints, representatives of 105 conservation, recreation, education and agricultural support organizations were invited to serve on a formal Advisory Group; 93 individuals representing 59 organizations agreed to participate (Appendix 2).

The Advisory Group met in Des Moines on July 17, 2004. The purpose of the meeting was to develop a vision for the IWAP and strategies for attaining that vision by the year 2030. The Advisory Group was updated on the planning process and the status of wildlife and their habitats in Iowa. The large group then broke into eight focus groups and developed vision elements and conservation actions. When condensed by the steering committee, these vision elements and conservation actions form the basis for the strategies and priorities outlined in Chapters 6-10.

One of the key factors identified during the process of determining the SGCN was the lack of current, credible information on the distribution and abundance of many nongame species. For this reason, the Multiple Species Inventory and Monitoring Program has been a signature aspect in the implementation of this Plan.

2012 Modification

In 2012, an update to certain portions of the Iowa Wildlife Action Plan was completed and approved. That modification was focused primarily on adding and removing several species from the list of SGCN, as well as editing the map of High

Opportunity Areas for Collaborative Conservation in order to more fully represent the priorities of conservation entities within the state.

During the public comment period for the 2012 modification, comments were received from eight people (3 DNR employees and 5 non-employees). To the extent that integration of these comments was feasible and within the scope of this modification, the comments were all integrated. Those who submitted comments that addressed broader issues of the scope, priorities, or format of the IWAP were informed that their comments had been compiled and would be addressed in the full review/revision of the IWAP

2015 Comprehensive Revision Process

Persons representing much of the ecological and conservation expertise existing in the state were included in various stages of the revision process. A variety of efforts were made to ensure that information about the Plan received statewide distribution to the public as well. The public comment period for the draft IWAP revision was held from August 4, 2015-September 11, 2015. A total of three written comments were received and incorporated in whole or part into the final version of the Plan.

2025 Comprehensive Revision Process

Individuals across the state with relevant ecological and conservation expertise once again engaged in various stages of the revision process, either as members of committees or as consultants and reviewers of specific portions of the IWAP.

A variety of efforts were made to ensure that information about the Plan received statewide distribution to the public as well:

- A complete draft of the revised Plan was placed on the DNR's web site with the email address for the Plan Coordinator, who received comments.
- Statewide news releases advertised completion of the Draft revised Plan, where it was available and how to comment.

Box 1-2

The ABC's of Wildlife Action Plans (SWAP and SWG and SGCN (oh my!))

SWAP = State Wildlife Action Plan

SWG = State and Tribal Wildlife Grant Program

SGCN = Species of Greatest Conservation Need

These three acronyms are used often in reference to wildlife diversity conservation. The use of so many acronyms can lead to confusion about how they relate. **SWAPs** are comprehensive conservation strategies developed by states, territories, and tribes. These documents identify **SGCN** which are indicative of the diversity and health of the region's wildlife. Development of **SWAPs** was required by Congress in order for states, tribes, and territories to remain eligible for federal funding provided through the **SWG** program. The **SWG** program is the only funding source dedicated solely to implementation of **SWAPs**. Conservation of **SGCN** is a requirement of projects funded by the program. However, the **SWAPs** are meant to be comprehensive strategies, rather than just spending plans for **SWG**. Together, the **SWAPs** have created a national blueprint for the future of fish and wildlife conservation.

Iowa's Conservation Legacy

Iowa has a long and important role in the advancement of fish and wildlife conservation. Some of the most prominent figures in the nation's history of conservation have roots in Iowa:

- Iowa Congressman John Lacey brought us the Lacey Act, which was passed in 1900. This Act essentially brought the era of market hunting to a close. The Act prohibits interstate transport or export of illegally harvested species.

- Aldo Leopold, author of “Game Management” and “A Sand County Almanac” (among many other works) was a conservationist, philosopher, author, forester, hunter, and educator. Leopold, commonly viewed as the father of wildlife management, was born and raised in Burlington, Iowa. In addition to serving as the nation’s first Chair of Game Management (at UW-Madison), he helped found The Wilderness Society and The Wildlife Society.
- Jay N. “Ding” Darling, was a Pulitzer Prize-winning editorial cartoonist for the Des Moines Register. Darling was instrumental in the development of the Federal Duck Stamp Program and designed its first stamp. He was also involved in founding the National Wildlife Federation.
- Paul Errington was a professor of Zoology and led the nation’s first Cooperative Fish and Wildlife Research Unit at Iowa State College (now Iowa State University).

Iowans strongly favor conservation. In 2013, a non-partisan survey of Iowa’s voters found that 97% of respondents agree with the statement “We need to ensure that our children and grandchildren can enjoy Iowa’s land, water, wildlife, and natural beauty the same way we do” (Weigel and Metz, 2013).

Preserving all the species that reside in or migrate through the state and their habitats is important to maintaining the health of Iowa’s wildlife which contributes not only to the economy, but also to the aesthetic value of the state. Maintaining Iowa’s biological diversity will help this natural resource persist for many years into the future and continue to provide nature’s benefits that we enjoy through hunting, fishing, wildlife viewing, and other outdoor recreational activities.

While a large number of individuals contributed in some manner to the IWAP, ultimate responsibility for its content lies with the Implementation Committee and the Iowa Department of Natural Resources.

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Chapter Two

History of the Formation and Conservation of Iowa's Natural Communities

Required Element #2: Descriptions of the extent and condition of habitats and community types essential to conservation of species identified in Element 1.

Physiography

Topography

Iowa is a state of 56,239 square miles (36,016,500 acres) bordered by the Mississippi River on the east, and the Missouri and Big Sioux Rivers on the west. Iowa has a relatively low relief - elevations run from a high of 1,670 feet above mean sea level in Osceola County in northwestern Iowa to 480 feet above mean sea level in Lee County in the southeastern corner of the state.

Climate

Iowa's climate is classified as humid continental and is characterized by warm summers and cold winters. The long-term (1895-2024) average annual temperature was 47.7°F. More recently, the average annual temperature during 2000-2024 was 48.7°F. Average temperature during the summer is 71.8°F (from 2000 to present). December to February winter temperatures average 23.0°F from 2000 to present (NOAA 2025). Average winter temperature differences range 6.5 degrees between north and south. Temperature minimums of -25°F are not uncommon in northern Iowa. Iowa's temperature has been gradually increasing (Box 2-1).

The long-term (1895-2024) statewide average annual precipitation was 32.5 inches (NOAA 2025). A shorter-term average used to estimate "normal" rainfall amounts (2000-2024) was 34.86 inches. The northwest part of the state is the driest with an annual precipitation of 30.74 inches (1991-2020 average) while the eastern third is the wettest with an annual precipitation of 37.81 inches (1991-2020 average, Midwestern Regional Climate Center, 2025). Annual precipitation has been increasing (Box 2-1).

Iowa often experiences seasonal extremes and frequent local, rapid weather changes due to the convergence of cold, dry Arctic air, moist maritime air from the Gulf of Mexico, and dry Pacific air masses. Like most states, periods of severe drought and periods of excessive precipitation can have a dramatic impact on terrestrial and aquatic vegetation as well as their associated fish and wildlife species.

Statewide winter snowfall averages 32 inches. Northern Iowa (north of U.S. Highway 30) receives frequent snow often associated with strong winds, blowing and drifting. Southern Iowa may experience substantial snowfall as well as more frequent ice storms. This results in a snow cover that is often covered by a surface crust of ice or hard snow. Harsh conditions seldom last for more than a few weeks in most of the state, even less in the south half.

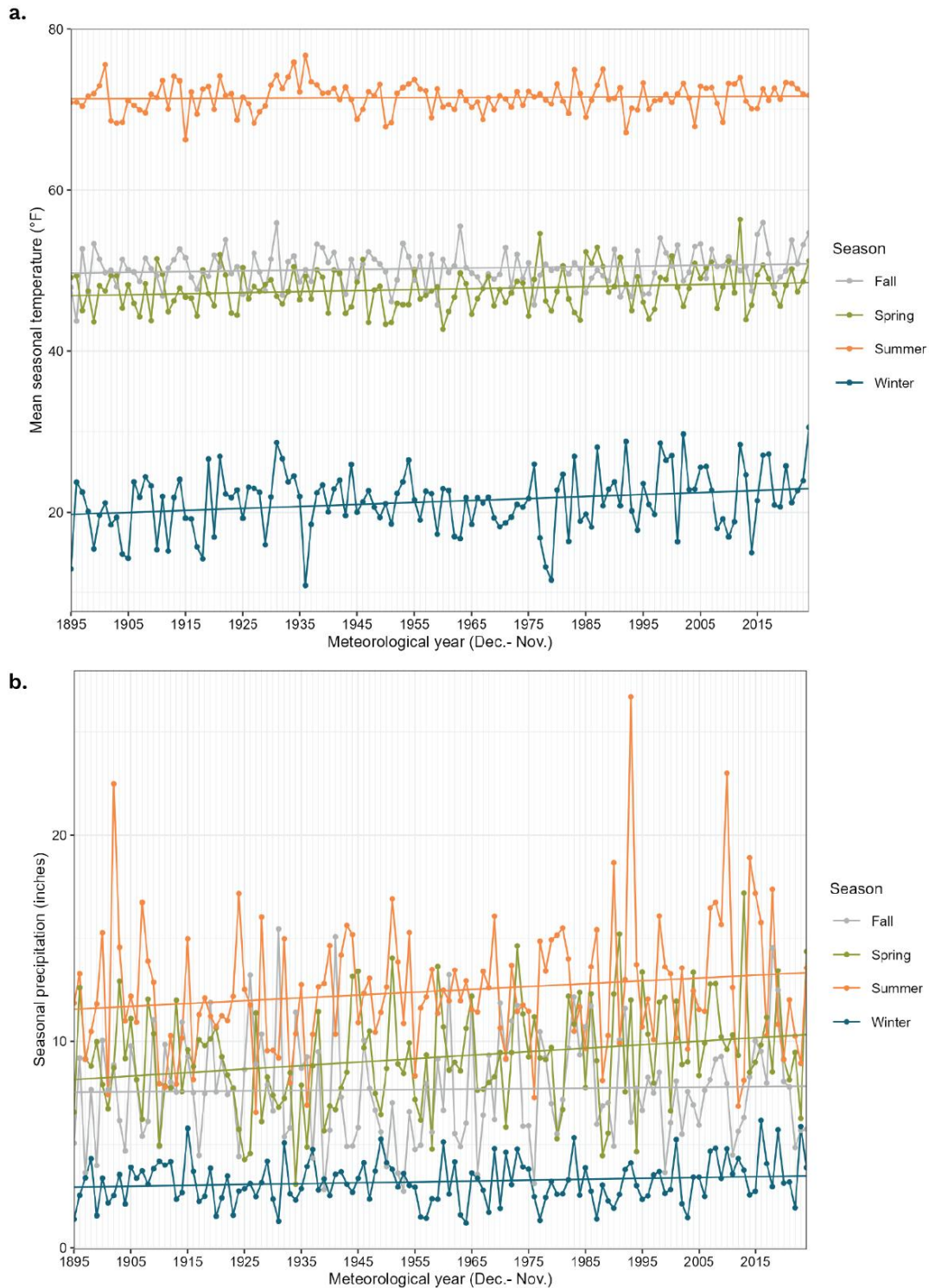
These climatic factors combine to influence the length of the growing season across the state. Late frosts in the spring and early freezes in the fall result in a reduced growing season of 135 days in northeastern and northwestern Iowa. The longest growing season is in southeastern Iowa, with an average of 175 days. The statewide average growing season is 158 days long.

Iowa now has a statewide average of five more frost-free days per year than 50 years ago, and 8 to 9 more than at the beginning of the 20th century. This provides Iowa with a longer growing season, earlier seasonal snowmelt, and longer ice-free period on lakes and streams (Takle, 2011).

Box 2-1

Seasonal Climate Trends

Annual temperatures in Iowa show an increasing trend with the warming concentrated in winter and fall (a). Annual precipitation has also had an increasing trend, with most increases coming in spring and summer (b) (NOAA 2025). These changing weather patterns can influence wildlife distribution, survival, disease, or the ecosystems they rely on.



Geology

Iowa's natural communities are as much a result of its recent geologic past as they are a result of climatic conditions (Prior 1991). The boundaries of the ecoregions that resulted from this geologic history coincide well with the boundaries of other habitat based classification systems (Map 2-1). The names of the ecoregions follow the US EPA (Omernik) Level III and IV Ecoregions. The numbers and descriptions of each Level IV ecoregion are taken from Chapman et al. (2002). Descriptions of Level III ecoregions are taken from the US Environmental Protection Agency (EPA)'s [Descriptions of Level III Ecoregions](#), accessed on the EPA website.

Map 2-1. Level III & IV Ecoregions of Iowa (US EPA - Omernik)
Large font denotes the names of Level III ecoregions and small font, Level IV ecoregions.



Level III Ecoregion Descriptions

The following narrative is organized by EPA Level III ecoregions. Although Level III ecoregions are relatively homogeneous, tables under each major heading describe subtle differences in landform, geology and native plant communities that characterize the EPA Level IV ecoregions they encompass.

40. The Central Irregular Plains

The Central Irregular Till Plains have a mix of land use and are topographically more irregular than the Western Corn Belt Plains (47) to the north, where most of the land is in crops. The region, however, is less irregular and less forest covered than the ecoregions to the south and east. The potential natural vegetation (PNV) of this ecological region is a grassland/forest mosaic with wider forested strips along the streams than historically found in Ecoregion 47 to the north. The mix of land use activities in the Central Irregular Plains includes mining operations of high-sulfur bituminous coal. The disturbance of these coal strata in southern Iowa has degraded water quality and affected aquatic biota.

Table 2-1. Characteristics of Level IV Ecoregions within the Central Irregular Plains

Level IV Ecoregion Name	Physiography	Geology	Potential Natural Vegetation
40a. Loess Flats and Till Plains	Glaciated. Low hills and smooth plains. Perennial streams with many channelized.	Moderate loess over loamy till and clay loam till. Pennsylvanian sandstone, limestone, shale. Also, Mississippian limestone in Iowa.	Mosaic of Little Bluestem-Sideoats Grama prairie, Bur Oak woodland, and Chinkapin Oak woodland.

47. Western Corn Belt Plains

Once mostly covered with tallgrass prairie, over 80 percent of the Western Corn Belt Plains is now used for cropland agriculture and much of the remainder is in forage for livestock. A combination of nearly level to gently rolling glaciated till plains and hilly loess plains, an average annual precipitation of 26 to 37 inches, which occurs mainly in the growing season, and fertile, warm, moist soils make this one of the most productive areas of corn and soybeans in the world. Agricultural practices have contributed to environmental issues, including surface and groundwater contamination from fertilizer and pesticide applications as well as concentrated livestock production.

Table 2-2. Characteristics of Level IV Ecoregions within the Western Corn Belt Plains

Level IV Ecoregion Name	Physiography	Geology	Potential Natural Vegetation
47a. Northwest Iowa Loess Prairies	Irregular plains. Dendritic streams.	Moderate to thick loess over clay-loam till. Cretaceous shale, sandstone, and limestone, some Precambrian Sioux Quartzite.	Big Bluestem-Indiangrass prairie, Little Bluestem-Indiangrass prairie, limited areas of Bur Oak woodland.
47b. Des Moines Lobe	Smooth to irregular plains. Dendritic streams and drained depressional wetlands.	Loamy till with no loess cover. Ground, stagnation and end moraines.	Big Bluestem-Indiangrass prairie, Cordgrass wet prairie, limited areas of Bur Oak woodland.
47c. Eastern Iowa and Minnesota Drift Plains	Irregular to smooth plains. Low gradient streams.	Thin loess cover over loamy till. Devonian and Silurian limestone and dolomite.	Big Bluestem-Indiangrass prairie, areas of Bur Oak mixed savanna and woodlands.
47d. Missouri Alluvial Plain	Smooth to irregular alluvial plain. Channelized streams.	Alluvium over Pennsylvanian and Cretaceous shale, sandstone and limestone.	Northern floodplain forest, pin oak forest, and cordgrass wet prairie.
47e. Steeply Rolling Loess Prairies	Open low hills. Intermittent and perennial streams, many channelized.	Moderate to thick loess, 25-50 feet, over clay loam till. Pennsylvanian shale, sandstone and limestone.	Big Bluestem-Indiangrass prairie, and White Oak-Red Oak Woodland, Bur Oak mixed woodland.
47f. Rolling Loess Prairies	Irregular plains to open low hills. Intermittent and perennial streams, many channelized.	Moderate to thick loess, generally less than 25 feet, over clay loam till. Pennsylvanian and Cretaceous shale, sandstone and limestone.	Mosaic of Big Bluestem-Indiangrass prairie, and Bur Oak woodland.
47m. Western Loess Hills	Open hills and bluffs. Intermittent and perennial streams.	Thick loess, 60-150 feet over clay-loam till. Pennsylvanian shale, sandstone and limestone in southern half of region; Cretaceous shale, sandstone and limestone in the northern half.	Mosaic of Bur Oak woodland and Big Bluestem-Indiangrass prairie.

52. The Driftless Area

The hilly uplands of the Driftless Area easily distinguish it from surrounding ecoregions. Much of the area consists of a deeply dissected, loess-capped, bedrock dominated plateau. The region is also called the Paleozoic Plateau because the landscape's appearance is a result of erosion through rock strata of Paleozoic age rather than glacial or post-glacial deposition. Although there is evidence of glacial drift in the region, its influence on the landscape has been minor compared to adjacent ecoregions. In contrast to adjacent ecoregions, the Driftless Area has few lakes, most of which are

reservoirs with generally high trophic states. Livestock and dairy farming are major land uses and have had a major impact on stream quality.

Table 2-3. Characteristics of Level IV Ecoregions within the Driftless Area

Level IV Ecoregion Name	Physiography	Geology	Potential Natural Vegetation
52b. Paleozoic Plateau/ Coulee Section	Dissected hills, rolling to steep-sided valleys. Perennial streams.	Thin loess and patches of glacial drift over Silurian, Ordovician and Cambrian dolomite, shale, sandstone, and limestone.	Mosaic Little Bluestem-Indian grass prairie, Bur Oak and White Oak forests, and areas of Maple-Basswood forests.
52c. Rochester/ Paleozoic Plateau Upland	Rugged region of bluffs and valleys cut by tributaries of the Mississippi River.	Thinly deposited loess and pre-Wisconsin glacial till over an eroded Paleozoic sedimentary plateau. Pre-Wisconsin till exposed mainly in the west where loess deposits are thin and discontinuous	Mosaic Little Bluestem-Indian grass prairie on flat, fire-prone remnants of the plateau, with oak forests developing downslope. Mesic forest of basswood and sugar maple on north and east-facing slopes with wet mesic forests on silty bottomlands.

72. Interior River Valleys and Hills

The Interior River Lowland is made up of many wide, flat-bottomed terraced valleys, forested valley slopes, and dissected glacial till plains. In contrast to the generally rolling to slightly irregular plains in adjacent ecological regions to the north (54), east (55) and west (40, 47), where most of the land is cultivated for corn and soybeans, a little less than half of this area is in cropland, about 30 percent is in pasture, and the remainder is in forest. Bottomland deciduous forests and swamp forests were common on wet lowland sites, with mixed oak and oak-hickory forests on uplands. Paleozoic sedimentary rock is typical and coal mining occurs in several areas.

Table 2-4. Characteristics of Level IV Ecoregions within the Interior River Valleys and Hills

Level IV Ecoregion Name	Physiography	Geology	Potential Natural Vegetation
72d. Upper Mississippi Alluvial Plain	Smooth to irregular alluvial plains. Channelized streams.	Alluvium. Brown to gray silt, clay, sand, and gravel. Thickness of alluvial and older fluvial deposits > 100 feet.	Cottonwood-willow riparian forest, Pin Oak forest, Cordgrass wet prairie.

The glacial history and topography of each landform affect the type and distribution of current wildlife habitats and agricultural land use. These land uses are displayed in Map 4-3. Present-day land uses and habitats are discussed further in Chapter 4.

Historic Plant Communities

Pre-settlement Iowa lay at a biological crossroads. Hardwood forests dominated the cooler and more humid lands east of the Mississippi River. The warmer, drier mixed grass prairie and prairie potholes of the northern Great Plains lay to the west. To the north, great maple-basswood and pine forests covered the Great Lakes region. To the south, oak savannas gradually gave way to the vast oak-hickory forests of the Missouri Ozarks. These different ecological regions blended together in Iowa to produce a unique landscape of great biological diversity (Map 2-2).

Roughly two-thirds of the state (an estimated 23 million acres) was dominated by lush prairies. Most was tallgrass prairie, although short grasses were present on hot, dry sites. Nearly 7 million acres of forest or forest-prairie savanna covered much of the eastern third of Iowa and followed the river valleys into the prairies to the north and west. Around 4 million acres of prairie pothole marshes dotted recently-glaciated and poorly-drained northcentral and northwest Iowa where larger wetlands and lakes protected oak savannah from prairie fires. Another million acres of backwaters, sloughs and flooded oxbows were found in the floodplains of the Mississippi, Missouri and larger inland rivers.

Prairies

The prairie was more than just a monolithic sea of grass. Prairie plants are adapted to subtle changes in moisture and soils that occur along a gradient from lowlands to drier prairie ridges. Poorly drained wetlands and wetland margins supported rank growths of sedges, cord grass, bluejoint, prairie muhly grass, and panic grass, with common forbs such as gayfeather, prairie dock, Turk's-cap lily and New England aster. Better-drained loamy soils on slopes and broad ridges were covered with more moderate stands of switchgrass, big bluestem, Indian grass and forbs like compass plant, rattlesnake master, smooth aster, wild indigo and goldenrod. Drier sites on gravel and sand ridges or steep slopes supported shorter and more open stands of little bluestem, side-oats grama, and needlegrass, with forbs like pasque flower, silky aster, yellow pucoon and common milkweed.



Photo by Adam Janke

Forests

Closed-canopy mature forests as we know them today existed only on the floodplains where fire could not routinely penetrate. Silver maple, American elm, and swamp white oak dominated the wettest sites, with hickories, hackberry, black walnut, white ash, red oak, basswood and slippery elm on lower slopes. Shrubs were not abundant and were primarily young silver maples and hackberry with catbriar, poison ivy and grape.

Map 2-2. Landcover of Iowa in the 1850s

(from Government Land Office original public land survey of Iowa). Prairie ~23,300,000 acres (65%); Wetlands/ prairie pothole marshes ~4,000,000 acres (11%); Forest ~6,700,000 acres (19%); Water, floodplains, and backwaters ~1,800,000 acres (5%).

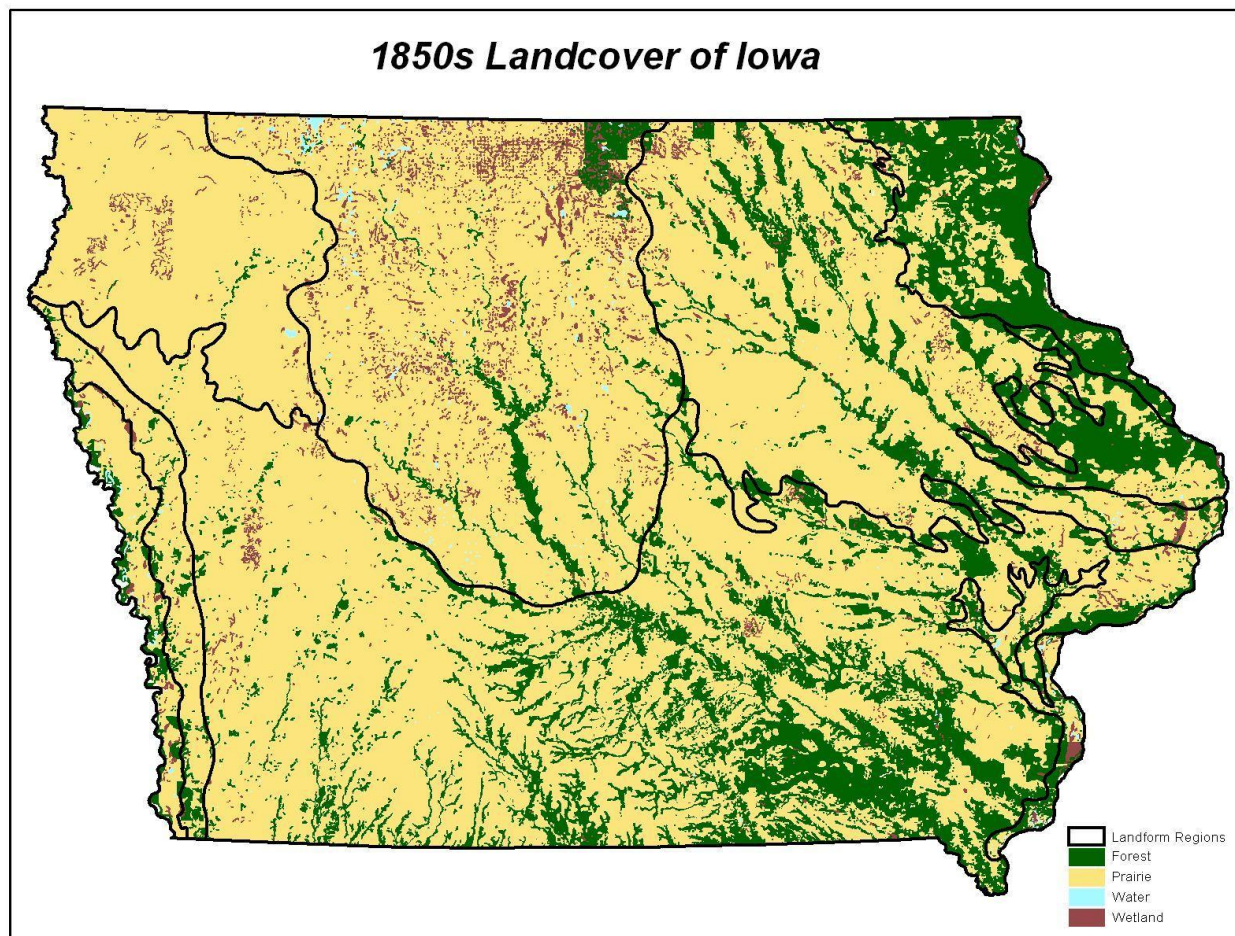




Photo by Adam Janke

Forests on drier slopes and uplands were primarily oak openings or savannas - scattered old oak trees or small clumps of oaks with an understory of prairie or mixed prairie-forest shrubs and herbs. Burr oak, with its thick, fire-retardant bark dominated with some red and white oaks on moister sites. The understory was primarily prairie grasses and forbs but hazel, coralberry, sumac and grape occurred where fire was less common.

The heaviest concentrations of timber were in the cooler and moister eastern third of the state. In the west only the floodplains and the coolest sites on north and east facing slopes in the deepest river valleys were timbered. Because of the many river systems that penetrated the prairies to the north and west at least some timber and shrub lands were found across most of the state.

Fire and grazing

Drought, fire and grazing combined to make Iowa's prairie-wetland-forest communities dynamic ecosystems. In wet years, water levels were high, and multiple years of high-water levels caused wetland vegetation to gradually die out, and marshes began to look like ponds or small lakes. But dry weather runs in approximately 10 to 15-year cycles on the prairies, with severe drought at roughly 20-year intervals. Drought caused wetland basins to temporarily de-water. Seeds buried in moist wetland soils were able to germinate once again and dense stands of emergent vegetation were reestablished and accumulated plant material decomposed in the aerobic sediments liberating nutrients. Thus, regenerated wetlands awaited only the end of drought to return them to their former productive condition.

In wet years fire was less prevalent on the prairie. Without burning the dead stems and leaves of grasses and forbs accumulated on the ground and this litter created a cooler, moister environment. In some cases sun tolerant trees, and coralberry and other shrubs were able to survive and spread from forest edges farther into the grasslands. During drought, fire burned off large areas of prairie and forest, killed invading shrubs and trees, eliminated the litter, returned nutrients to the soil and allowed grasses to regain their dominance. Thus, the boundary between forest and prairie ecosystems was a dynamic back and forth movement. Fire also allowed annual plants like ragweed, fleabane, thistle and primrose to take a temporary foothold before the longer-lived grasses and forbs recovered and choked them out.

Although fires were common, it is impossible to say how much and how frequently the prairies burned. Weather is seldom in complete synchrony over all of Iowa. Local dry spells undoubtedly created mini-droughts that lowered wetlands and produced frequent fires, while just a few miles away precipitation was normal. Even in normal years a dry late summer could result in a partial drawdown of marshes and occasional fires. The network of wetlands, creeks and rivers probably stopped smaller fires from expanding too greatly.

Grazers and browsers like bison, wapiti and deer relied on this mosaic of habitat condition and also contributed to it. They suppressed trees and shrubs and slowed the growth of tall grasses where they fed intensively. Wapiti and bison created wallows - sandy areas where they rolled in the loose earth to remove hair and dislodge insects. Prairie dogs, though not common in Iowa, kept the vegetation around their towns clipped short. Even plains pocket gophers created small openings over their mounds where annual plants could gain a foothold.

The result of all this variety in soils, topography, weather, fire and animal activity was a great patchwork of plant communities in both time and space. On some sites 250 species of plants could be found. Not only were prairies, forest and wetlands in close proximity, but at any given location plant communities were in a state of growth, retrenchment or suppression depending on their local history.

Historic Wildlife Communities

The great diversity of plant communities that covered pre-settlement Iowa also supported a variety and abundance of wildlife that was foreign to settlers from the East. Iowa native Aldo Leopold, writing in 1931 in his *Game Survey of the North Central States*, said, “...no region in the world was originally more richly endowed with game than this one, quantity and quality both considered. Contrary to common belief, the cream of its game country was the prairie type...” Prairie animals like wapiti were common, and bison, pronghorn, prairie chickens and sharp-tailed grouse penetrated the tallgrass prairies from the west. White-tailed deer, wild turkeys, passenger pigeons, northern bobwhite quail, ruffed grouse and woodcock followed the deciduous woodlands and river valleys into the prairie from the East.



Waterbirds

The prairie pothole and riverine wetlands provided excellent nesting habitat and attractive resting and feeding stops for millions of migrating waterfowl between their nesting and wintering grounds. Giant Canada geese, trumpeter swans and over a dozen species of ducks nested in Iowa, mainly blue-winged teal, mallards, redheads, and wood ducks. Between 3-4 million ducks may have been raised annually.



American White Pelicans - Photo by Carter Oliver

Other waterbirds were also plentiful. White pelicans migrated along corridors of major rivers and lakes and used some large marshes and lakes for breeding. Sandhill cranes were abundant during migration and nested here occasionally. Whooping cranes were less numerous, but nested frequently in the marshes of northcentral and northwest Iowa. More than 30 species of shorebirds migrated through Iowa. Of these, long-billed curlew, marbled godwit and upland sandpiper nested here, and the American golden-plover, Eskimo curlew and common snipe were abundant during migration. Sora was an extremely common marsh rail.

Furbearers

Beaver, muskrat and river otters were found throughout Iowa, associated entirely with marshes, streams and rivers. Muskrat were most abundant in the prairie marshes of northcentral Iowa and maintained very high numbers. Beaver and river otters were associated more with riparian habitats. Mink, badger, and striped skunks were not highly sought after, but each must have been abundant. Many farm boys made pocket change by trapping highly abundant spotted skunks, locally known as civet cats and until recently thought to be extirpated from the state. Raccoon and opossum, two of the most abundant furbearers today, may have spread westward onto the prairie in association with the spread of agriculture and farmsteads.



Common muskrat - Photo by Carter Oliver

Canids and other Large Predators

Carnivorous and omnivorous furbearers fed on the diversity of small mammals, birds and their nests and other prey. Although descriptions of canid communities are often confusing and varied over time as settlement progressed, it seems that two subspecies of gray wolves occurred in Iowa - the smaller Great Plains wolf that followed the bison and wapiti herds and was most common in the western two-thirds of the state, and the eastern timber wolf, a slightly larger and often darker subspecies, inhabited the forested eastern third, mostly in the northeast corner of the state. Coyotes were found statewide, living between wolf packs and perhaps becoming more common as wolves were extirpated. Red foxes were found in the prairies and at the prairie-forest border in northern Iowa. Since in some parts of their range red foxes are actively excluded, even killed by coyotes, they may have become common after wolves were exterminated and predator control began to focus on coyotes. The gray fox, more omnivorous than other canids, seemed to occupy a niche that enabled it to co-exist with them and was found primarily in the eastern third of the state, perhaps because of its tendency to climb trees for fruit and bird eggs. Bobcats were numerous, occurring statewide in a variety of forested and shrubby habitats. Mountain lions, or cougars, were scattered across the state, but reports are few, perhaps because of their secretive nature. The lynx, a larger version of the bobcat which principally inhabited the coniferous forests of the Great Lakes states and Canada, was at least occasionally found here.

The Black Bear was the largest predator in pre-settlement Iowa. Although their preferred habitat was woodlands, they occasionally wandered into the prairies, usually along river corridors. Reports of Black Bears originate from 48 counties fairly uniformly scattered across the state but they were almost certainly most common in eastern Iowa.

Fish and Mussels

The historical baseline for Iowa fishes is based on the work conducted in the middle and late 1880s by Seth Meek for the United States Fish Commission while he was a professor at Coe College in Cedar Rapids. Meek surveyed streams and natural lakes in most major river basins in Iowa, and his survey was published in 1892. Even though his surveys were conducted approximately 50 years after urban and agricultural development of the state began, Meek's surveys suggest an exceptionally diverse pre-settlement fish community in Iowa's streams, rivers, and natural lakes and suggest considerably different and higher quality aquatic ecosystems than exist today.



Mussels - Photo from MSIM Program

Roughly 145 fish species are considered native to Iowa, with five of these species now considered extirpated. In the 2012 version of this Plan, 49% of fish species were listed as SGCN, comprising 24% of all Iowa SGCN. The most significant declines appear to be in fish species that require vegetated backwater habitat in which to spawn. In addition, lowered levels of water quality and decline of aquatic habitat quality has either eliminated or caused reductions in the Iowa distributions of some Iowa fishes.

Historically, Iowa's rivers and streams hosted huge mussel beds. Burial mounds along the Mississippi River provided evidence that the Mississippi River provided abundant food supplies of freshwater fishes and mussels to pre-historic Native American tribes (Harlan et al. 1987).

Today, 54 mussel species are considered native to Iowa (including 3 that are now considered extirpated from Iowa). In the 2012 version of this Plan, 53% of mussel species were listed as SGCN, comprising 9% of all Iowa SGCN.

Nongame Species

Records of the un-hunted fauna that inhabited Iowa are largely nonexistent. The early explorers and settlers were concerned mostly with wildlife as a source of food, hides or feathers, or as perceived threats to livestock and crops. But of 440 species of birds and mammals that resided here or migrated through Iowa, less than 15 percent were ever hunted or trapped. Serious scientific efforts to describe Iowa's wildlife did not begin until nearly 40 years after settlement and by then significant changes had already occurred.

Birds

In all, more than 180 species of birds nested in Iowa. Abundant wetlands were habitat for countless yellow-headed blackbirds, marsh wrens, American and least bitterns, black and Forster's terns, black-crowned night-herons, rails and dozens of other species. Wetland-prairie margins were nesting sites for song sparrows, sedge wrens and northern harriers. Wooded wetlands and floodplain forests were the favored habitat of colonies of nesting herons and egrets as well as Carolina parakeets, an abundant species that flocked in the hundreds. Native parakeets were extinct in Iowa by the 1870s due to deforestation, hunting for feathers to adorn women's hats and possibly due to competition with introduced European honey bees that competed for tree cavity nest sites. To see one today would indeed make our remaining most colorful species look drab by comparison.



Yellow-headed blackbird - Photo by Carter Oliver

Where shrubby, early successional stages of forest pushed into the prairies cardinals, yellowthroats, spotted towhees and rose-breasted grosbeaks and other forest edge species were abundant, as well as ruffed grouse. Larger stands of mature forests provided nesting sites for interior forest species like cerulean warblers, ovenbirds, scarlet tanagers, wood thrushes, pileated woodpeckers, and passenger pigeons. Riparian woodlands would have been habitat for black-billed cuckoos, red-headed woodpeckers, belted kingfishers and northern flickers. Red-headed woodpeckers would have been especially abundant in oak savannah. Each forest type had its own unique assemblage of small mammals as well.

Grasshopper and vesper sparrows would have nested in recently burned prairies. A year or two after burning or intensive grazing, regenerating prairie would have provided nesting cover for bobolinks and dickcissels. Henslow's sparrows, savanna sparrows and upland sandpipers would have nested in oldest and rankest prairies with dense ground litter. Loggerhead shrikes and mourning doves would have sought out grasslands with a shrub component.

Reptiles, Amphibians, and Invertebrates



Ornate box turtle - Photo from MSIM

Even less is known of the historic reptiles, amphibians and invertebrates of Iowa. More than 60 species of reptiles and amphibians were eventually found in Iowa. Prairie and prairie potholes, riverine wetlands, prairies and woodlands provided homes for a diversity of lizards like the great plains skink and six-lined racerunner, common turtles like the ornate box and painted turtles, snakes like the timber and massasauga rattlesnakes and frogs like the green and gray tree frogs and leopard frogs which erupted in incredible numbers in wet prairie during wet years.

Impacts of Settlement

Settlement in Iowa progressed roughly southeast to northwest. Most of the south half of the state had been inhabited by the end of the 1840s; northcentral and northwest Iowa were settled in the 1850s; Lyon County in extreme northwest Iowa was the last to be settled, receiving its first homestead family in 1866.

Human population growth was slow at first. By 1840 only 43,000 settlers had braved the prairies. Pressure for cheap land increased after the Civil War, however, and massive land grants were made to railroad builders to stimulate completion of a trans-continental railroad network. By 1870, Iowa's population had increased to nearly 650,000; by 1900 it had skyrocketed to 2 million.

At the same time Iowa was being settled, a revolution was overhauling industry and agriculture. The advent of improved farm implements, coupled with a rapidly expanding population base devoted mostly to agriculture, had a devastating and permanent impact on Iowa's native plant communities.

Forests

Woodlands were the first to go. Early pioneers, emerging from the eastern deciduous forest, often likened tallgrass prairie to an ocean of grass, with scattered savanna or woodlands along streams like a distant shoreline on the horizon. Some found the light and openness of the prairie invigorating, others found it oppressive, accustomed as they were to woodlands, where trees were a symbol of soil fertility. Some early settlers preferred farming woodlands rather than open prairie, fearing that land too poor to grow trees would not grow crops either. While experience would quickly prove that wrong, forests felt the bite of the pioneer's axe early in our history.

Early farmers tended to settle close to timber for building materials and fuel. By 1875 when most of the Iowa prairie had been settled, woodland acres sold for \$35/ac while prairie land, thought to be less fertile, went for \$5/acre (ac). As late as 1867, in Marshall County Iowa, good timbered land was selling for up to \$50/ac while prairie brought a paltry \$3/ac (Madson 1995).

Most of the initial forest clearing in Iowa was done to allow conversion of the land to agriculture. Iowa's native hardwoods did not prove valuable as building materials. Most of the lumber that eventually built the farm homes, barns and livestock dwellings that dotted the countryside came from the great pineries of Minnesota and Wisconsin. Starting in the 1850s, however, railroad expansion and the discovery of coal in southern Iowa fueled a demand for oak ties and mine timbers that would last into the early 20th century. By 1875, just one-third of the original 6.7 million acres of primitive forest remained, most on rough land or in floodplains either too steep or too wet to plow.

Prairies

The effect on our extensive prairies and prairie-wetland complexes was even more devastating. When pulled by up to 5 teams of horses or yokes of oxen a steel *breaking plow* could shear through and break up 2 acres a day of the foot-thick sod with its intricately intertwined root systems. On the open prairie, huge breaking plows and teams of oxen were required to prepare the land for farming, requiring a major capital investment. If a farmer lacked such equipment he had to hire it done for as much as \$600/quarter section, a staggering sum. The newly exposed soil was so fertile that a crop, first wheat and later corn, was planted directly on the overturned furrows. The next year a second plowing would complete the conversion of prairie to a field tillable by conventional methods. Starting in the 1850s, Iowa lost nearly 2 percent of its 25 million acres of native prairie a year, 3 million acres a decade, until less than 30,000 acres (0.1%) remained after 80 years.

Wetlands

The vast prairie-pothole wetlands of northcentral and northwest Iowa took longer to impact. Through the first 20 years of settlement there was plenty of good land available without trying to drain and farm wetlands. In 1850, Congress passed the SwampLand Act. It directed each county to survey all wetlands and sell them at auction for 5 cents an acre, the first of what would become a century-long succession of government-subsidized efforts to drain wetlands. County drainage commissions and drainage districts were soon organized. Eventually pothole soils were discovered to be some of the most productive when dry, further accelerating the demand for drainage.

The first drainage attempts were with hand-dug, open ditches that drained small, shallow wetlands. This reasonably ineffective approach was quickly replaced by massive teams of oxen pulling breaking plows that created furrows through and beyond a wetland to a stream that received the water. Steam dredges did not replace manual labor until nearly 1900 and this was the era of draining lakes and large marshes into excavated ditches (bull ditches) that led to streams. Underground ceramic tiles were developed to drain smaller potholes into ditches as early as 1858. By 1917 modern clay tiles were used to drain seasonally wet fields into extensive, inter-connected drainage systems that had eliminated all but the largest wetlands. By 1906 just 25 percent of the original 4 million acres of pothole wetlands remained. By 1970 less than 1% of Iowa's historic wetlands remained.

Rivers

Even in the late 1800s, Meek noticed and reported impacts to the state's streams and fish communities:

The prairie was originally covered with a dense growth of prairie grass and herbaceous plants, which tended to produce a stiff sod. During heavy rains this sod absorbed the water, preventing its direct flow into the rivers, and it reached the latter chiefly by slowly filtering through the soil. The streams were thus relieved from overflow, and were kept from drying up during the summers. I have been informed that many streams, formerly deep and narrow, and abounding in pickerel, bass, and catfishes, have since grown wide and shallow, while the volume of water in them varies greatly in the different seasons, and they are now inhabited only by bullheads, suckers, and a few minnows. The breaking of the native sod for agricultural purposes has especially affected the smaller streams in this respect, while the construction of ditches and the practice of underdraining have had their effects upon the larger ones. Moreover, the constant loosening of the soil, in farming, tends to reduce it to that condition in which it is readily transported by the heavy rains to produce muddy currents.

Border Rivers - Engineering began on the Mississippi River starting in 1824. Initially, this consisted mainly of snag removal. An act of Congress in 1907 approved creation of a 6-foot navigation channel from the Missouri River northward to Minneapolis. In 1935, further legislation provided for a 9-foot navigational channel maintained through a system of locks and dams as well as dredging. Navigation locks and dams result in a series of pools within the river, leading to a change in the fish community within the river towards those preferring more slow-moving water. (Harlan et al. 1987).

Engineering along the Missouri River for flood control and navigation drastically altered the river system. Between 1923 and 1976, the Missouri was corralled from a wide, braided, dynamic river to a single narrow channel. The channel area was reduced by 80%, with ~35,000 acres of this reduction being in Iowa. By the 1980s, sport and commercial fisheries along the Missouri had dwindled to a tiny fraction of their former abundance.

Interior Rivers - Because Iowa has productive, and therefore intensively cultivated, soils, the rivers which run through and drain these areas are subjected to large and sometimes sudden fluctuations. Draining heavily cultivated lands also results in silt loads, leading to sedimentation. This has changed the fish community assemblage, especially in lower, more turbid reaches of streams where the remaining species tend to be tolerant of lower water quality.

Additionally, many low-head dams were constructed across the state, usually for milling or water supply uses. By 1870, more than 1000 low-head dams dotted the state's interior rivers, restricting seasonal movement of fish species, as well as mussel species dependent upon their fish-hosts for dispersal.

Wildlife

Iowa's original wildlife populations suffered a similar fate as its native habitats and plant communities. Species that competed with humans for space, or were particularly useful for food or fiber, or required very specific habitats that were eliminated or drastically reduced did not survive. Others of less importance to humans held on in low numbers wherever suitable habitat remained. Those species that could adapt to or favored agricultural environments thrived, at least until agriculture became too pervasive.

By 1900 the large game animals and the predators that lived on them were gone (bison, black bear, bobcats, gray wolves, mountain lions, wapiti, and white-tailed deer). Smaller predators like coyotes and red and gray fox were more adaptable, fed on a wider range of smaller prey animals, and were able to survive in Iowa into the 20th century. Economically important furbearers like river otter and beaver were also essentially gone by 1900.

Wild turkeys, passenger pigeons, prairie chickens and waterfowl all fed occasionally on settler's crops and were considered pests, and all were valuable as table fare or to sell at local and big city



Coyote - Photo by Carter Oliver

markets like Chicago. The spread of railroads into the Midwest in the 1860s and 1870s allowed hunters to reach the best hunting grounds and permitted shipping frozen game to markets in Chicago, Milwaukee and as far as New York City. Game was served as a delicacy in many eastern restaurants in the late 19th century. As city dwellers developed more leisure time in the 1880s, hunting for sport or recreation also became more popular.

The take of game birds was enormous. A single net could capture 1,500 passenger pigeons. Entire flocks of turkeys could be pot shot from the roost on cold winter nights. Hunters could occasionally take 100 or more prairie chickens in a day (seasonal takes of 900 or more chickens were recorded). Sport hunters were able to take up to 100 ducks in a single day. The best market hunters could take up to 3,000 ducks in a season. One group of 7 hunters shipped 14,000 ducks east in a single year. A careful hunter willing to pick his shots could take a half dozen mallards or 8 or 9 prairie chickens with a single shot. Avid woodcock hunters could take 40 birds a day; one market hunter took up to 3,000 woodcock a year in northeast Iowa. A hunter could easily take several ruffed grouse in a day but apparently few were ever sold at market. A variety of shorebirds - snipe, long-billed and Eskimo curlews, marbled godwits, upland and golden plovers were frequently hunted and at least some sold at market. Whooping and sandhill cranes were also hunted for the table and because they were a pest in grain fields.

But as hunting pressure increased in the 1870s and 1880s, habitat loss was also accelerating. Iowa was becoming settled. Nearly every square mile of land had several farm families living on it. New farmers looked to more ways to create tillable land. Much of the forested land that remained into the 1870s was turned into pasture. Cattle, sheep and hogs destroyed the undergrowth and competed with wildlife for acorns and other native food. A variety of species that so far had been able to withstand the hunting pressure alone began to be affected by the increasing fragmentation and elimination of their habitats. Whatever the reason - unregulated hunting, habitat loss, or more likely a combination of both - much of the wildlife that had existed here for centuries was in severe decline by the late 1870s.

Ever smaller flights of passenger pigeons continued into the mid-1870s, dwindled more into the 1880s and 90s and were gone by 1900. Wild turkeys were gone from northeast Iowa by 1854, from most of central Iowa by the 1870s, and disappeared from southern Iowa by 1910. Ruffed grouse were able to hold on into the 20th century only in the most heavily forested counties of northeast Iowa.

Prairie chickens and bobwhite quail fared somewhat better. Opening the prairies to grain farming provided an alternate winter food supply in grain stubble. More reliable foods allowed their numbers to increase and their range to expand as long as there was enough prairie remaining for nesting and winter cover. Prairie chicken numbers may have peaked in the 1870s. After that prairie chickens and quail began declining as too much prairie was converted to crop fields. Both hung on at lower numbers well into the 20th century.

Waterfowl and shorebirds continued to migrate in large numbers through Iowa until the end of the 19th century. Fewer were produced here as prairies were turned over and wetlands drained, but spectacular migrations from the breeding grounds on the prairies to the north undoubtedly softened the blow of local habitat loss. By the 1890s, however, the loss of wetlands was taking a toll and by 1900 market hunting was a thing of the past. The last Sandhill and Whooping crane nests were found in Hancock County in 1894, the last long-billed curlew nest in 1890, and the last giant Canada goose nest in 1910.

Clearing of forests, conversion of native prairies to farm fields and the draining of wetlands eliminated many species of songbirds, reptiles and amphibians. Most of the loss went unnoticed by settlers, and by the time the first naturalists began studying the flora and fauna of Iowa, much change had already occurred and went unrecorded.

Species	Suspected Extirpated from Iowa
American Bison	1870
Black Bear	1876
Bobcat	About 1900
Carolina Parakeet	1870s
Eskimo Curlew	1901
Giant Canada Goose	1930s

Greater Prairie-chicken	1955
Long-billed Curlew	1890
Mountain Lion	1867
Passenger Pigeon	1896
Sandhill Crane	1894
Trumpeter Swan	1883
Wapiti (Elk)	1871
White-tailed deer	Prior to 1885
Whooping Crane	1894
Wild Turkey	1913
Wolf	Prior to 1910

Laws enacted to protect declining species generally addressed harvest levels but did not provide mechanisms for preventing habitat loss. For most of Iowa's early history harvest activity was totally unregulated. Seasons, bag limits, shooting hours and restrictions on weapons effectively did not exist or were not enforced. Settlers shot game for the table year around as they could find it. Sport and market hunters were active primarily in fall and spring to exploit concentrations of migratory birds. By the 1870s market hunters were building freezers to prolong their ability to market their products. Nesting birds suffered the additional indignity of having their eggs collected for food or by egg collectors, a common hobby in the later 1800s. There seemed to be no need for regulation - the game seemed limitless, far more than anyone could possibly use.

Fish

Since the time of settlement by Europeans in the early to mid-19th century, the natural resources of the state of Iowa have undergone extensive changes. The development of Iowa for the agricultural, industrial, and urban-residential uses that exist today has caused several types of changes to the aquatic resources of Iowa. Extensive agricultural use of the landscape increased the levels of sediment and the turbidity in Iowa's lakes and flowing waters. The straightening of once-meandered stream and river channels reduced both the amount and quality of the habitats available for Iowa's aquatic life. The more rapid movement of water from the altered landscape increased the magnitude of flood flows in Iowa streams and rivers, thus causing erosion of stream banks and lowering (degradation) of the channels of streams and rivers. As part of channel straightening, the natural vegetation bordering stream channels, including trees, was removed. An additional threat to Iowa's native fishes is the introduction of non-native invasive fishes. Such impacts began almost 140 years ago with the intentional introduction of the Common Carp to Iowa waters in the early 1880s. Invasive species continue to be a concern such as the late 20th century arrival of the Bighead Carp and Silver Carp in the state's waters.

The types of aquatic life that inhabit a stream, river, or lake reflect the physical and chemical quality of the aquatic environment. Changes in distributions of Iowa's fishes closely reflect the changes that have occurred over the approximately 180 years of agricultural, industrial, and municipal development in the state. Several fish species that were unable to adapt to the changed aquatic environments have been eliminated from the state's waters. Another group of fishes continues to exist in the state but occur in an increasingly smaller number of areas with some limited to a single stream segment. The status of several species remains poorly-known. The majority of Iowa fishes, however, appears to have adapted to the changed conditions in the aquatic habitats and continue to thrive in the state.

Freshwater mussels

Mussels were a seemingly inexhaustible resource in Iowa's rivers and streams. Freshwater mussels were collected for use in a variety of industries, but primarily for use in the manufacture of pearl buttons. Use of freshwater mussels for the pearl button industry began in 1891. In three years alone (1912-14), it is estimated that 672 tons of mussels were taken from Iowa's interior rivers (Coker 1919). As Coker (1919) described:



Hickorynut - Photo from MSIM Program

“It was the custom of the early shellers, as now, to gather the river-run of mussels and cook out the meats of all, but the shells of only two or three species were saved, while the others were thrown away as worthless. The shellers cooked out the entire lot of mussels in the hope of finding additional pearls and slugs. The shelling and the button industries, therefore, have a history similar to many other American industries in that the pioneers wasted large quantities of good material through lack of knowledge and experience and while secure in the thought that the supply was inexhaustible.”

Shell button factories in Mississippi River towns began with the first big pearl strike on the Iowa reach of the Mississippi in 1889 and the beginning of the pearl button industry in 1891. Between 1898 and 1916 there were 300 professional “clambers” working the Mississippi between Burlington and Clinton, Iowa. However, in response to over-harvesting and pollution, large-scale clamming with dredges was outlawed in Wisconsin in 1915, and by 1946 it was outlawed altogether below Muscatine, Iowa.

It may be that the entire historic mussel community in Iowa will remain unknown. What is known is that Iowa’s rivers and lakes have changed radically over the last 150 years. The Big Sioux River in northwest Iowa was once known as the “Silvery Sioux” for its clear water flowing over a gravel bottom. Iowa’s rivers today have been altered by channelization and levees that isolate them from their floodplains, sediment accumulation from uplands and incised banks covering their historic gravel beds, nutrient enrichment leading to low oxygen levels, higher high flows due to drainage in their watersheds, lower summer flows due to lowered water tables, dams that obstruct fish passage and a host of other factors related to fish and mussel habitat.

Change Continues in the 20th Century

In less than a century the landscape of Iowa was changed more by settlement than that of any other state. In 1900, most of Iowa’s 2 million residents lived on small, nearly self-sufficient farms of 100 acres or less. They subsisted on corn, wheat, oats, hay and a variety of livestock. Iowa had been converted from a seemingly limitless prairie-forest-wetland mosaic into a domesticated landscape of small farms, grain fields and pastures. There were still undrained sloughs and wet pastures on many farms and tracts of prairie could still be found to remind farmers of vintage Iowa, but these native areas were scattered and becoming ever smaller. In the early 20th century they were still looked on as waste areas needing conversion to a more productive use. Most of Iowa’s native wildlife was either gone or reduced to such low numbers that rabbits, squirrels, quail and the occasional prairie chicken were the only game animals available to most hunters.

The changes in Iowa’s landscape in the 20th century were less dramatic but in some ways more devastating. Wildlife and its habitats were impacted by constant improvements in farming technology and the effects of government agricultural policy on farmers’ decisions about how their land would be used.

Improved Farming Technology

Change was slow at first. Much of northern Iowa was too wet to permit iron-wheeled tractors to function so gasoline-powered equipment did not replace horses on a large scale until rubber balloon tires became available in the late 1930s. Hybrid seed corn was introduced in the 1930s to improve yields; for the first time more crops could consistently be raised than was needed for use on the farm. Farming ever so gradually became less a way of life and more of a business.

Industrial technology developed during World War II rapidly accelerated the pace of change. By mid-century mechanical planters, harvesters (hay balers, corn pickers and grain combines) and grain handling equipment were reducing the need for hand labor. Repeated field cultivation for weed control was the norm, but control in cultivated fields was a constant and frequently unsuccessful battle for farmers. Inefficient harvesting equipment often left a substantial part of the crop in the field.

Labor saving devices permitted farmers to handle ever-larger farming operations. In the 1950s the average northern Iowa farm had grown to 250 acres but was still a diverse operation of livestock, small grains, hay and corn. Foxtail-choked cornfields with plenty of waste grain were a pheasant hunter’s delight and a source of food and cover for a variety of other game and nongame wildlife.

The last half of the century brought even more change. Modern tiling machines could mechanically dig and insert underground perforated field tiles to drain even the wettest areas. The use of agricultural chemicals - herbicides, pesticides, and fertilizers - became the norm and weeds and insects were, if not conquered, at least minimized as a threat to crop yields. The first pesticides were organochlorines -DDT and its derivatives- that had devastating long-term effects on bird populations that led to the ban on their use in the 1970s. Soybeans were introduced as a cash crop and genetically modified crops with built-in pesticide resistance were developed. Livestock operations shifted from on-the-farm to confinement operations and the need for extensive livestock forage (hay and small grains) was reduced. Crop rotations eventually were simplified to continuous corn or soybeans or corn-soybean rotations over most of the state. Planting and harvesting equipment and the tractors to pull them became ever larger. Modern grain combines became so efficient that little waste grain or crop residue was left in the fields for wildlife food or cover.

By 2000, the average farm had increased to more than 340 acres (Figure 2-1). The number of farms in Iowa decreased from 203,000 in 1950 to just 93,000 in 2007 (USDA and Census Bureau - Census of Agriculture). In 2024, the National Agricultural Statistical Survey estimated there were 86,700 farms operating 30,000,000 acres of farmland and averaging 346 acres/farm. Nearly every rural county in Iowa is experiencing a continuous outmigration, primarily by young people seeking jobs no longer available as farm size and mechanization has increased. Iowa is trending toward a more urban populace. By 2020, the population of Iowa was 62% urban, up from 25.6% in 1900 (U.S. Census Bureau), and 51% in 1980 (U.S.D.A. Economic Research Service). In 2020, Iowa's population was about 3.2 million.

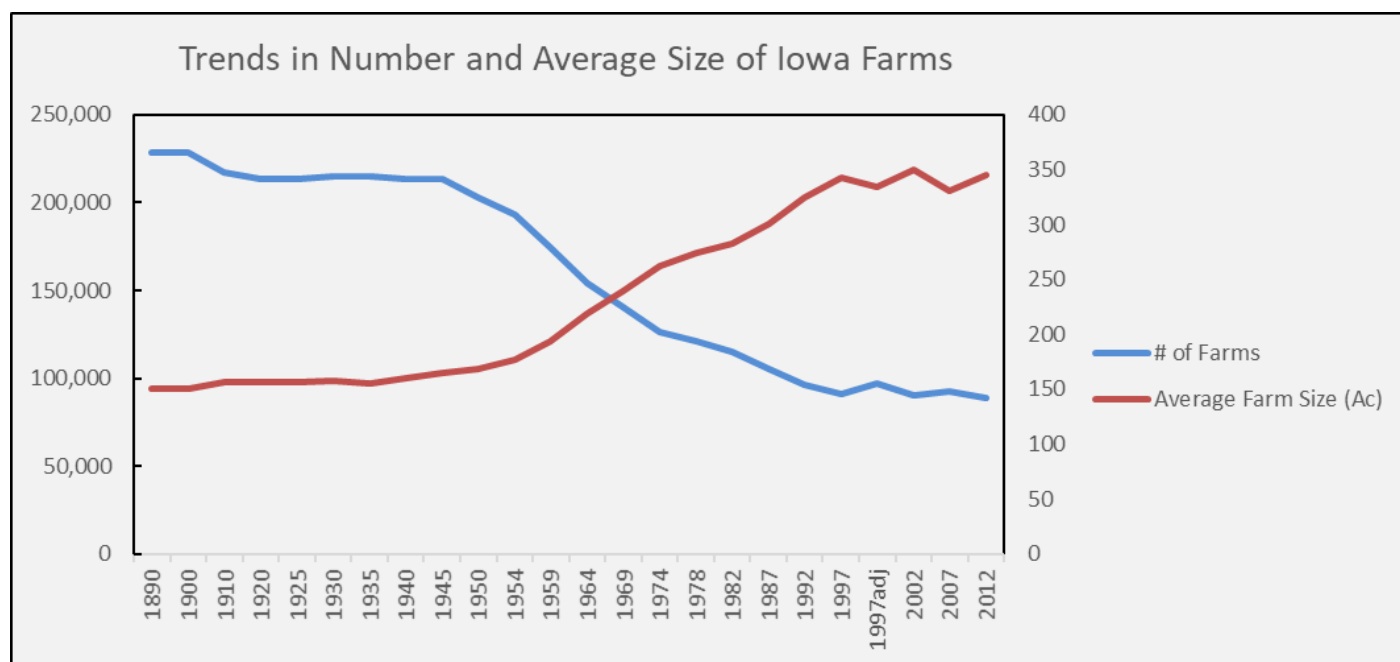


Figure 2-1. Trends in number and average size of Iowa farms. Data compiled by Iowa State University, Iowa Community Indicators Program, from various sources: 1900-1950: National Historical Geographic Information System: Pre-release Version 0.1. Minneapolis, MN: University of Minnesota 2004; 1954-1974: "Number of farms by County, years 1940 to 1997," originated by Chris Kahle, Iowa Department of Natural Resources, Iowa Geological Survey, compiled February 2003; 1978-1992: USA Counties, U.S. Census Bureau; 1997-2012: Census of Agriculture, National Agricultural Statistics Service, U.S. Department of Agriculture

US Department of Agriculture (USDA) farm policies

Government farm policy also played a role in accelerating these changes. Congress passed the first of several programs to retire crop land and spur agricultural income in the depth of the depression in the 1930s. Farm policy shifted to all-out production during World War II. By the mid-1950s farm prices were again depressed and a second, 10-year land retirement program (the Soil Bank) was implemented. Pheasants, bobolinks and other grassland birds responded to the increased habitat until the program ended in 1965.

For the next 20 years USDA required farmers to set aside up to 10 percent of their crop land in order to participate in subsidy programs. These set-aside acres were rotated annually and never developed permanent wildlife cover. Their

value to wildlife was limited - some biologists claimed they had a net negative effect on pheasants and other ground-nesting birds because set-aside acres had to be mowed for weed control just at the time birds were nesting.

In the early 1970s grain export quotas were removed to open up international markets. Row crops in Iowa grew by more than 3 million acres at the expense of hay and pasture (Figure 2-2), most in the southern third of Iowa. The distribution of the ring-necked pheasant nearly reversed itself as a result. The new croplands in southern Iowa allowed pheasants to flourish where the bobwhite quail had been the dominant game bird. The added pressure to raise row crops eliminated most of the remaining wildlife habitat in northern Iowa, however, and pheasant populations there plummeted.

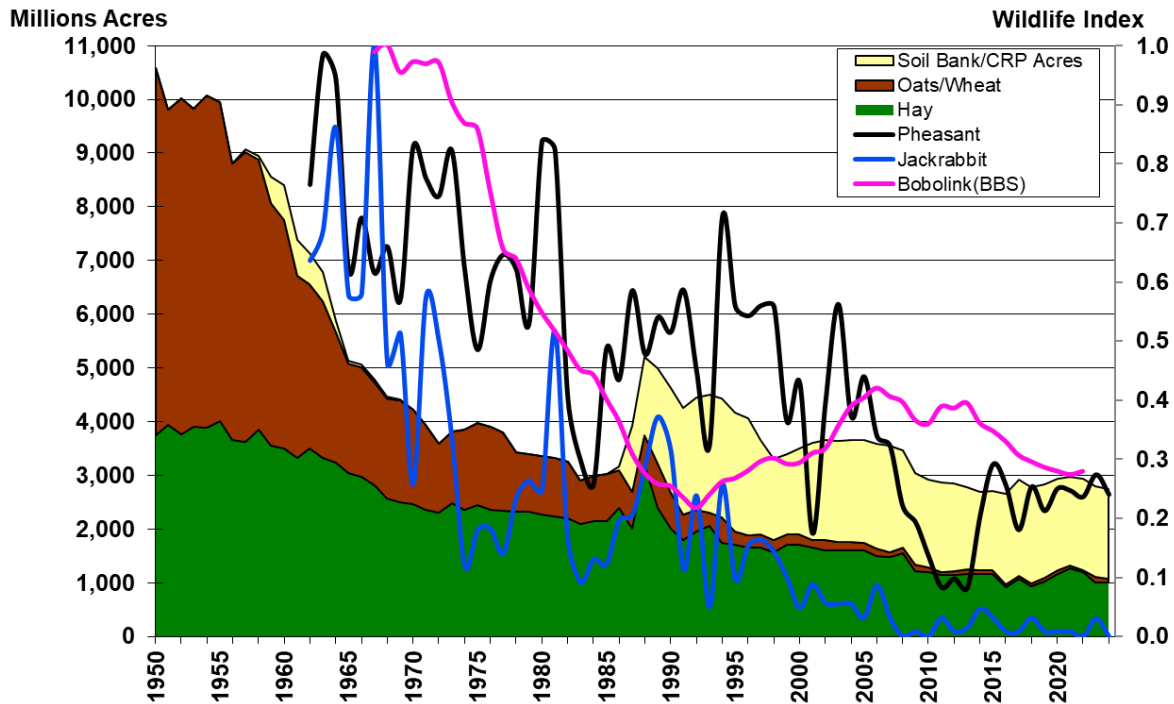
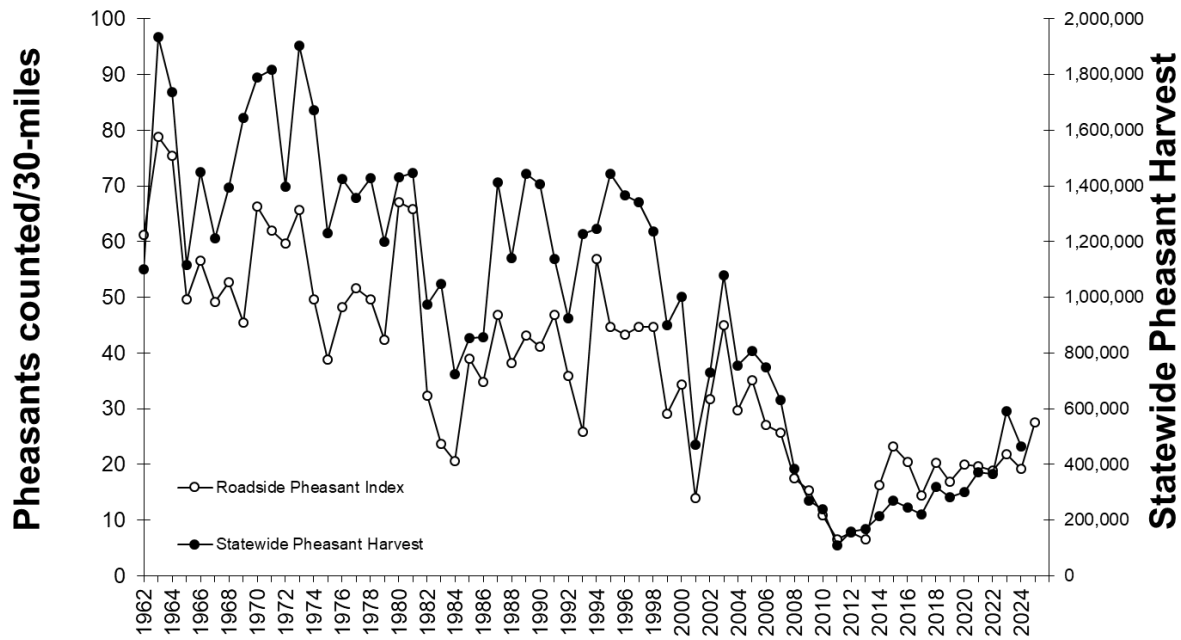


Figure 2-2. Changes in Cropping Patterns and Representative Grassland Wildlife.

The increased row crop acreage also put added pressure on Iowa's remnant forests. Pasture that was converted to row crops had to be replaced, so bulldozing timber to create new pasture became a popular practice. Iowa's forestlands hit their all-time low - 1.5 million acres - during the U.S. Forest Service's 1974 inventory of forestlands.

In the midst of another farm economic crisis in the 1980s a third 10-year land retirement program - the Conservation Reserve Program (CRP) - was introduced to supplement farm income. CRP fields were mostly planted to cool season grasses like smooth brome that provided valuable nesting cover for grassland wildlife. Iowa's pheasant populations and harvest, both in the midst of a 20-year decline, rebounded quickly (Figure 2-3). In northern Iowa, pheasant numbers increased wherever CRP fields were planted and increases were also recorded in the southern half of the state. But, as the initial 10-year contracts matured, the benefits to game birds in southern Iowa declined. Brome developed a thick sod and annual weeds (important foods for birds) were eliminated. Southern Iowa counties that had the maximum of 25 percent of their cropland enrolled in CRP saw declines in pheasants and quail.

Statewide Pheasant Trends



Mean number of pheasants counted on 30-mile August roadside survey routes, statewide, 1962-present compared to total statewide pheasant harvest.

Figure 2-3. Mean number of pheasants counted in 30-mile August roadside survey routes, statewide, 1962-2024, compared to statewide pheasant harvest.

DNR-sponsored research would eventually find that some nongame birds like Henslow's sparrows that nested in mature grasslands would respond to the habitat provided by older CRP fields. Small mammals and the avian and mammalian predators that fed on them would increase also. The return of the bobcat to Iowa is at least partly explained by the prey provided in CRP fields.

When it was established by the Food Security Act of 1985, the CRP program was intended to enroll 40 million acres nationwide. At the end of fiscal year (FY) 1986, Iowa had enrolled 76,469 acres into CRP. As of 2023, the national acreage cap is set at 27 million acres. At the end of FY24, Iowa had 1,674,236 acres enrolled in the program. Over time, subsequent Farm Bills have included a number of other permanent and short-term programs designed to provide soil and wildlife conservation benefits as well as subsidize the production of commodity crops. The Continuous CRP (buffer strips), Wetland Reserve Easements (WRE), Conservation Stewardship Program (CSP), Environmental Quality Incentives Program (EQIP), and others have been beneficial. These programs change with different iterations of the farm bill. As a result, conservation agencies must be aware of changes and be flexible in order to ensure that wildlife benefit from these programs.

Summary

The result of improved agricultural technology, economic drivers for agricultural producers, and decades of ever-changing and sometimes-conflicting farm policy has been a gradual and long-term decline in wildlife habitat on private agricultural lands and a decline in rural communities. Farm operations have shifted from diversified agriculture to corn and soybean monocultures. Between 1926 and 2024 in Iowa, corn and soybean acres planted increased from 11.2 million acres to 22.9 million acres (NASS, 2025). Small grain acreage decreased as well. For example, acres of oats planted in Iowa decreased from 6.1 million acres in 1929 to 225,000 acres in 2024 (NASS, 2025). Larger farms and field sizes have eliminated fencerows, windbreaks, waterways and other on-farm habitat. The nearly exclusive use of farm chemicals for weed and insect control has eliminated food and cover for songbirds and other wildlife. Conservation practices subsidized by various titles of farm legislation have helped slow this trend, but the funding available to implement them has never been comparable to the amount USDA has spent subsidizing commodity crops, which encourages increased production.

The impact of these trends on wildlife that utilize agricultural lands has been slowly devastating. The loss of grasslands to row crop agriculture has resulted in substantial declines in most native grassland wildlife, e.g., bobolinks and white-tailed jackrabbits (Figure 2-2). Even the popular ring-necked pheasant has experienced declines, although the population has recently been climbing (Figure 2-3). Other examples can be found in *Trends in Iowa Wildlife Populations and Harvest* (2022 and earlier years) published by DNR and available for download on the DNR website.

These landscape changes have impacted aquatic wildlife as well, although they are not as well documented. Advertisements to attract settlers to Iowa in the 1850s stressed the vast acreages of fertile soils, abundant wildlife and sparkling clean waters teeming with game fish.

By the early 20th century, however, conservationists Aldo Leopold and Jay N. "Ding" Darling were decrying the excessive erosion of soils that had been denuded of their vegetative cover and the excessive siltation of Iowa's waters that resulted. Loss of vegetative cover, excessive grazing, channelization of streams, and shoreline alterations led to accelerated siltation and the transport of pesticides and fertilizers into aquatic systems from agricultural fields. Heavy silt loads altered water turbidity and temperature regimes. Streambed degradation and the loss of submersed and emergent plants frequently followed. As the silt settles it can cover existing bottom substrates and alter the entire natural community.

All of these alterations to native habitats, aquatic plant communities and wildlife increase the opportunities for invasive exotic species to supplant native wildlife. Alien species like carp further increased water turbidity and in many cases made smaller water bodies unsuitable for native fish.

Wildlife Conservation

Wildlife Restoration

Not all wildlife trends of the past half-century have been negative. The creation of the Iowa State Conservation Commission (now the Iowa Department of Natural Resources or DNR) in 1935, the gradual development of wildlife science and management as professions after World War II, and the formation of DNR's Wildlife Diversity Program in 1981 have returned a portion of Iowa's native wildlife to the state. White-tailed deer, wild turkeys and giant Canada geese are now more abundant than at any time since the late 1800s. Other restoration programs have returned river otters to the state's streams, and peregrine falcons, ospreys and trumpeter swans nest again in Iowa. Bald eagles, bobcats and Sandhill cranes have reappeared as a result of successful conservation programs here and elsewhere. Details of these and other wildlife restoration programs are explained in *Trends in Iowa Wildlife Populations and Harvest - 2021-2022*.

Land Acquisition

DNR has also pursued land acquisition programs to permanently protect and enhance wildlife habitat. Since 1972 Iowa waterfowlers have been required to purchase an Iowa Migratory Game Bird Stamp in addition to the Federal Migratory Bird Hunting and Conservation Stamp ("Duck Stamp"). Since 1979 all hunters have been required to purchase an Iowa Habitat Stamp along with their hunting license. Proceeds from these stamps are dedicated to habitat protection and management. Funds from the State Habitat Stamp are shared equally with Iowa's 99 County Conservation Boards.

DNR has doggedly sought funds for habitat protection through the North American Wetlands Conservation Act, Wildlife Restoration and Sportfish Restoration funds, Cooperative Endangered Species Conservation Program grants, State Wildlife Grants, Iowa County Conservation Boards and others. DNR also partners with NGOs to extend the reach of state and Federal funds. The Iowa Natural Heritage Foundation, Ducks Unlimited, Pheasants Forever, the National Wild Turkey Federation, and The Nature Conservancy have been major cooperators with DNR's habitat protection programs. Numerous other NGOs and individual private contributors have helped as well.

In spite of consistent efforts to protect wildlife habitat, Iowa remains one of the states with the highest proportion of privately held land (Map 2-3). In 2004 as the IWAP was first being developed, public conservation lands accounted for just over 600,000 acres, or just 1.7% of the land area of the state. In 2015 when the last version of the Plan was being written, public conservation lands were estimated at 895,907, or 2.48% of land area of the state. Some of this increase was due to land protection, however, most of that increase is attributable to an improved estimate due to technological

improvements which allow for increased data sharing between cities, counties, state, and federal entities. In 2025, the public conservation lands are estimated to be 916,213 acres, or 2.5% of the total land area of the state.

The DNR owns nearly half of the public conservation lands (406,857 acres), including wildlife management areas, state parks, and state forests. Federal land ownership accounts for 288,383 acres (0.80% of Iowa's land area). Primary federal land management agencies in Iowa include the Army Corps of Engineers, with 38,206 acres in four flood control reservoirs, and the US Fish and Wildlife Service with its 5 national wildlife refuges in the State. DNR has land management agreements on portions of the reservoirs but little control over water levels. County Conservation Boards own 181,328 acres. (This accounting does not include the Road Rights of Way owned and managed by the U.S. or Iowa Departments of Transportation.)

Unlike most other states across the Midwest and West, Iowa does not have a significant presence of lands owned by the US Forest Service, Bureau of Land Management, or the National Park Service (Table 2-5). Therefore, unlike other states which have significantly higher federal land bases, a relatively high proportion of Iowa's habitat base is managed by the Iowa DNR, County Conservation Boards, and of course, private landowners.

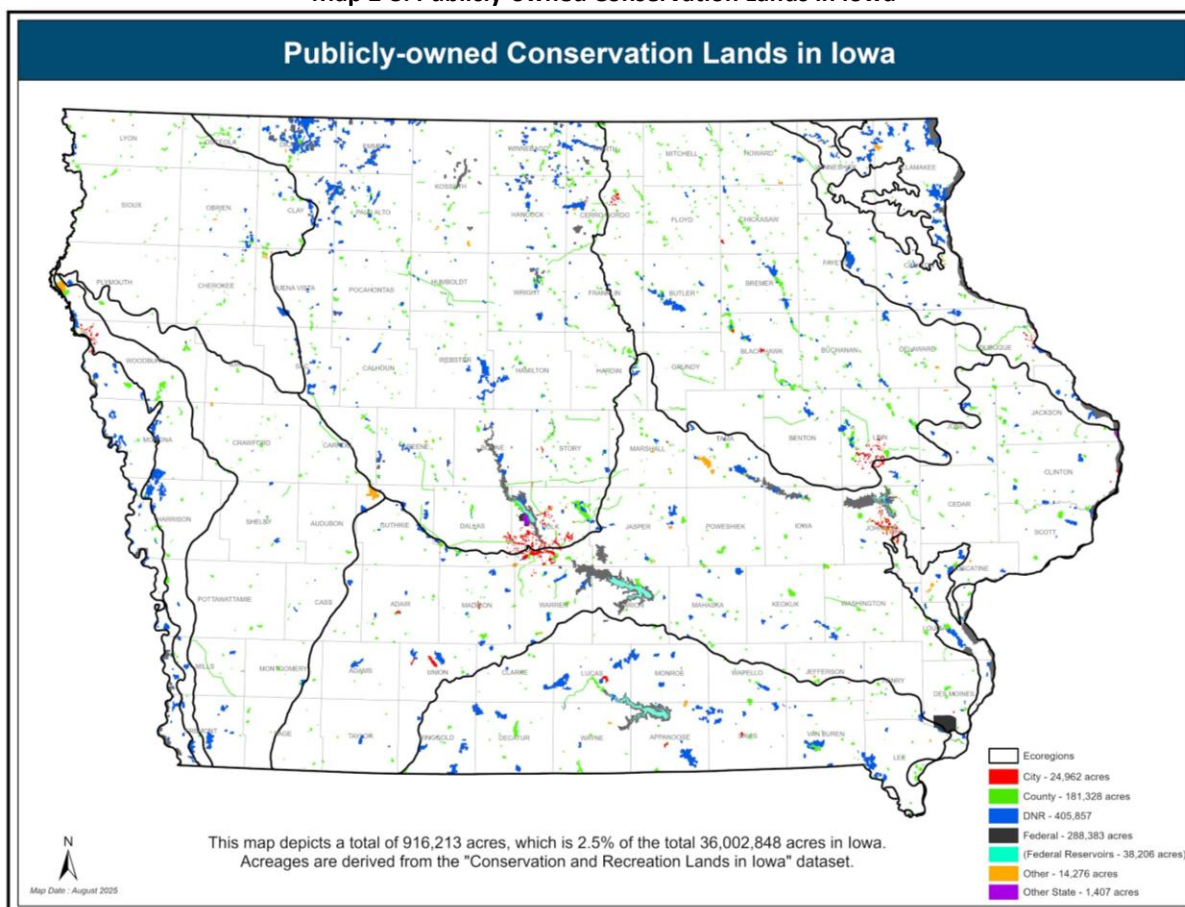
**Table 2-5. Estimates of federal land area for eight Midwest states.
Iowa Data from Iowa DNR, Other State Data from Congressional Research Service (CRS) 2020.**

State	Total Surface Area (acres)	Federal Land	Proportion Federal
Iowa	35,860,480	288,383	0.80%
Illinois	35,795,200	423,782	1.20%
Kansas	52,510,720	253,919	0.50%
Minnesota	51,205,760	3,503,977	6.80%
Missouri	44,248,320	1,702,983	3.80%
Nebraska	49,031,680	546,852	1.10%
South Dakota	48,881,920	2,640,005	5.40%
Wisconsin	35,011,200	1,854,085	5.30%

Habitat on private lands

Wildlife habitat on private lands has also received attention from DNR programs. Farm Game Habitat crews roamed the state in the 1950s and 1960s helping landowners establish habitat on their property. In 1971 the number of DNR wildlife management biologists was doubled and they were housed in USDA farm service center offices to promote contacts with private landowners. In the 1980s farmstead shelterbelts and switchgrass cost-sharing programs were introduced to promote these practices on private land. For the past 20 years DNR biologists have actively promoted USDA farm bill practices (e.g. CRP, WRP) that provide landowners funds to assist with developing wildlife habitat.

Map 2-3. Publicly-owned Conservation Lands in Iowa



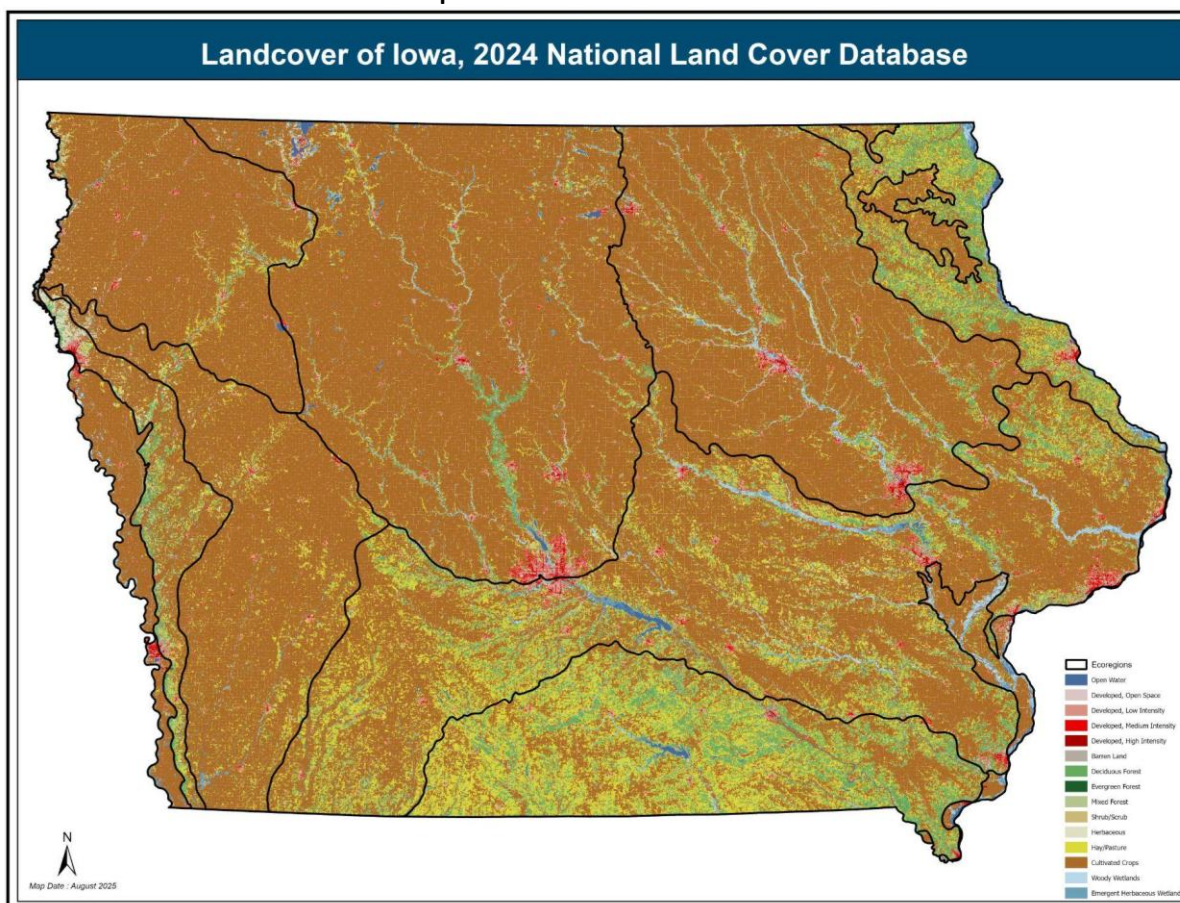
The Wildlife Bureau's Private Lands Program (PLP) was formed in 2002 to take better advantage of wildlife-friendly USDA farm programs of that era like the Landowner Incentive Program (LIP) and Wildlife Habitat Incentive Program (WHIP). In 2017, the program was restructured to also include private lands (District) Foresters. Now in its 24th year, the Private Lands Program is successful in Iowa because of its many partnerships including Natural Resources Conservation Service, Farm Service Agency, Pheasants Forever, Fish and Wildlife Service, Soil and Water Conservation Districts, Wildlife Management Institute, and most importantly, Iowa's landowners. The PLP uses this Plan and the Iowa Forest Action Plan as strategic guidance, working with any interested landowners but also trying to direct staff and resources to highest priority conservation issues. PLP biologists and foresters work with hundreds of landowners annually, providing technical assistance and ensuring that conservation programs provide benefits to Iowa's forest, fish, and wildlife resources.

Iowa's Natural Communities Today

The result of a century and a half of change as a result of human intervention on Iowa's landscape has been a shift in the composition of Iowa's plant communities and the wildlife that inhabits them. Few undisturbed natural plant or wildlife communities exist today. Approximately 0.2% of Iowa's native prairies (47,000 acres including remnant, restored and reconstructed prairies), 7.4% of its wetlands (294,081 acres of herbaceous wetlands estimated in 2024 NLCD), and 38% of its forests (2,568,270 acres of forest estimated in 2024 NLCD) remain.

Map 2-4 shows the land cover in Iowa in the year 2024. The majority of the state is covered with rowcrops, primarily corn and soybeans. Most of the remainder of the state is in grassland, often conservation reserve, road ditches or pasture, with lesser acreages of timber and other habitat types. More details on the current status of Iowa's wildlife are provided in Chapter 3, and the status of wildlife habitats in Chapter 4.

Map 2-4. Landcover of Iowa in 2024



Percentage of Iowa for Each Land Cover Class

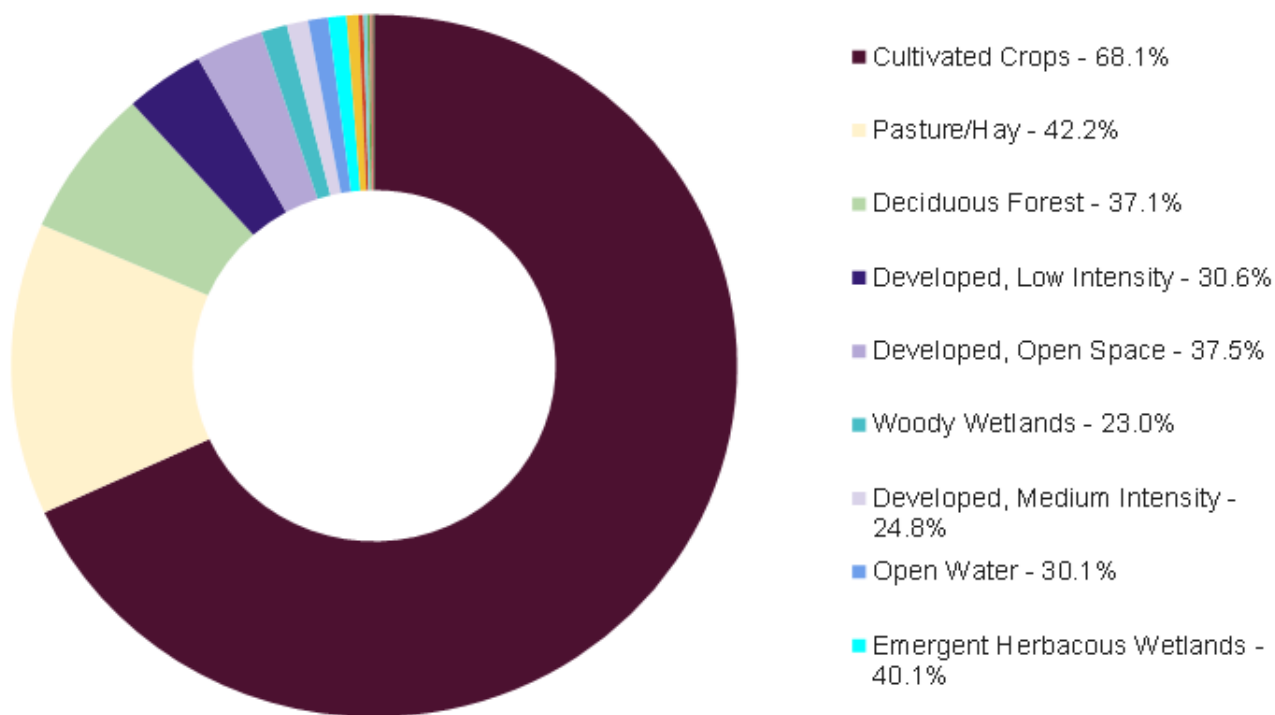


Figure 2-4. Percentage of Iowa's total acreage for each Land Cover Class. From 2024 National Land Cover Dataset.

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Chapter Three

Iowa Fish and Wildlife and Species of Greatest Conservation Need

Required Element #1: “Information on the distribution and abundance of species of wildlife, including low and declining populations as the state fish and wildlife agency deems appropriate, that are indicative of the diversity and health of the state’s wildlife.”

Species Included in the Iowa Wildlife Action Plan

The DNR is the sole agency given the responsibility to manage Iowa's fish and wildlife resources, preserve their habitats (Code of Iowa, Chapter 455A), and establish and protect state-listed endangered or threatened species (chapter 481B.4 and Iowa Administrative Code Chapter 571-77(481B)). Iowa law recognizes that *wildlife* includes any species of wild mammal, fish, bird, reptile, amphibian, mollusk, crustacean, arthropod, or other invertebrate (Code of Iowa sections 456A.24, 481A.1, 481A.38, 481A.39, 481A.48, 481B.1). In addition to taxonomic groups designated as *wildlife* in Iowa law, this Plan is intended to guide conservation of all Iowa’s native fauna for which an adequate level of information is available to assess the conservation status and needs. The first edition of the Plan included all the vertebrate taxa as well as butterflies, land snails, fresh water mussels, dragonflies, and damselflies. For the 2015 version, crayfish were added. This version adds consideration of bumble bees, a small subset of the moth fauna, and plants. A total of 1,601 species were evaluated by subcommittees. Subcommittees considered all species which have been documented in Iowa, including some species which may be occasional visitors, expanding their range, have been introduced, or have already been extirpated (Table 3-1).

Determining the Species of Greatest Conservation Need

Taxonomic subcommittees of the IWAP Wildlife Working Group evaluated the status of all species considered for their focal group. The same status assessment criteria were used for all species which are native to Iowa, not already extirpated from the state, not vagrant or accidental in their occurrence within Iowa, and for which there is adequate information to assess conservation status. Until the implementation of the Wildlife Action Plan, Iowa had long lacked a systematic survey to document the distribution and abundance of most wildlife species. Therefore, varying amounts of information were available for subcommittee members to use when assessing taxonomic groups, as a whole, as well as individual species.

Table 3-1. Number of species evaluated by the IWAP.

IWAP taxonomic subcommittees evaluated all species with validated occurrence records for Iowa (includes vagrant species, exotic/introduced species, and those which are now presumed extirpated).

Phyla	Class	Taxonomic Group	Species	List location
Chordata	Amphibia	Amphibians	25	Appendix 3
Chordata	Reptilia	Reptiles	47	Appendix 4
Chordata	Aves	Breeding birds	197	Appendix 5
Chordata	Aves	Non-breeding birds ¹	210	Appendix 6
Chordata	Mammalia	Mammals	81	Appendix 7
Chordata	Actinopterygii, (Ray-finned fishes), Cephalaspidomorphi (lampreys), & Chondrichthyes (cartilaginous fishes)	Fishes	156	Appendix 8
Mollusca	Bivalvia	Mussels	54	Appendix 9
Mollusca	Gastropoda	Terrestrial snails	90	Appendix 10
Arthropoda	Insecta, Order Hymenoptera	Bumble Bees	15	Appendix 11
Arthropoda	Insecta, Order Lepidoptera	Butterflies	127	Appendix 12
Arthropoda	Insecta, Order Lepidoptera	Moths	32	Appendix 13
Arthropoda	Insecta, Order Odonata	Dragonflies and Damselflies	120	Appendix 14
Arthropoda	Malacostraca	Crayfishes	8	Appendix 15

Phyla	Class	Taxonomic Group	Species	List location
Kingdom Plantae	All classes of plants in Iowa	Plants	439	Table 3-16
		Total species evaluated	1,601	

¹Species that do not nest in Iowa but migrate through the state.

Development of Species Conservation Status Assessment Criteria

We utilized 8 criteria to assess the conservation status of all native, extant Iowa wildlife species. For the 2015 revision, an ad hoc working group of the Wildlife Working Group considered a variety of conservation status assessment schemes, from the published literature, before ultimately developing a set of criteria that could reasonably be utilized by each taxonomic subcommittee for assessing wildlife in Iowa. These included a species assessment methodology described by Partners in Flight (PIF) as well as NatureServe's ranking system. For the 2025 revision, the full Wildlife Working Group decided to utilize the same 8 criteria, to allow comparisons between 2015 and 2025 results.

The system described in the Partners in Flight (PIF) Handbook on Species Assessment (Panjabi et al. 2012) ranks each species of North American breeding bird based upon seven measures of conservation status:

1. *Population Size* (PS) indicates vulnerability due to the total number of adult individuals in the global population.
2. *Breeding Distribution* (BD) indicates vulnerability due to the geographic extent of a species' breeding range on a global scale.
3. *Non-breeding Distribution* (ND) indicates vulnerability due to the geographic extent of a species' non-breeding range on a global scale.
4. *Threats to Breeding* (TB) indicates vulnerability due to the effects of *current and probable future* extrinsic conditions that threaten the ability of populations to survive and successfully reproduce in breeding areas within North America.
5. *Threats to Non-breeding* (TN) indicates vulnerability due to the effects of *current and probable future* extrinsic conditions that threaten the ability of North American breeding populations to survive over the non-breeding season.
6. *Population Trend* (PT) indicates vulnerability due to the direction and magnitude of changes in population size within North America since the mid-1960s.

NatureServe's Ranking System (Faber-Langendoen et al. 2012), which is used by some state Natural Heritage Programs, also served as a partial basis for the approach used in this assessment. Factors included in NatureServe's Ranking System include:

Rarity

1. Range Extent - defined as the area contained within an imaginary boundary encompassing all known, inferred, or projected sites of present occurrence of a taxon, excluding vagrancy.
2. Area of Occupancy - area within its "extent of occurrence" which is occupied by a taxon, excluding vagrancy.
3. Population - estimated current total of the species within the area of interest (IA)
4. Number of Occurrences - each occurrence is an area of land or water in which a species is or was present
5. Number of Occurrences or % Area with Good Viability - if current conditions prevail, the occurrence is likely to persist for the foreseeable future in its current condition or better
6. Environmental Specificity - degree to which a species depends upon a relatively scarce set of habitats, substrates, food types, or other biotic/abiotic factors within its overall range (this is to be used mostly when the # of occurrences, range extent or area of occupancy are largely unknown)

Trends

1. Long-term Trend - degree of change over ~200 years (for area of interest) in population size, range extent, # of occurrences, and/or % area with good viability.
2. Short-term Trend - same as above, for 10 years or 3 generations, whichever is longer.

Threats

1. Threats - incorporates information on severity, scope, impact and timing
2. Intrinsic Vulnerability - to be used when threats unknown

After discussing these assessment systems, the working group decided on 8 criteria that would be used to assess the species included in Iowa's Wildlife Action Plan (See Appendix 17 for a detailed description of the ranks associated with each of the following 8 criteria):

1. Global Range Extent (all other criteria are for Iowa only)
2. Area of Occupancy
3. Long-term Trend
4. Short-term Trend
5. Ecological Specialization (Population Concentration)
6. Dietary Specialization
7. General Ecological Specialization
8. Threat Not Addressed Above

The Scoring Process

The Wildlife Working Group developed a scoring process in which each criterion was weighted according to our understanding of the relative contribution of each factor to a species' overall conservation status. The theoretical potential score for an individual species ranges from 0 - 3.75. Calculated scores ranged from 0.57 (for the Snuffbox mussel) to 3.75 (for several species of low conservation concern that have been expanding their range within Iowa). See Appendix 17 for a detailed explanation of the criteria used to score each wildlife species.

Not all criteria were expected or intended to have normal distributions. For example, the *Range Extent* criterion exists to significantly reduce the score for the small number of Iowa species which have a global range of less than 40,000 square miles. This is because threats within the Iowa portion of a species' range, with a small overall range, pose greater risk to the species as a whole. Very few species scored a three or lower for this criterion.

Similarly, the *Ecological Specialization - Population Concentration* criterion is intended to highlight those species that aggregate at a small number of locations, and therefore could be at risk of extirpation given one disastrous event during the time period when the population is aggregated. This criterion was not relevant for most Iowa species. Rather, it served to reduce the scores for a small number of species which face this high-risk situation, regardless of their current trend and distribution. Thus, a hypothetical example of an 'average' SGCN species would have a restricted geographic range, occupy only a portion of its former range, be suffering moderate long- and short-term population declines, and be specialized with respect to population concentration, diet, or some other factor. Species with 2 or more fields that are unknown went into a separate "Data Deficient" (DD) category of species - for which information needs are high. These species will be SGCN-DD until such time as there is adequate information to allow assessment of their conservation status. If a species has been extirpated from the state, it was also put into a separate category for further discussion. Examples include the Starhead Topminnow and the Pondmussel. This SGCN-E category was created because some extirpated species are better candidates for conservation efforts than others, depending on whether Iowa remains an important part of their range and whether their conservation status in other areas is stable.

A variety of data resources were utilized by taxonomic subcommittees as they considered which species should be listed as Species of Greatest Conservation Need. In general, the following types of resources were used:

- Published historic and scientific literature;
- Unpublished reports, scientific surveys and databases maintained by the DNR fisheries, wildlife and water quality bureaus (e.g., Natural Areas Inventory, Multiple Species Inventory and Monitoring Program, Statewide Mussel Survey, etc.);
- Personal research and survey data supplied by wildlife ecologists at Iowa educational institutions;
- Museum and personal specimen collections;
- State and regional databases maintained by other conservation organizations (e.g. NatureServe, Partners In Flight, Partners for Amphibian and Reptile Conservation, US Fish and Wildlife Service, US Geological Survey, Iowa Ornithologist's Union, etc.);
- Personal expertise of working group members and consultants.

To determine the list of SGCN from the scores created through the assessments, we combined the wildlife species into one dataset, with the exception of the moth and terrestrial snail species. (The expertise and capacity to address moths and terrestrial snails is limited, so these two subcommittees each selected a relatively small number species to assess. Therefore, including these taxa in the full analysis would have biased the results.) We combined the scores for analysis because separating the data into individual taxa resulted in several groups with non-normal score distributions. Combining these into one group, the dataset was still skewed (more scores with 3+ values) but did have a more normal distribution.

Given the skewedness, we elected to use the Quartiles and Interquartile Range as the methodology for determining where to set the SGCN value (as opposed to the standard deviation), because the Interquartile Range and Median Absolute Deviation method is less impacted by outliers than the Median Standard Deviation. Species with a score that was at or below the 0.5 Median Absolute Deviation from Quartile 2 were considered to be those of Greatest Conservation Need. First, we found the three Quartiles (Q2 is the median of the dataset while Q1 and Q3 are the medians of the remaining data below and above the median, respectively). The Interquartile Range (IQR) is the difference between Q3 and Q1. The Median Absolute Deviation (MAD) is half of the IQR. This methodology resulted in a SGCN list of wildlife species with scores less than or equal to 2.844.

Plants, however, followed a different methodology to determine SGCN status. A working group of plant experts considered records of plants from multiple sources and decided that all native species with fewer than 40 records since 1980, as well as a subset with unknown status, would be considered SGCN.

Table 3-2. Proportion of Iowa Species Designated as SGCN.

Taxonomic Group	2012	2015	2025			
	# of SGCN in 2012	# of SGCN in 2015	# of SGCN in 2025	# Species Evaluated (Valid Iowa Records)	# of Species Assessed (Native Species)	% SGCN of Species Assessed
Amphibians	9	16	8	25	21	38%
Reptiles	23	40	36	47	46	78%
Birds - Breeding	67	78	48	197	190	25%
Birds - Non-breeding	18	34	39	210	190	19%
Mammals	19	22	18	81	53	34%
Fish	74	79	65	156	144	45%
Mussels	29	43	45	54	52	87%
Terrestrial Snails*	8	5	3	90	3	N/A
Bumble Bees	N/A	N/A	12	15	15	80%
Butterflies	38	51	31	127	108	29%
Moths*	N/A	N/A	32	32	32	N/A
Dragonflies & Damselflies	28	30	19	120	107	18%
Crayfish*	N/A	7	4	8	7	57%
Total Fauna	313	405	360	1162	988	36%*
Plants*	N/A	N/A	439	439	439	N/A
Total Fauna and Flora	313	405	799	1601	1427	N/A

*The entirety of the taxonomic groups of native Terrestrial Snails, Moths, and Plants were not assessed for SGCN status due to lack of sufficient information; a subset of species were assessed. This somewhat inflates the percentage of species that were determined to be SGCN of those that were assessed.

The status assessment process resulted in lists of SGCN for each taxonomic group included in the Plan. These lists are displayed in Tables 3-3 through 3-16.

Future Changes to List of SGCN

As research and monitoring progress, Iowa may find that the conservation status scores assigned to each species during the 2025 Comprehensive Review and Revision have changed. Also, Iowa may be able to complete the status assessment for species that were rated Data Deficient in 2025. This section outlines the process that would be undertaken to evaluate changes to the list of SGCN within taxonomic groups already included in the Plan prior to the next Comprehensive Review and Revision, scheduled for 2035.

Step 1: Taxonomic Subcommittee Completes Status Assessment

The taxonomic subcommittee for the relevant taxon would use the approved criteria to re-do the Species Status Assessment for the species in question (see Appendix 17).

Step 2: Wildlife Working Group Review and Notification to Fish and Wildlife Service

Once the Species Status Assessment process is completed, the results will be reviewed for approval by the Wildlife Working Group. If approved by the Wildlife Working Group, then the potential changes to the list of SGCN would be compiled for submission to the US Fish and Wildlife Service (USFWS). The Director of DNR would send a letter of intent to make minor revisions to the Plan to the USFWS Region 3 Coordinator of Conservation Investment (CI) Programs.

Step 3: Public Review and Submittal of Changes to Fish and Wildlife Service

Once the USFWS has been informed of Iowa's intent to complete a minor revision to the Plan, the list of species to be added to the SGCN category will be made available for public review and comment. After public input is considered and integrated, then the proposed changes to the list of SGCN will be submitted to the USFWS for review and approval.

Evaluation of Additional Taxonomic Groups

As additional information about Iowa wildlife becomes available through biological surveys and research, Iowa may consider evaluating other taxonomic groups for inclusion in the Plan. This section outlines the process that would be undertaken to evaluate any potential additional taxa prior to the Plan's next Comprehensive Review and Revision, scheduled for 2035.

Step 1: Completion of Nomination Form by Sponsor

The evaluation process begins when an interested party (hereafter, "sponsor") submits a form to the Wildlife Working Group of the Implementation Committee. The preferred taxonomic level for inclusion in the Plan is an entire order or sub-order of species known to occur within Iowa, but we will consider groups as small as complete genera occurring within Iowa. For that entire taxon, the form requests information such as the list of species with documented occurrences in Iowa, how long the taxon has been studied in Iowa and what portions of the state have been surveyed, a list of publications resulting from the work (if any), and a list of the primary people studying the taxon within Iowa.

Step 2: Wildlife Working Group-Sponsor Consultation

Once a completed nomination form has been received, members of the Wildlife Working Group will work with the sponsor to determine the feasibility of adding the taxon. Feasibility will depend on several issues: whether there are an adequate number of experts knowledgeable about the taxon to develop a taxon-specific subcommittee, whether there are potential sources of funding for research and conservation projects for the taxon, and whether established monitoring protocols for the taxon can be integrated into the Multiple Species Inventory and Monitoring (MSIM) program.

Step 3: Species Status Assessment

If the sponsor and the Wildlife Working Group determine that inclusion of the taxon is feasible, then a taxon-specific subcommittee will be formed. The subcommittee will complete a Species Status Assessment process. To be included in the Plan, all Iowa species within the taxonomic group will need to have the Species Status Assessment Scoring Criteria completed (see Appendix 17.) This forms the basis for determining which species would be listed as SGCN, as discussed above. If two or more criteria are unknown for a given species, that species will be placed in the "Data Deficient" category of SGCN.

Step 4: Wildlife Working Group Review and Notification to Fish and Wildlife Service

Once the Species Status Assessment process is completed, the results will be reviewed for approval by the Wildlife Working Group. If approved by the Wildlife Working Group, then the potential changes to the list of SGCN would be compiled for submittal to the US Fish and Wildlife Service (USFWS). The Director of DNR would send a letter of intent to make minor revisions to the Plan to the USFWS Region 3 Coordinator of Conservation Investment (CI) Programs.

Step 5: Public Review and Submittal of Changes to Fish and Wildlife Service

Once the USFWS has been informed of Iowa's intent to complete a minor revision to the Plan, the list of species to be added to the SGCN category will be made available for public review and comment. After public input is considered and integrated, then the proposed changes to the list of SGCN will be submitted to the USFWS for review and approval.

Tables of Species of Greatest Conservation Need

In June 2026, the Iowa Department of Natural Resources (DNR) completed the process of revising the Iowa Administrative Code (IAC) 571—Chapter 77, which lists the state's Threatened and Endangered (T&E) plants and animals. The proposed rule was not finalized at the time of completion of this revision to the Wildlife Action Plan. Therefore, minor changes were made to correct the state status of T&E species after the final rule was published in June. A list detailing the species with their updated status is available in Appendix 16.

Each of the following tables of SGCN is intended to display a similar suite of information for each taxonomic group included in this plan; including common and scientific names, whether the species is considered data deficient, whether the species is listed as Endangered or Threatened at either the state or federal level, and whether the species is included in the Midwest list of Regional Species of Greatest Conservation Need (RSGCN). For some taxa groups, there may be more information included if relevant, or less included (e.g., some taxa were not included in the RSGCN list).

Table 3-3. Amphibians of Greatest Conservation Need

Taxonomic order and scientific names derived from: The [Society for the Study of Amphibians and Reptiles Standard English and Scientific Names](#) Document.

Nicholson, KE. (ed.). 2025. Scientific and Standard English Names of Amphibians and Reptiles of North America North of Mexico, with Comments Regarding Confidence in Our Understanding. Ninth Edition. Society for the Study of Amphibians and Reptiles. 87pp.

Rows shaded in gray: indicate data deficient SGCN for which information needed to assess conservation status is lacking.

T/E Status: Refers to whether a species is federally listed as Endangered, Threatened, or Proposed for listing at the time of this plan's publication. It also refers to those species with Endangered or Threatened status at the state level. For up-to-date state of Iowa listing information, please see the Threatened and Endangered Species Program page on the [DNR website](#).

- I-E: Endangered in Iowa
- I-T: Threatened in Iowa
- I-SC: Special Concern in Iowa
- F-E: Federally listed as Endangered in the United States
- F-T: Federally listed as Threatened in the United States
- F-P: Proposed for federal listing as an Endangered or Threatened species

Regional SGCN: To access more information about this effort and for the updated list of [Regional SGCN](#).

- R: Species is considered a Regional Species of Greatest Conservation Need in the Midwest.
- W: Watchlist. This is a list of species for which there was concern but insufficient information or differing trends across the region (WA: Watchlist - Assessment Priority). For some species this is because there is a different region of the country that is more important to the species than the Midwest (WD: Watchlist - Defer to adjacent region).
- PR: R: Species is proposed as a Regional Species of Greatest Conservation Need in the Midwest, if a Midwest state lists the species as SGCN.

Assessments of species conservation status undertaken as part of the IWAP are used to determine SGCN status only. Other information is provided as a reference. Updates to State Wildlife Action Plans, NatureServe National Ranks, Federal T&E Status, and State T&E Status are each independent processes, undertaken by different entities with differing timeframes. As such, the various listings or status ranks for a given species at a given point in time may not always appear to be in accord.

	Common Name	Scientific Name	T/E Status	Regional SGCN
1	Blue-spotted Salamander	<i>Ambystoma laterale</i>	I-E	R
2	Small-mouthed Salamander	<i>Ambystoma texanum</i>	I-SC	
3	Tiger Salamander	<i>Ambystoma tigrinum</i>		
4	Eastern Newt	<i>Notophthalmus viridescens</i>	I-T	WA
5	Mudpuppy	<i>Necturus maculosus</i>	I-T	R
6	Plains Spadefoot	<i>Spea bombifrons</i>	I-SC	
7	Great Plains Toad	<i>Anaxyrus cognatus</i>		
8	Crawfish Frog*	<i>Lithobates areolatus</i>		

*Extirpated from Iowa, but reintroduction is a possibility.

Table 3-4. Reptiles of Greatest Conservation Need

Taxonomic order and scientific names derived from: The [Society for the Study of Amphibians and Reptiles Standard English and Scientific Names](#) Document.

Nicholson, KE. (ed.). 2025. Scientific and Standard English Names of Amphibians and Reptiles of North America North of Mexico, with Comments Regarding Confidence in Our Understanding. Ninth Edition. Society for the Study of Amphibians and Reptiles. 87pp.

Rows shaded in gray: indicate data deficient SGCN for which information needed to assess conservation status is lacking.

T/E Status refers to whether a species is listed as either state or federally Endangered or Threatened, at the time of this plan's publication. It also refers to those species with Endangered or Threatened status at the state level. For up-to-date state listing information, please see the Threatened and Endangered Species Program page on the [DNR website](#).

- I-E: Endangered in Iowa
- I-T: Threatened in Iowa
- I-SC: Special Concern in Iowa
- F-E: Federally listed as Endangered in the United States
- F-T: Federally listed as Threatened in the United States
- F-P: Proposed for federal listing as an Endangered or Threatened species

Regional SGCN: To access more information about this effort and for the updated list of [Regional SGCN](#).

- R: Species is considered a Regional Species of Greatest Conservation Need in the Midwest.
- W: Watchlist. This is a list of species for which there was concern but insufficient information or differing trends across the region (WA: Watchlist - Assessment Priority). For some species this is because there is a different region of the country that is more important to the species than the Midwest (WD: Watchlist - Defer to adjacent region).

Assessments of species conservation status undertaken as part of the IWAP are used to determine SGCN status only. Other information is provided as a reference. Updates to State Wildlife Action Plans, NatureServe National Ranks, Federal T&E Status, and State T&E Status are each independent processes, undertaken by different entities with differing timeframes. As such, the various listings or status ranks for a given species at a given point in time may not always appear to be in accord.

	Common Name	Scientific Name	T/E Status	RSGCN
1	Slender Glass Lizard	<i>Ophisaurus attenuatus</i>	I-T	WA
2	Common Five-lined Skink	<i>Plestiodon fasciatus</i>		
3	Great Plains Skink	<i>Plestiodon obsoletus</i>	I-E	
4	Prairie Skink	<i>Plestiodon septentrionalis</i>		WA
5	Six-Lined Racerunner	<i>Aspidoscelis sexlineatus</i>		
6	Western Wormsnake	<i>Carphophis vermis</i>	I-T	
7	North American Racer	<i>Coluber constrictor</i>		
8	Ring-necked Snake	<i>Diadophis punctatus</i>		
9	Western Hog-nosed Snake	<i>Heterodon nasicus</i>	I-E	R
10	Eastern Hog-nosed Snake	<i>Heterodon platirhinos</i>		WA
11	Prairie Kingsnake	<i>Lampropeltis calligaster</i>	I-SC	
12	Speckled Kingsnake	<i>Lampropeltis holbrooki</i>	I-T	
13	*Plain-bellied Watersnake	<i>Nerodia erythrogaster</i>	I-T	R
14	Diamond-backed Watersnake	<i>Nerodia rhombifer</i>	I-T	

	Common Name	Scientific Name	T/E Status	RSGCN
15	Smooth Greensnake	<i>Opheodrys vernalis</i>	I-SC	R
16	Gophersnake (Bullsnake)	<i>Pituophis catenifer</i>	I-T	
17	Western Ratsnake	<i>Pantherophus obsoletus</i>		
18	Graham's Crayfish Snake	<i>Regina grahamii</i>	I-T	
19	Western Ribbonsnake	<i>Thamnophis proximus</i>		
20	Lined Snake	<i>Tropidoclonion lineatum</i>		
21	Smooth Earthsnake	<i>Virginia valeriae</i>		
22	Eastern Copperhead	<i>Agkistrodon contortrix</i>	I-E	
23	Timber Rattlesnake	<i>Crotalus horridus</i>	I-SC	R
24	Prairie Rattlesnake	<i>Crotalus viridis</i>	I-E	
25	Eastern Massasauga	<i>Sistrurus catenatus</i>	I-E, F-T	R
26	Western Massasauga	<i>Sistrurus tergeminus</i>	I-E	R
27	North American Snapping Turtle	<i>Chelydra serpentina</i>		
28	Blanding's Turtle	<i>Emydoidea blandingii</i>	I-T	R
29	Wood Turtle	<i>Glyptemys insculpta</i>	I-E	R
30	Northern Map Turtle	<i>Graptemys geographica</i>	I-SC	
31	Ouachita Map Turtle	<i>Graptemys ouachitensis</i>	I-SC	
32	False Map Turtle	<i>Graptemys pseudogeographica</i>	I-SC	
33	Ornate Box Turtle	<i>Terrapene ornata</i>	I-T	WA
34	Yellow Mud Turtle	<i>Kinosternon flavescens</i>	I-E	R
35	Eastern Musk Turtle	<i>Sternotherus odoratus</i>	I-T	
36	Smooth Softshell	<i>Apalone mutica</i>	I-SC	

*The Copperbelly Watersnake (*Nerodia erythrogaster neglecta*) was renamed Plain-bellied Watersnake (*Nerodia erythrogaster*) after the subspecies designation was removed. However, the northern Distinct Population Segment (DPS) of the Copperbelly Water Snake (*Nerodia erythrogaster neglecta*) is still federally listed as threatened (status not yet updated to show taxonomic name change). This DPS includes northern Indiana, Michigan, and Ohio, and does not include Iowa populations.

Table 3-5. Breeding Birds of Greatest Conservation Need

Taxonomic order and nomenclature derived from: The [American Ornithological Society Check-List of North American Birds](#).

Rows shaded in gray: indicate data deficient SGCN for which information needed to assess conservation status is lacking.

T/E Status Refers to whether a species is federally listed as Endangered, Threatened, or Proposed for listing at the time of this plan's publication. It also refers to those species with Endangered or Threatened status at the state level. For up-to-date state of Iowa listing information, please see the Threatened and Endangered Species Program page on the [DNR website](#).

- I-E: Endangered in Iowa
- I-T: Threatened in Iowa
- I-SC: Special Concern in Iowa
- F-E: Federally listed as Endangered in the United States
- F-T: Federally listed as Threatened in the United States
- F-P: Proposed for federal listing as an Endangered or Threatened species

Regional SGCN: To access more information about this effort and for the updated list of [Regional SGCN](#).

- R: Species is considered a Regional Species of Greatest Conservation Need in the Midwest.
- W: Watchlist. This is a list of species for which there was concern but insufficient information or differing trends across the region (WA: Watchlist - Assessment Priority). For some species this is because there is a different region of the country that is more important to the species than the Midwest (WD: Watchlist - Defer to adjacent region).
- PR: R: Species is proposed as a Regional Species of Greatest Conservation Need in the Midwest, if a Midwest state lists the species as SGCN.

R2R Refers to Road to [Recovery Tipping Point Species List](#).

- Red Alert Species: Very High Urgency (perilously low population size, steeply declining or unknown population trend)
- Orange Alert Species: (large population loss, continued or accelerated decline, conservation reliant)
- Yellow Alert List: Moderate Urgency (large population loss, but now relatively stable, still conservation reliant)

Assessments of species conservation status undertaken as part of the IWAP are used to determine SGCN status. Other information is provided as a reference. Updates to State Wildlife Action Plans, Regional SGCN lists, Federal T&E Status, etc., are each independent processes, undertaken by different entities with differing timeframes. As such, the various listings or status ranks for a given species at a given point in time may not always appear to be in accord. Please visit the links above for updated information.

	Common Name	Scientific Name	T/E Status	Regional SGCN	R2R
1	American Wigeon	<i>Mareca americana</i>			
2	American Black Duck	<i>Anas rubripes</i>			
3	Northern Pintail	<i>Anas acuta</i>	I-SC		Yellow
4	Canvasback	<i>Aythya valisineria</i>			
5	Lesser Scaup	<i>Aythya affinis</i>			
6	Northern Bobwhite	<i>Colinus virginianus</i>		R	
7	Ruffed Grouse	<i>Bonasa umbellus</i>	I-SC		
8	Greater Prairie-Chicken	<i>Tympanuchus cupido</i>		R	Red
9	Red-necked Grebe	<i>Podiceps grisegena</i>	I-SC		
10	Western Grebe	<i>Aechmophorus occidentalis</i>	I-SC		

	Common Name	Scientific Name	T/E Status	Regional SGCN	R2R
11	Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>		R	
12	Common Nighthawk	<i>Chordeiles minor</i>			
13	Chuck-will's-widow	<i>Antrostomus carolinensis</i>	I-T		
14	Eastern Whip-poor-will	<i>Antrostomus vociferus</i>	I-SC	R	Yellow
15	Chimney Swift	<i>Chaetura pelagica</i>	I-SC	R	Orange
16	King Rail	<i>Rallus elegans</i>	I-T	WA	Orange
17	Black-necked Stilt	<i>Himantopus mexicanus</i>			
18	Piping Plover	<i>Charadrius melodus</i>	I-E, F-E	R	Orange
19	Wilson's Snipe	<i>Gallinago delicata</i>	I-SC		
20	Wilson's Phalarope	<i>Phalaropus tricolor</i>			
21	Franklin's Gull	<i>Leucophaeus pipixcan</i>	I-SC		
22	Least Tern	<i>Sternula antillarum</i>	I-T, F-E*	R	Orange
23	Black Tern	<i>Chlidonias niger</i>	I-T	R	
24	Forster's Tern	<i>Sterna forsteri</i>	I-T		
25	American White Pelican	<i>Pelecanus erythrorhynchos</i>			
26	American Bittern	<i>Botaurus lentiginosus</i>			
27	Yellow-crowned Night Heron	<i>Nyctanassa violacea</i>			
28	Black-crowned Night Heron	<i>Nycticorax nycticorax</i>			
29	White-faced Ibis	<i>Plegadis chihi</i>			
30	Swainson's Hawk	<i>Buteo swainsoni</i>			
31	American Barn Owl	<i>Tyto furcata</i>			
32	Eastern Screech-Owl	<i>Megascops asio</i>			
33	Burrowing Owl	<i>Athene cunicularia</i>			
34	Long-eared Owl	<i>Asio otus</i>	I-T		
35	Short-eared Owl	<i>Asio flammeus</i>	I-T	R	
36	American Kestrel	<i>Falco calumbarius</i>			
37	Scissor-tailed Flycatcher	<i>Tyrannus forficatus</i>	I-SC		
38	Say's Phoebe	<i>Sayornis saya</i>			
39	Loggerhead Shrike	<i>Lanius ludovicianus</i>	I-SC	R	
40	Bank Swallow	<i>Riparia riparia</i>		WA	
41	Purple Martin	<i>Progne subis</i>			
42	Bewick's Wren	<i>Thryomanes bewickii</i>			
43	Veery	<i>Catharus fuscescens</i>			
44	Grasshopper Sparrow	<i>Ammodramus savannarum</i>		R	
45	Bobolink	<i>Dolichonyx oryzivorus</i>	I-SC	R	Orange
46	Western Meadowlark	<i>Sturnella neglecta</i>	I-SC	R	
47	Blue-winged Warbler	<i>Vermivora cyanoptera</i>			
48	Cerulean Warbler	<i>Setophaga cerulea</i>		R	Yellow

*In 2021, the Interior Least Tern population (including Iowa) was delisted. Other populations of Least Terns remain on the list of federally Threatened species.

Table 3-6. Non-breeding Birds of Greatest Conservation Need

Taxonomic order and nomenclature derived from: The [American Ornithological Society Check-List of North American Birds](#).

Rows shaded in gray: indicate data deficient SGCN for which information needed to assess conservation status is lacking.

T/E Status refers to whether a species is listed as either state or federally Endangered or Threatened, at the time of this plan's publication. It also refers to those species with Endangered or Threatened status at the state level. For up-to-date state listing information, please see the Threatened and Endangered Species Program page on the [DNR website](#).

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- I-T: Threatened in Iowa
- I-SC: Special Concern in Iowa
- F-E: Federally listed as Endangered in the United States
- F-T: Federally listed as Threatened in the United States
- F-P: Proposed for federal listing as an Endangered or Threatened species

Regional SGCN: To access more information about this effort and for the updated list of [Regional SGCN](#).

- R: Species is considered a Regional Species of Greatest Conservation Need in the Midwest.
- W: Watchlist. This is a list of species for which there was concern but insufficient information or differing trends across the region (WA: Watchlist - Assessment Priority). For some species this is because there is a different region of the country that is more important to the species than the Midwest (WD: Watchlist - Defer to adjacent region).

R2R Refers to [Road to Recovery Tipping Point Species List](#).

- Red Alert Species: Very High Urgency (perilously low population size, steeply declining or unknown population trend)
- Orange Alert Species: (large population loss, continued or accelerated decline, conservation reliant)
- Yellow Alert List: Moderate Urgency (large population loss, but now relatively stable, still conservation reliant)

Assessments of species conservation status undertaken as part of the IWAP are used to determine SGCN status. Other information is provided as a reference. Updates to State Wildlife Action Plans, Regional SGCN lists, Federal T&E Status, etc., are each independent processes, undertaken by different entities with differing timeframes. As such, the various listings or status ranks for a given species at a given point in time may not always appear to be in accord. Please visit the links above for updated information.

	Common Name	Scientific Name	T/E Status	Regional SGCN	R2R
1	Greater Scaup	<i>Aythya marila</i>			
2	Horned Grebe	<i>Podiceps auritus</i>			Yellow
3	Yellow Rail	<i>Coturnicops noveboracensis</i>		R	Yellow
4	Black Rail	<i>Laterallus jamaicensis</i>	F-T*		
5	Whooping Crane	<i>Grus americana</i>	F-E	R	Orange
6	Black-bellied Plover	<i>Pluvialis squatarola</i>			Orange
7	American Golden-Plover	<i>Pluvialis dominica</i>			Orange
8	Semipalmated Plover	<i>Charadrius semipalmatus</i>		WA	
9	Whimbrel	<i>Numenius phaeopus</i>			Orange
10	Long-billed Curlew	<i>Numenius americanus</i>			
11	Hudsonian Godwit	<i>Limosa haemastica</i>			Red
12	Marbled Godwit	<i>Limosa fedoa</i>		R	

	Common Name	Scientific Name	T/E Status	Regional SGCN	R2R
13	Ruddy Turnstone	<i>Arenaria interpres</i>			Orange
14	Red Knot	<i>Calidris canutus</i>	F-T**		Orange
15	Stilt Sandpiper	<i>Caladris himantopus</i>			Orange
16	Sanderling	<i>Calidris alba</i>			Orange
17	Dunlin	<i>Calidris alpina</i>			
18	White-rumped Sandpiper	<i>Calidris fuscicollis</i>			
19	Buff-breasted Sandpiper	<i>Calidris subruficollis</i>		R	Orange
20	Pectoral Sandpiper	<i>Calidris melanotos</i>			Orange
21	Short-billed Dowitcher	<i>Limnodromus griseus</i>			Orange
22	Long-billed Dowitcher	<i>Limnodromus scolopaceus</i>			Orange
23	Bonaparte's Gull	<i>Chroicocephalus philadelphia</i>			
24	Herring Gull	<i>Larus argentatus</i>			
25	Common Tern	<i>Sterna hirundo</i>			
26	Common Loon	<i>Gavia immer</i>			
27	Olive-sided Flycatcher	<i>Contopus cooperi</i>			Yellow
28	Yellow-bellied Flycatcher	<i>Empidonax flaviventris</i>			
29	Philadelphia Vireo	<i>Vireo philadelphicus</i>			
30	Northern Shrike	<i>Lanius borealis</i>			
31	Bohemian Waxwing	<i>Bombycilla garrulus</i>			
32	Sprague's Pipit	<i>Anthus spragueii</i>		R	Orange
33	Redpoll	<i>Acanthis flammea</i>			
34	White-winged Crossbill	<i>Loxia leucoptera</i>			
35	Lapland Longspur	<i>Calcarius lapponicus</i>			
36	Golden-winged Warbler	<i>Vermivora chrysoptera</i>			Yellow
37	Connecticut Warbler	<i>Oporornis agilis</i>		R	
38	Bay-breasted Warbler	<i>Setophaga castanea</i>			
39	Black-throated Blue Warbler	<i>Setophaga caerulescens</i>			

* Eastern Black Rail - Only the subspecies *Laterallus jamaicensis jamaicensis* is listed as federally threatened; this subspecies is considered an accidental species in Iowa by the Fish & Wildlife Service.

** Rufa Red Knot - Only the subspecies *Calidris canutus rufa* is listed as federally threatened; this subspecies does not occur in Iowa.

Table 3-7. Mammals of Greatest Conservation Need

Taxonomic order derived from: The [American Society of Mammalogist's Mammal Diversity Database](#). (2025). Mammal Diversity Database (Version 2.0) [Data set]. [Zenodo](#).

Rows shaded in gray: indicate data deficient SGCN for which information needed to assess conservation status is lacking.

T/E Status: Refers to whether a species is federally listed as Endangered, Threatened, or Proposed for listing at the time of this plan's publication. It also refers to those species with Endangered or Threatened status at the state level. For up-to-date state of Iowa listing information, please see the Threatened and Endangered Species Program page on the [DNR website](#).

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- I-T: Threatened in Iowa
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- F-E: Federally listed as Endangered in the United States
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Regional SGCN: To access more information about this effort and for the updated list of [Regional SGCN](#).

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- PR: R: Species is proposed as a Regional Species of Greatest Conservation Need in the Midwest, if a Midwest state lists the species as SGCN.

Assessments of species conservation status undertaken as part of the IWAP are used to determine SGCN status. Other information is provided as a reference. Updates to State Wildlife Action Plans, Regional SGCN lists, Federal T&E Status, etc., are each independent processes, undertaken by different entities with differing timeframes. As such, the various listings or status ranks for a given species at a given point in time may not always appear to be in accord. Please visit the links above for updated information.

	Common Name	Scientific Name	T/E Status	Regional SGCN
1	White-tailed Jackrabbit	<i>Lepus townsendii</i>	I-T	R
2	Franklin's Ground Squirrel	<i>Spermophilus franklinii</i>		R
3	Plains Pocket Gopher	<i>Geomys bursarius</i>	I-T	WA
4	Plains Pocket Mouse	<i>Perognathus flavescens</i>	I-T	WA
5	Woodland Vole	<i>Microtus pinetorum</i>		WA
6	Southern Bog Lemming	<i>Synaptomys cooperi</i>	I-E	
7	Common Muskrat	<i>Ondrata zibethicus</i>		
8	North American Least Shrew	<i>Cryptotis parvus</i>	I-T	WA
9	Prairie Shrew	<i>Sorex haydeni</i>		
10	Little Brown Myotis	<i>Myotis lucifigus</i>	I-T	R
11	Northern Myotis (Northern Long-eared Bat)	<i>Myotis septentrionalis</i>	I-E, F-E	R
12	Indiana Myotis	<i>Myotis sodalis</i>	I-E, F-E	R
13	Tricolored Bat	<i>Perimyotis subflavus</i>	I-T, F-PE	R
14	Plains Spotted Skunk	<i>Spilogale interrupta</i>	I-E	R

	Common Name	Scientific Name	T/E Status	Regional SGCN
15	Long-tailed Weasel	<i>Mustela frenata</i>		
16	Least Weasel	<i>Mustela nivalis</i>		
17	American Ermine	<i>Mustela ermine</i>		
18	Northern Gray Fox	<i>Urocyon cinereoargenteus</i>	I-SC	WA

Table 3-8. Fishes of Greatest Conservation Need

Taxonomy and nomenclature from: American Fisheries Society. 2023. *Common and Scientific Names of Fishes from the United States, Canada, and Mexico*, 8th Edition (2023). American Fisheries Society, Special Publication 37, Bethesda, MD. <https://fisheries.org/bookstore/all-titles/special-publications/namesoffishes8/>

Rows shaded in gray: indicate data deficient SGCN for which information needed to assess conservation status is lacking.

T/E Status: Refers to whether a species is federally listed as Endangered, Threatened, or Proposed for listing at the time of this plan's publication. It also refers to those species with Endangered or Threatened status at the state level. For up-to-date state of Iowa listing information, please see the Threatened and Endangered Species Program page on the [DNR website](#).

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- PR: R: Species is proposed as a Regional Species of Greatest Conservation Need in the Midwest, if a Midwest state lists the species as SGCN.

Assessments of species conservation status undertaken as part of the IWAP are used to determine SGCN status. Other information is provided as a reference. Updates to State Wildlife Action Plans, Regional SGCN lists, Federal T&E Status, etc., are each independent processes, undertaken by different entities with differing timeframes. As such, the various listings or status ranks for a given species at a given point in time may not always appear to be in accord. Please visit the links above for updated information.

	Common Name	Scientific Name	T/E Status	Regional SGCN
1	Chestnut Lamprey	<i>Ichthyomyzon castaneus</i>	I-T	
2	Lake Sturgeon	<i>Acipenser fulvescens</i>	I-E	R
3	Pallid Sturgeon	<i>Scaphirhynchus albus</i>	I-E, F-E	R
4	Paddlefish	<i>Polyodon spathula</i>		
5	Emerald Bowfin	<i>Amia ocellicauda</i>		
6	American Eel	<i>Anguilla rostrata</i>	I-T	WA
7	Skipjack Herring	<i>Alosa chrysochloris</i>	I-T	
8	Blue Sucker	<i>Cycleptus elongatus</i>		
9	Lake Chubsucker	<i>Erimyzon sucetta</i>		
10	Black Buffalo	<i>Ictiobus niger</i>		
11	Spotted Sucker	<i>Minytrema melanops</i>		
12	Silver Redhorse	<i>Moxostoma anisurum</i>		
13	River Redhorse	<i>Moxostoma carinatum</i>		
14	Black Redhorse	<i>Moxostoma duquesnei</i>	I-SC	

	Common Name	Scientific Name	T/E Status	Regional SGCN
15	Golden Redhorse	<i>Moxostoma erythrurum</i>		
16	Pealip Redhorse	<i>Moxostoma pisolabrum</i>		
17	Greater Redhorse	<i>Moxostoma valenciennesi</i>		
18	River Shiner	<i>Alburnops blennius</i>		
19	Weed Shiner	<i>Alburnops texanus</i>	I-T	
20	Largescale Stoneroller	<i>Campostoma oligolepis</i>		
21	Southern Redbelly Dace	<i>Chrosomus erythrogaster</i>		
22	Gravel Chub	<i>Erimystax x-punctatus</i>		WA
23	Western Silvery Minnow	<i>Hybognathus argyritis</i>	I-E	R
24	Mississippi Silvery Minnow	<i>Hybognathus nuchalis</i>		
25	Plains Minnow	<i>Hybognathus placitus</i>		WA
26	Pallid Shiner	<i>Hybopsis amnis</i>		
27	Redfin Shiner	<i>Lythrurus umbratilis</i>	I-T	
28	Sturgeon Chub	<i>Macrhybopsis gelida</i>	I-E	R
29	Shoal Chub	<i>Macrhybopsis hyostoma</i>		
30	Sicklefin Chub	<i>Macrhybopsis meeki</i>	I-E	R
31	Northern Pearl Dace	<i>Margariscus nachtriebi</i>	I-E	WA
32	Pugnose Shiner	<i>Miniellus anogenus</i>	I-E	R
33	Ozark Minnow	<i>Miniellus nubilus</i>		
34	Topeka Shiner	<i>Miniellus topeka</i>	I-T, F-E	R
35	Blacknose Shiner	<i>Notropis heterolepis</i>	I-E	
36	Pugnose Minnow	<i>Opsopoeodus emiliae</i>	I-T	
37	Ghost Shiner	<i>Paranotropis buchanani</i>	I-E	
38	Mimic Shiner	<i>Paranotropis volucellus</i>		
39	Suckermouth Minnow	<i>Phenacobius mirabilis</i>		
40	Flathead Chub	<i>Platygobio gracilis</i>		R
41	Longnose Dace	<i>Rhinichthys cataractae</i>		
42	Brown Bullhead	<i>Ameiurus nebulosus</i>		
43	Tadpole Madtom	<i>Noturus gyrinus</i>		
44	Redfin (Grass) Pickerel	<i>Esox americanus</i>	I-T	
45	Northern Pike	<i>Esox lucius</i>		
46	Central Mudminnow	<i>Umbra limi</i>		
47	Trout-perch	<i>Percopsis omiscomaycus</i>	I-T	
48	Brook Silverside	<i>Labidesthes sicculus</i>		
49	Banded Killifish	<i>Fundulus diaphanus</i>	I-T	
50	Starhead Topminnow	<i>Fundulus dispar</i>	I-E	R
51	Plains Topminnow	<i>Fundulus sciadicus</i>	I-E	R
52	Warmouth	<i>Lepomis gulosus</i>		
53	Northern Sunfish*	<i>Lepomis peltastes</i>		WA
54	Mottled Sculpin	<i>Cottus bairdii</i>	I-T	
55	Slimy Sculpin	<i>Cottus cognatus</i>		

	Common Name	Scientific Name	T/E Status	Regional SGCN
56	Western Sand Darter	<i>Ammocrypta clara</i>	I-T	R
57	Crystal Darter	<i>Crystallaria asprella</i>	I-E	R
58	Mud Darter	<i>Etheostoma asprigene</i>		
59	Rainbow Darter	<i>Etheostoma caeruleum</i>		
60	Bluntnose Darter	<i>Etheostoma chlorosoma</i>	I-E	
61	Iowa Darter	<i>Etheostoma exile</i>		
62	Least Darter	<i>Etheostoma microperca</i>	I-E	WA
63	Orangethroat Darter	<i>Etheostoma spectabile</i>	I-SC	
64	Blackside Darter	<i>Percina maculata</i>		
65	River Darter	<i>Percina shumardi</i>		

*Until the publication of Page et al. (2013), the Northern Sunfish (*Lepomis peltastes*) was called the Longear Sunfish (*L. megalotis*). But, in Page et al. (2013), the name of the form of the Longear Sunfish known to have occurred in Iowa was changed to Northern Sunfish (*L. peltastes*). There are no native occurrences of the Longear Sunfish (*L. megalotis*) in Iowa.

Table 3-9. Mussels of Greatest Conservation Need

Taxonomic order derived from: DD Turgeon, JF Quinn Jr., AE Bogan, EV Coan, FG Hochberg Jr., WG Lyons, PM Mikkelsen, RJ Neves, CFE Roper, G Rosenberg, B Roth, A Scheltema, FG Thompson, M Vecchione & JD Williams. 1998. *Common and scientific names of aquatic invertebrates from the United States and Canada: Mollusks. 2nd Edition.* American Fisheries Society, Special Publication 26, Bethesda, Maryland. ix + 526 pp

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- PR: R: Species is proposed as a Regional Species of Greatest Conservation Need in the Midwest, if a Midwest state lists the species as SGCN.

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	Common Name	Scientific Name	T/E Status	Regional SGCN
1	Mucket	<i>Actinonaias ligamentina</i>	I-T	
2	Elktoe	<i>Alasmodonta marginata</i>	I-SC	R
3	Slippershell	<i>Alasmodonta viridis</i>	I-E	WA
4	Three Ridge	<i>Amblema plicata</i>		
5	Cylinder (Cylindrical Papershell)	<i>Anodontoides ferussacianus</i>	I-SC	
6	Rock Pocketbook	<i>Arcidens confragosus</i>		WA
7	Spectaclecase	<i>Cumberlandia monodonta</i>	I-E, F-E	R
8	Wartyback	<i>Cyclonaias nodulata</i>	I-SC	
9	Pimpleback	<i>Cyclonaias pustulosa</i>		
10	Purple Wartyback	<i>Cyclonaias tuberculata</i>	I-E	R
11	Butterfly	<i>Ellipsaria lineolata</i>	I-SC	R
12	Elephant Ear	<i>Elliptio crassidens</i>		R

	Common Name	Scientific Name	T/E Status	Regional SGCN
13	Snuffbox	<i>Epioblasma triquetra</i>		R
14	Spike	<i>Eurynia dilatata</i>	I-E	
15	Wabash Pigtoe	<i>Fusconaia flava</i>		
16	Higgins' Eye Pearlymussel	<i>Lampsilis higginsii</i>	I-T F-E	R
17	Canary Kingshell	<i>Lampsilis sietmani</i>		PW
18	Fatmucket	<i>Lampsilis siliquoidea</i>		
19	Yellow Sandshell	<i>Lampsilis teres</i>	I-T	R
20	White Heelsplitter	<i>Lasmigona camplanata</i>		
21	Creek Heelsplitter	<i>Lasmigona compressa</i>	I-SC	R
22	Flutedshell	<i>Lasmigona costata</i>	I-SC	
23	Black Sandshell	<i>Ligumia recta</i>		R
24	Washboard	<i>Megaloniaias nervosa</i>		
25	Threehorn Wartyback	<i>Obliquaria reflexa</i>		
26	Hickorynut	<i>Obovaria olivaria</i>		
27	Sheepnose	<i>Plethobasus cyphus</i>	I-E, F-E	R
28	Round Pigtoe	<i>Pleurobema sintoxia</i>	I-E	WA
29	Pink Heelsplitter	<i>Potamilus alatus</i>		
30	Fat Pocketbook	<i>Potamilus capax</i>	F-E	
31	Scaleshell	<i>Potamilus leptodon</i>		
32	Lake Floater	<i>Pyganodon lacustris</i>		
33	Winged Mapleleaf	<i>Quadrula fragosa</i>		
34	Mapleleaf	<i>Quadrula quadrula</i>		
35	Ebonyshell	<i>Reginaia ebena</i>		
36	Pondmussel	<i>Saggitunio subrostratus</i>		
37	Salamander Mussel	<i>Simpsoniaias ambigua</i>	I-E, F-PE	R
38	Monkeyface	<i>Theliderma metanevra</i>	I-T	
39	Gulf mapleleaf*	<i>Tritogonia nobilis</i>		
40	Pistolgrip (formerly Buckhorn)	<i>Tritogonia verrucosa</i>	I-T	
41	Fawnsfoot	<i>Truncilla donaciformis</i>	I-SC	WA
42	Deertoe	<i>Truncilla truncata</i>		
43	Pondhorn	<i>Uniomerus tetralasmus</i>		
44	Flat Floater	<i>Utterbackiana suborbiculata</i>		
45	Ellipse	<i>Venustaconcha ellipsiformis</i>	I-T	R

*Presumed extirpated, inclusion is based on relic shells in the Mississippi River.

Table 3-10. Terrestrial Snails of Greatest Conservation Need

Taxonomic order and nomenclature derived from: DD Turgeon, JF Quinn Jr, AE Bogan, EV Coan, FG Hochberg Jr, WG Lyons, PM Mikkelsen, RJ Neves, CFE Roper, G Rosenberg, B Roth, A Scheltema, FG Thompson, M Vecchione and JD Williams. 1998. *Common and scientific names of aquatic invertebrates from the United States and Canada: Mollusks*. 2nd Edition. American Fisheries Society, Special Publication 26, Bethesda, Maryland. ix + 526 pp

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T/E Status: Refers to whether a species is federally listed as Endangered, Threatened, or Proposed at the time of this plan's publication. It also refers to those species with Endangered or Threatened at the state level. For up-to-date state of Iowa listing information, please see the Threatened and Endangered Species Program page on the [DNR website](#).

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	Common Name	Scientific Name	T/E Status	Regional SGCN
1	Midwest Pleistocene Vertigo	<i>Vertigo arthuri</i>	I-T	
2	Bluff Vertigo	<i>Vertigo meramecensis</i>	I-E	
3	Iowa Pleistocene Snail	<i>Discus macclintocki</i>	I-E, F-E	

Table 3-11. Bumble Bees of Greatest Conservation Need

Taxonomic order and scientific names derived from: Williams, PH, RW Thorp, LL Richardson, and SR Colla. (2014). Bumble Bees of North America: An identification guide. Princeton University Press.

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T/E Status: Refers to whether a species is federally listed as Endangered, Threatened, or Proposed for listing at the time of this plan's publication. It also refers to those species with Endangered or Threatened status at the state level. For up-to-date state of Iowa listing information, please see the Threatened and Endangered Species Program page on the [DNR website](#).

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- W: Watchlist. This is a list of species for which there was concern but insufficient information or differing trends across the region (WA: Watchlist - Assessment Priority). For some species this is because there is a different region of the country that is more important to the species than the Midwest (WD: Watchlist - Defer to adjacent region).
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	Common Name	Scientific Name	T/E Status	Regional SGCN
1	Rusty Patched Bumble Bee	<i>Bombus affinis</i>	I-E, F-E	R
2	Black and Gold Bumble Bee	<i>Bombus auricomus</i>		PR
3	Ashton's Cuckoo Bumble Bee	<i>Bombus bohemicus*</i>		R
4	Northern Amber Bumble Bee	<i>Bombus borealis</i>		
5	Lemon Cuckoo Bumble Bee	<i>Bombus citrinus</i>		
6	Yellow Bumble Bee	<i>Bombus fervidus</i>		
7	Southern Plains Bumble Bee	<i>Bombus fraternus</i>	F-Under Review	R
8	American Bumble Bee	<i>Bombus pensylvanicus</i>	F-Under Review	R
9	Red-belted Bumble Bee	<i>Bombus rufocinctus</i>		
10	Tri-colored Bumble Bee	<i>Bombus ternarius</i>		
11	Half-black Bumble Bee	<i>Bombus vagans</i>		
12	Variable Cuckoo Bumble Bee	<i>Bombus variabilis</i>	F-Under Review	R

*also referred to as *B. ashtonii*. Not the same as the *B. bohemicus* as referred to in Europe.

Table 3-12. Butterflies of Greatest Conservation Need

Taxonomic order and scientific names derived from: Pelham, JP. (2023). [A catalogue of the butterflies of the United States and Canada](#).

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	Common Name	Scientific Name	T/E Status	Regional SGCN
1	Southern Cloudywing	<i>Cecropterus bathyllus</i>		WA
2	Hayhurst's Scallopwing	<i>Staphylus hayhurstii</i>		
3	Dreamy Duskywing	<i>Erynnis icelus</i>	I-SC	
4	Mottled Duskywing	<i>Gesta martialis</i>	I-E	R
5	Columbine Duskywing	<i>Gesta lucilius</i>	I-SC	WA
6	Dion Skipper	<i>Euphyes dion</i>		
7	Two-spotted Skipper	<i>Euphyes bimakula</i>	I-T	R
8	Arogos Skipper	<i>Atrytone arogos</i>	I-E	R
9	Byssus Skipper	<i>Atrytone byssus</i>	I-SC	WA
10	Crossline Skipper	<i>Limochores origenes</i>	I-T	
11	Leonard's Skipper	<i>Hesperia leonardus</i>	I-T	R
11a	Leonard's Skipper	<i>Hesperia leonardus leonardus</i>		R
11b	“Pawnee” Skipper	<i>Hesperia leonardus pawnee</i>		R
12	Ottoo Skipper	<i>Hesperia ottoe</i>	I-E	R
13	Dakota Skipper*	<i>Hesperia dacotae</i>	I-E, F-T	

	Common Name	Scientific Name	T/E Status	Regional SGCN
14	Mulberry Wing	<i>Poanes massasoit</i>	I-E	
15	Broad-winged Skipper	<i>Poanes viator</i>		
16	Dusted Skipper	<i>Atrytonopsis hianna</i>	I-E	R
17	Pepper and Salt Skipper	<i>Amblyscirtes hegon</i>	I-SC	
18	Swarthy Skipper	<i>Nastra lherminier</i>		
19	Poweshiek Skipper	<i>Oarisma poweshiek</i>	I-E, F-E	R
20	Olympia Marble	<i>Euchloe Olympia</i>	I-T	
21	Edwards' Hairstreak	<i>Satyrium edwardsii</i>		WA
22	Acadian Hairstreak	<i>Satyrium acadica</i>		
23	Silvery Blue	<i>Glaucopsyche lygdamus</i>	I-SC	
24	Monarch	<i>Danaus plexippus</i>	F-PT	R
25	Silver-bordered Fritillary	<i>Boloria myrina</i>	I-SC	
26	Western Regal Fritillary	<i>Argynnis idalia occidentalis</i>	I-T, F-PT	R
27	Aphrodite Fritillary	<i>Argynnis aphrodite</i>	I-SC	WA
28	Milbert's Tortoiseshell	<i>Aglais milberti</i>		
29	Compton Tortoiseshell	<i>Nymphalis l-album</i>		
30	Baltimore Checkerspot	<i>Euphydryas phaeton</i>	I-T	
30a	"Ozark" Baltimore Checkerspot	<i>Euphydryas phaeton ozarkae</i>		
31	Eyed Brown	<i>Lethe eurydice</i>		

*Extirpated, not likely to be reintroduced

Table 3-13. Moths of Greatest Conservation Need

Taxonomic order and scientific names derived from: [BugGuide](#) website.

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	Common Name	Scientific Name	T/E Status	Regional SGCN
1	Eastern Buckmoth	<i>Hemileuca maia</i>		
2	a gelechioid moth	<i>Agonopterix lythrella</i>		WA
3	Early Leadplant Leaf-twirler Moth	<i>Anacamptis wikeri</i>		R
4	Marbleseed Leafminer	<i>Acrocercops pnosmodiella</i>		PR
5	Abbreviated Underwing	<i>Catocala abbreviatella</i>		R
6	Whitney's Underwing	<i>Catocala whitneyi</i>		R
7	a noctuid moth	<i>Bagisara gulnare</i>		R
8	Grote's Black-tipped Quaker	<i>Dichagyris grotei</i>		
9	Red Sedge Borer Moth	<i>Globia laeta</i>		
10	Starry Champion Moth	<i>Hadena ectypa</i>		R
11	Fingered Lemmeria Moth	<i>Lemmeria digitalis</i>		
12	Franclemont's Lithophane	<i>Lithophane franclemonti</i>		PR
13	Newman's Brocade	<i>Meropleon ambifusca</i>		
14	Blazing Star Stem Borer	<i>Papaipema beeriana</i>		R
15	Golden Borer Moth	<i>Papaipema cerina</i>		R
16	Rattlesnake Master Borer Moth	<i>Papaipema eryngii</i>		R

	Common Name	Scientific Name	T/E Status	Regional SGCN
17	Eupatorium Borer Moth	<i>Papaipema eupatoria</i>		
18	Ash Tip Borer Moth	<i>Papaipema furcata</i>		
19	Turtlehead Borer Moth	<i>Papaipema nepheleptena</i>		WA
20	Culver's Root Borer Moth	<i>Papaipema sciata</i>		R
21	Silphium Borer Moth	<i>Papaipema silphii</i>		R
22	a noctuid moth	<i>Plagiomimicus heitzmani</i>		
23	Bina Flower Moth	<i>Schinia bina</i>		R
24	Leadplant Flower Moth	<i>Schinia lucens</i>		WA
25	Bleeding Flower Moth	<i>Schinia sanguinea</i>		
26	Northern Flower Moth	<i>Schinia septentrionalis</i>		
27	Marked Noctuid	<i>Tricholita notata</i>		R
28	a crambid snout moth	<i>Neodactria murellus</i>		WA
29	Sand Dune Panic Grass Moth	<i>Coenochroa bipunctella</i>		WA
30	a tortricid moth	<i>Aethes patricia</i>		WA
31	a tortricid moth	<i>Ancylis semiovana</i>		R
32	Two-lined Eucosma	<i>Eucosma bilineana</i>		

Table 3-14. Dragonflies and Damselflies of Greatest Conservation Need

Taxonomic order and scientific names derived from: Paulson, DR, SW Dunkle, and JT Johnson eds. 2024. [A Checklist of North American Odonata](#).

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	Common Name	Scientific Name	T/E Status	Regional SGCN
1	Sweetflag Spreadwing	<i>Lestes forcipatus</i>	I-SC	
2	Eastern Red Damselfly	<i>Amphiagrion saucium</i>	I-SC	
3	Paiute Dancer	<i>Argia alberta</i>	I-SC	
4	Prairie Bluet	<i>Coenagrion angulatum</i>	I-E	
5	Taiga Bluet	<i>Coenagrion resolutum</i>	I-T	
6	Boreal Bluet	<i>Enallagma boreale</i>		
7	Alkali Bluet	<i>Enallagma clausum</i>		
8	Western Forktail	<i>Ischnura perparva</i>		
9	Skillet Clubtail	<i>Gomphurus ventricosus</i>		R
10	Sioux Snaketail	<i>Ophiogomphus smithi</i>	I-T	R
11	Westfall's Snaketail	<i>Ophiogomphus westfalli</i>	I-T	WA
12	Rapids Clubtail	<i>Phanogomphus quadricolor</i>	I-SC	
13	Brimstone Clubtail	<i>Stylurus intricatus</i>	I-SC	
14	Arrow Clubtail	<i>Stylurus spiniceps</i>		
15	Racket-tailed Emerald	<i>Dorocordulia libera</i>		

	Common Name	Scientific Name	T/E Status	Regional SGCN
16	Stygian Shadowdragon	<i>Neurocordulia yamaskanensis</i>		
17	Plains Emerald	<i>Somatochlora ensigera</i>	I-T	R
18	Mocha Emerald	<i>Somatochlora linearis</i>		
19	Carolina Saddlebags	<i>Tamea carolina</i>		

Table 3-15. Crayfish of Greatest Conservation Need

Taxonomic order and scientific names derived from: NatureServe Explorer.

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	Common Name	Scientific Name	T/E Status	Regional SGCN
1	Golden Crayfish	<i>Faxonius luteus</i>	I-SC	WA
2	Northern Clearwater Crayfish	<i>Faxonius propinquus</i>		R
3	Great Plains Mudbug	<i>Lacunicambarus nebrascensis</i>		
4	Prairie Crayfish	<i>Procambarus gracilis</i>		

Table 3-16. Plants of Greatest Conservation Need

Taxonomy primarily from the Flora of North America (FNA) with exceptions for the genus *Rubus* (Widrechner, 1998), and the federally listed species of Northern Wild Monkshood (*Aconitum novaboracense*) and Hall's Bulrush (*Schoenoplectiella hallii*) as presented in the Federal Register.

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- T: Federally listed as Threatened in the United States

	Common Name	Scientific Name	IA T/E/SC	Fed T/E
1	Balsam fir	<i>Abies balsamea</i>	SC	
2	Three-seeded mercury	<i>Acalypha gracilens</i>	T	
3	Red maple	<i>Acer rubrum</i>	SC	
4	Mountain maple	<i>Acer spicatum</i>	SC	
5	American bird's-foot trefoil	<i>Acmispon americanus</i>	SC	
6	Northern wild monkshood	<i>Aconitum noveboracense</i>	T	T
7	Allegheny vine	<i>Adlumia fungosa</i>	SC	
8	Round-stemmed false foxglove	<i>Agalinis gattereri</i>	T	
9	Pale false foxglove	<i>Agalinis skinneriana</i>	E	
10	Blue giant hyssop	<i>Agastache foeniculum</i>	SC	
11	Nodding wild onion	<i>Allium cernuum</i>	SC	
12	Saskatoon serviceberry	<i>Amelanchier alnifolia</i>	SC	
13	Low serviceberry	<i>Amelanchier humilis</i>	SC	
14	Inland serviceberry	<i>Amelanchier interior</i>	T	
15	Allegheny serviceberry	<i>Amelanchier laevis</i>	SC	
16	Roundleaf serviceberry	<i>Amelanchier sanguinea</i>	E	
17	Fragrant false indigo	<i>Amorpha nana</i>	T	
18	Raccoon grape	<i>Ampelopsis cordata</i>	E	
19	Pearly everlasting	<i>Anaphalis margaritacea</i>	E	
20	Sand bluestem	<i>Andropogon hallii</i>	E	
21	Round-lobed hepatica	<i>Anemone americana</i>	E	
22	Carolina anemone	<i>Anemone caroliniana</i>	E	
23	Bearberry	<i>Arctostaphylos uva-ursi</i>	E	
24	Virginia snakeroot	<i>Aristolochia serpentaria</i>	E	
25	Black chokeberry	<i>Aronia melanocarpa</i>	E	
26	Fringed sagewort	<i>Artemisia frigida</i>	E	
27	Woolly milkweed	<i>Asclepias lanuginosa</i>	T	
28	Mead's milkweed	<i>Asclepias meadii</i>	E	T

	Common Name	Scientific Name	IA T/E/SC	Fed T/E
29	Oval-leaved milkweed	<i>Asclepias ovalifolia</i>	T	
30	Showy milkweed	<i>Asclepias speciosa</i>	E	
31	Narrow-leaved milkweed	<i>Asclepias stenophylla</i>	T	
32	Green antelopehorn	<i>Asclepias viridis</i>	E	
33	Pawpaw	<i>Asimina triloba</i>	T	
34	Wall-rue	<i>Asplenium ruta-muraria</i>	E	
35	Field milkvetch	<i>Astragalus agrestis</i>	E	
36	Bent milkvetch	<i>Astragalus distortus</i>	SC	
37	Slender milkvetch	<i>Astragalus flexuosus</i>	SC	
38	Prairie milkvetch	<i>Astragalus laxmannii</i>	E	
39	Missouri milkvetch	<i>Astragalus missouriensis</i>	SC	
40	Fern-leaved false foxglove	<i>Aureolaria pedicularia</i>	E	
41	Mexican mosquito fern	<i>Azolla mexicana</i>	SC	
42	Blue wild indigo	<i>Baptisia australis</i>	SC	
43	Water parsnip	<i>Berula erecta</i>	T	
44	Kittentails	<i>Besseyia bullii</i>	SC	
45	Bog birch	<i>Betula pumila</i>	SC	
46	Water marigold	<i>Bidens beckii</i>	E	
47	Pagoda plant	<i>Blephilia ciliata</i>	SC	
48	Purple rockcress	<i>Boechera grahamii</i>	SC	
49	Green rockcress	<i>Boechera missouriensis</i>	SC	
50	Prairie bulrush	<i>Bolboschoenus maritimus</i>	SC	
51	Prairie moonwort	<i>Botrychium campestre</i>	SC	
52	Matricary grape fern	<i>Botrychium matricariifolium</i>	E	
53	Little grapefern	<i>Botrychium simplex</i>	E	
54	Swamp moonwort	<i>Botrychium tenebrosum</i>	E	
55	Buffalograss	<i>Bouteloua dactyloides</i>	SC	
56	Watershield	<i>Brasenia schreberi</i>	T	
57	Satin brome	<i>Bromus nottowanianus</i>	SC	
58	Poppy mallow	<i>Callirhoe alcaeoides</i>	SC	
59	Poppy mallow	<i>Callirhoe triangulata</i>	T	
60	Water-starwort	<i>Callitriche heterophylla</i>	T	
61	Vernal water-starwort	<i>Callitriche palustris</i>	SC	
62	Terrestrial water-starwort	<i>Callitriche terrestris</i>	SC	
63	Oklahoma grass-pink	<i>Calopogon oklahomensis</i>	SC	
64	Tuberous grass-pink	<i>Calopogon tuberosus</i>	SC	
65	Low bindweed	<i>Calystegia spithamea</i>	T	
66	Prairie hyacinth	<i>Camassia angusta</i>	SC	
67	Wild hyacinth	<i>Camassia scilloides</i>	SC	
68	White-tinged sedge	<i>Carex albicans</i>	E	
69	Foxtail sedge	<i>Carex alopecoidea</i>	SC	
70	Assiniboine sedge	<i>Carex assiniboinensis</i>	T	

	Common Name	Scientific Name	IA T/E/SC	Fed T/E
71	Back's sedge	<i>Carex backii</i>	E	
72	Carey's sedge	<i>Carex careyana</i>	T	
73	Cordroot sedge	<i>Carex chordorrhiza</i>	E	
74	Fibrous-root sedge	<i>Carex communis</i>	T	
75	Field sedge	<i>Carex conoidea</i>	SC	
76	Fringed sedge	<i>Carex crinita</i>	E	
77	Raven's-foot sedge	<i>Carex crus-corvi</i>	E	
78	Dewey's sedge	<i>Carex deweyana</i>	SC	
79	Lesser tussock sedge	<i>Carex diandra</i>	SC	
80	Needleleaf sedge	<i>Carex duriscula</i>	SC	
81	Star sedge	<i>Carex echinata</i>	E	
82	Fescue sedge	<i>Carex festucacea</i>	SC	
83	Slender sedge	<i>Carex gracilescens</i>	SC	
84	Shoreline sedge	<i>Carex hyalenolepis</i>	E	
85	Bladder sedge	<i>Carex intumescens</i>	SC	
86	Wiregrass sedge	<i>Carex lasiocarpa</i>	SC	
87	Spreading sedge	<i>Carex laxiculmis</i>	T	
88	Delicate sedge	<i>Carex leptalea</i>	T	
89	Mud sedge	<i>Carex limosa</i>	SC	
90	Hoplike sedge	<i>Carex lupuliformis</i>	E	
91	Yellow sedge	<i>Carex lurida</i>	T	
92	Poor sedge	<i>Carex magellanica</i>	SC	
93	Intermediate sedge	<i>Carex media</i>	E	
94	Peck's sedge	<i>Carex peckii</i>	SC	
95	Plantain-leaved sedge	<i>Carex plantaginea</i>	E	
96	Drooping sedge	<i>Carex prasina</i>	E	
97	Cyperus-like sedge	<i>Carex pseudocyperus</i>	E	
98	Reflexed sedge	<i>Carex retroflexa</i>	E	
99	Rocky Mountain sedge	<i>Carex saximontana</i>	E	
100	Dry-spike sedge	<i>Carex siccata</i>	SC	
101	Sterile sedge	<i>Carex sterilis</i>	T	
102	Swan's sedge	<i>Carex swanii</i>	SC	
103	Quill sedge	<i>Carex tenera</i>	T	
104	Shaved sedge	<i>Carex tonsa</i>	T	
105	Tuckerman's sedge	<i>Carex tuckermanii</i>	SC	
106	Wood's sedge	<i>Carex woodii</i>	T	
107	Pignut hickory	<i>Carya glabra</i>	SC	
108	Fireweed	<i>Chamaenerion angustifolium</i>	E	
109	Inland oats	<i>Chasmanthium latifolium</i>	SC	
110	Pink turtlehead	<i>Chelone obliqua</i>	T	
111	Red goosefoot	<i>Chenopodium rubrum</i>	SC	
112	Pipsissewa	<i>Chimaphila umbellata</i>	E	

	Common Name	Scientific Name	IA T/E/SC	Fed T/E
113	Iowa golden saxifrage	<i>Chrysosplenium iowense</i>	SC	
114	Drooping woodreed	<i>Cinna latifolia</i>	E	
115	Hill's thistle	<i>Cirsium pumilum</i>	SC	
116	Wavy-leaved thistle	<i>Cirsium undulatum</i>	SC	
117	Purple clematis	<i>Clematis occidentalis</i>	E	
118	Blue-eyed mary	<i>Collinsia verna</i>	E	
119	Marsh cinquefoil	<i>Comarum palustre</i>	T	
120	Dayflower	<i>Commelina erecta</i>	T	
121	Cancer root	<i>Conopholis americana</i>	SC	
122	Spotted coralroot	<i>Corallorhiza maculata</i>	E	
123	Bunchberry	<i>Cornus canadensis</i>	T	
124	Golden corydalis	<i>Corydalis aurea</i>	E	
125	Large-bracted corydalis	<i>Corydalis curvisiliqua</i>	E	
126	Pale corydalis	<i>Corydalis flavula</i>	E	
127	Pink corydalis	<i>Corydalis sempervirens</i>	E	
128	Fireberry hawthorn	<i>Crataegus chrysocarpa</i>	T	
129	Hillside hawthorn	<i>Crataegus collina</i>	SC	
130	Dodge's hawthorn	<i>Crataegus dodgei</i>	SC	
131	River hawthorn	<i>Crataegus fluviatilis</i>	SC	
132	Large-seeded hawthorn	<i>Crataegus macrosperma</i>	SC	
133	Washington hawthorn	<i>Crataegus phaenopyrum</i>	SC	
134	Waxy-fruited hawthorn	<i>Crataegus pruinosa</i>	T	
135	Hawksbeard	<i>Crepis runcinata</i>	SC	
136	Prairie tea	<i>Croton monanthogynus</i>	SC	
137	Slender cliff brake	<i>Cryptogramma stelleri</i>	SC	
138	Waxweed	<i>Cuphea viscosissima</i>	SC	
139	Largeseed dodder	<i>Cuscuta indecora</i>	SC	
140	Bigfruit dodder	<i>Cuscuta umbrosa</i>	SC	
141	Small white lady's slipper	<i>Cypripedium candidum</i>	SC	
142	Showy lady's-slipper	<i>Cypripedium reginae</i>	T	
143	Fragile fern	<i>Cystopteris fragilis</i>	SC	
144	Laurentian fragile fern	<i>Cystopteris laurentiana</i>	SC	
145	Tennessee bladder fern	<i>Cystopteris tennesseensis</i>	SC	
146	Silky prairie-clover	<i>Dalea villosa</i>	E	
147	Shrubby cinquefoil	<i>Dasiphora fruticosa</i>	T	
148	Swamp loosestrife	<i>Decodon verticillatus</i>	SC	
149	Tree clubmoss	<i>Dendrolycopodium dendroideum</i>	E	
150	Silvery spleenwort	<i>Deparia acrostichoides</i>	T	
151	Sessile-leaved tick trefoil	<i>Desmodium sessilifolium</i>	E	
152	Northern panic-grass	<i>Dichanthelium boreale</i>	T	
153	Slim-leaved panic-grass	<i>Dichanthelium linearifolium</i>	T	
154	Fingergrass	<i>Digitaria filiformis</i>	SC	

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155	Persimmon	<i>Diospyros virginiana</i>	SC	
156	Crowfoot clubmoss	<i>Diphasiastrum digitatum</i>	SC	
157	Narrow-leaved spleenwort	<i>Diplazium pynocarpon</i>	T	
158	Jeweled shooting star	<i>Dodecatheon amethystinum</i>	SC	
159	Roundleaved sundew	<i>Drosera rotundifolia</i>	E	
160	Glandular wood fern	<i>Dryopteris intermedia</i>	T	
161	Marginal shield fern	<i>Dryopteris marginalis</i>	E	
162	Purple coneflower	<i>Echinacea purpurea</i>	E	
163	Waterwort	<i>Elatine rubella</i>	SC	
164	Purple spikerush	<i>Eleocharis atropurpurea</i>	SC	
165	Dwarf spikerush	<i>Eleocharis coloradoensis</i>	SC	
166	Elliptic spikerush	<i>Eleocharis elliptica</i>	E	
167	Green spikerush	<i>Eleocharis flavescens</i>	SC	
168	Intermediate spikerush	<i>Eleocharis intermedia</i>	SC	
169	Oval spikerush	<i>Eleocharis ovata</i>	T	
170	Few-flowered spikerush	<i>Eleocharis pauciflora</i>	E	
171	Wolf's spikerush	<i>Eleocharis wolfii</i>	E	
172	Diverseglume wildrye	<i>Elymus diversiglumis</i>	SC	
173	Southeastern wildrye	<i>Elymus glabriflorus</i>	SC	
174	Wiegand's wildrye	<i>Elymus wiegandii</i>	E	
175	Downy willowherb	<i>Epilobium strictum</i>	E	
176	Meadow horsetail	<i>Equisetum pratense</i>	SC	
177	Dwarf scouring rush	<i>Equisetum scirpoides</i>	SC	
178	Woodland horsetail	<i>Equisetum sylvaticum</i>	T	
179	Ponygrass	<i>Eragrostis reptans</i>	SC	
180	Slender cottongrass	<i>Eriophorum gracile</i>	E	
181	Tawny cottongrass	<i>Eriophorum virginicum</i>	E	
182	Yellow trout lily	<i>Erythronium americanum</i>	T	
183	Midland fawnlily	<i>Erythronium mesochoreum</i>	SC	
184	Upland boneset	<i>Eupatorium sessilifolium</i>	T	
185	Wood spurge	<i>Euphorbia commutata</i>	E	
186	Six-angled spurge	<i>Euphorbia hexagona</i>	SC	
187	Forked aster	<i>Eurybia furcata</i>	E	
188	Large-leaved aster	<i>Eurybia macrophylla</i>	E	
189	Schreber's aster	<i>Eurybia schreberi</i>	E	
190	Grass-leaved goldenrod	<i>Euthamia graminifolia</i>	SC	
191	Queen of the prairie	<i>Filipendula rubra</i>	E	
192	Slender fimbry	<i>Fimbristylis autumnalis</i>	T	
193	False mermaid	<i>Floerkea proserpinacoides</i>	E	
194	Blue ash	<i>Fraxinus quadrangulata</i>	T	
195	Umbrella grass	<i>Fuirena simplex</i>	SC	
196	Rough bedstraw	<i>Galium asprellum</i>	E	

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197	Bog bedstraw	<i>Galium labradoricum</i>	T	
198	Three-petal bedstraw	<i>Galium trifidum</i>	SC	
199	Early cudweed	<i>Gamochaeta purpurea</i>	SC	
200	Black Huckleberry	<i>Gaylussacia baccata</i>	E	
201	Northern cranesbill	<i>Geranium bicknellii</i>	SC	
202	Oak fern	<i>Gymnocarpium dryopteris</i>	T	
203	Nahanni oak fern	<i>Gymnocarpium jessoense</i>	SC	
204	Limestone oak fern	<i>Gymnocarpium robertianum</i>	SC	
205	Sweet Indian plantain	<i>Hasteola suaveolens</i>	SC	
206	Needle-and-thread grass	<i>Hesperostipa comata</i>	T	
207	Mud plantain	<i>Heteranthera limosa</i>	SC	
208	Water stargrass	<i>Heteranthera multiflora</i>	SC	
209	Hairy goldenaster	<i>Heterothecia villosa</i>	E	
210	American alumroot	<i>Heuchera americana</i>	SC	
211	Common mare's-tail	<i>Hippuris vulgaris</i>	SC	
212	Povertygrass	<i>Hudsonia tomentosa</i>	E	
213	Shining clubmoss	<i>Huperzia lucidula</i>	SC	
214	Rock clubmoss	<i>Huperzia porophila</i>	E	
215	Green violet	<i>Hybanthus concolor</i>	T	
216	Canadian St. Johnswort	<i>Hypericum canadense</i>	E	
217	Drummond St. Johnswort	<i>Hypericum drummondii</i>	SC	
218	Pineweed	<i>Hypericum gentianoides</i>	E	
219	Winterberry	<i>Ilex verticillata</i>	T	
220	Flax-leaved aster	<i>Ionactis linariifolia</i>	E	
221	White morning-glory	<i>Ipomoea lacunosa</i>	E	
222	Black-based quillwort	<i>Isoetes melanopoda</i>	E	
223	Sumpweed	<i>Iva annua</i>	SC	
224	Twinleaf	<i>Jeffersonia diphylla</i>	T	
225	Butternut	<i>Juglans cinerea</i>	SC	
226	Alpine rush	<i>Juncus alpinoarticulatus</i>	E	
227	Toad rush	<i>Juncus bufonius</i>	SC	
228	Soft rush	<i>Juncus effusus</i>	SC	
229	Green rush	<i>Juncus greenei</i>	T	
230	Edged rush	<i>Juncus marginatus</i>	E	
231	Vasey's rush	<i>Juncus vaseyi</i>	E	
232	Creeping juniper	<i>Juniperus horizontalis</i>	E	
233	Water willow	<i>Justicia americana</i>	SC	
234	Dwarf dandelion	<i>Krigia virginica</i>	T	
235	Intermediate pinweed	<i>Lechea intermedia</i>	E	
236	Hairy pinweed	<i>Lechea mucronata</i>	E	
237	Minute duckweed	<i>Lemna perpusilla</i>	SC	
238	Prairie bush clover	<i>Lespedeza leptostachya</i>	T	T

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239	Creeping bush clover	<i>Lespedeza repens</i>	SC	
240	Cleft conobea	<i>Leucospora multifida</i>	T	
241	Lanceleaf blazingstar	<i>Liatris lancifolia</i>	SC	
242	Twinflower	<i>Linnaea borealis</i>	T	
243	Wild flax	<i>Linum medium</i>	SC	
244	Brook lobelia	<i>Lobelia kalmii</i>	SC	
245	Whiskbroom parsley	<i>Lomatium foeniculaceum</i>	T	
246	Western parsley	<i>Lomatium orientale</i>	T	
247	Wild lupine	<i>Lupinus perennis</i>	E	
248	Bog clubmoss	<i>Lycopodiella inundata</i>	E	
249	Running clubmoss	<i>Lycopodium clavatum</i>	T	
250	Adder's-mouth orchid	<i>Malaxis unifolia</i>	SC	
251	Globe mallow	<i>Malvastrum hispidum</i>	SC	
252	Hairy waterclover	<i>Marsilea vestita</i>	E	
253	Bunchflower	<i>Melanthium virginicum</i>	T	
254	Ten-petaled blazingstar	<i>Mentzelia decapetala</i>	T	
255	Bog buckbean	<i>Menyanthes trifoliata</i>	T	
256	Northern lungwort	<i>Mertensia paniculata</i>	T	
257	Millet grass	<i>Milium effusum</i>	E	
258	Sensitive briar	<i>Mimosa nuttallii</i>	E	
259	Yellow monkeyflower	<i>Mimulus glabratus</i>	SC	
260	Rock sandwort	<i>Minuartia michauxii</i>	T	
261	Partridge berry	<i>Mitchella repens</i>	E	
262	Naked miterwort	<i>Mitella nuda</i>	E	
263	Pinesap	<i>Monotropa hypopithys</i>	T	
264	Water miner's-lettuce	<i>Montia chamissoi</i>	SC	
265	Scratchgrass	<i>Muhlenbergia asperifolia</i>	SC	
266	Mat muhly	<i>Muhlenbergia richardsonis</i>	E	
267	Water milfoil	<i>Myriophyllum heterophyllum</i>	SC	
268	Rough water milfoil	<i>Myriophyllum pinnatum</i>	SC	
269	Water milfoil	<i>Myriophyllum verticillatum</i>	SC	
270	Slender lip fern	<i>Myriopteris gracilis</i>	SC	
271	Glade mallow	<i>Napaea dioica</i>	SC	
272	Small sundrops	<i>Oenothera perennis</i>	E	
273	Southern adder's-tongue	<i>Ophioglossum vulgatum</i>	T	
274	Eastern pricklypear	<i>Opuntia cespitosa</i>	SC	
275	Fragile prickly-pear	<i>Opuntia fragilis</i>	E	
276	Bigroot pricklypear	<i>Opuntia macrorhiza</i>	SC	
277	Frenchgrass	<i>Orbexilum onobrychis</i>	E	
278	Clustered broomrape	<i>Orobanche fasciculata</i>	E	
279	Louisiana broomrape	<i>Orobanche ludoviciana</i>	SC	
280	One-sided shinleaf	<i>Orthilia secunda</i>	E	

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281	Rough-leaved ricegrass	<i>Oryzopsis asperifolia</i>	E	
282	Royal fern	<i>Osmunda regalis</i>	T	
283	Cinnamon fern	<i>Osmundastrum cinnamomeum</i>	E	
284	False golden ragwort	<i>Packera pseud aurea</i>	SC	
285	Philadelphia panic grass	<i>Panicum philadelphicum</i>	E	
286	Purple cliffbrake	<i>Pellaea atropurpurea</i>	T	
287	Arrow arum	<i>Peltandra virginica</i>	E	
288	White beardtongue	<i>Penstemon albidus</i>	T	
289	Cobaea beardtongue	<i>Penstemon cobaea</i>	E	
290	Slender beardtongue	<i>Penstemon gracilis</i>	E	
291	Tube beardtongue	<i>Penstemon tubaeiflorus</i>	E	
292	Wild dill	<i>Perideridia americana</i>	E	
293	Long beechfern	<i>Phegopteris connectilis</i>	E	
294	Broad beech fern	<i>Phegopteris hexagonoptera</i>	T	
295	Fameflower	<i>Phemeranthus parviflorus</i>	E	
296	Rough-seeded fameflower	<i>Phemeranthus rugospermus</i>	E	
297	Cleft phlox	<i>Phlox bifida</i>	SC	
298	Missouri ground-cherry	<i>Physalis missouriensis</i>	SC	
299	Annual ground-cherry	<i>Physalis pubescens</i>	SC	
300	Silvery bladderpod	<i>Physaria ludoviciana</i>	SC	
301	Mountain ricegrass	<i>Piptatherum pungens</i>	E	
302	Heart-leaved plantain	<i>Plantago cordata</i>	SC	
303	Northern bog orchid	<i>Platanthera aquilonis</i>	T	
304	Wood orchid	<i>Platanthera clavellata</i>	E	
305	Pale green orchid	<i>Platanthera flava</i>	SC	
306	Hooker's orchid	<i>Platanthera hookeri</i>	E	
307	Green fringed orchid	<i>Platanthera lacera</i>	E	
308	Eastern prairie fringed orchid	<i>Platanthera leucophaea</i>	E	T
309	Western prairie fringed orchid	<i>Platanthera praeclara</i>	T	T
310	Purple fringed orchid	<i>Platanthera psycodes</i>	T	
311	Plains bluegrass	<i>Poa arida</i>	SC	
312	Chapman's bluegrass	<i>Poa chapmaniana</i>	SC	
313	Bog bluegrass	<i>Poa paludigena</i>	T	
314	Woodland Bluegrass	<i>Poa saltuensis</i>	E	
315	Meadow bluegrass	<i>Poa wolfii</i>	SC	
316	Clammyweed	<i>Polansia jamesii</i>	E	
317	Crossleaf milkwort	<i>Polygala cruciata</i>	E	
318	Pink milkwort	<i>Polygala incarnata</i>	E	
319	Purple milkwort	<i>Polygala polygama</i>	E	
320	Hairy Solomon's-seal	<i>Polygonatum pubescens</i>	E	
321	Jointweed	<i>Polygonella articulata</i>	E	
322	Douglas' knotweed	<i>Polygonum douglasii</i>	SC	

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323	Large-leaved pondweed	<i>Potamogeton amplifolius</i>	SC	
324	Ribbonleaf pondweed	<i>Potamogeton epihydrus</i>	SC	
325	Blunt-leaved pondweed	<i>Potamogeton friesii</i>	SC	
326	White-stemmed pondweed	<i>Potamogeton praelongus</i>	E	
327	Spiralled pondweed	<i>Potamogeton spirillus</i>	SC	
328	Tussock pondweed	<i>Potamogeton strictifolius</i>	SC	
329	Vasey's pondweed	<i>Potamogeton vaseyi</i>	SC	
330	Silverweed	<i>Potentilla anserina</i>	E	
331	Pennsylvania cinquefoil	<i>Potentilla pensylvanica</i>	E	
332	Brook cinquefoil	<i>Potentilla rivalis</i>	SC	
333	Nodding rattlesnake-root	<i>Prenanthes crepidinea</i>	T	
334	Bird's-eye primrose	<i>Primula mistassinica</i>	SC	
335	Mermaid-weed	<i>Proserpinaca palustris</i>	SC	
336	Hortulan plum	<i>Prunus hortulana</i>	SC	
337	Mexican plum	<i>Prunus mexicana</i>	SC	
338	Canada plum	<i>Prunus nigra</i>	T	
339	Sand cherry	<i>Prunus pumila</i>	T	
340	Lemon scurfpea	<i>Psoralidium lanceolatum</i>	SC	
341	Pink shinleaf	<i>Pyrola asarifolia</i>	T	
342	Gmelin's crowfoot	<i>Ranunculus gmelinii</i>	SC	
343	Lanceleaf buckthorn	<i>Rhamnus lanceolata</i>	SC	
344	Meadow beauty	<i>Rhexia virginica</i>	T	
345	Dwarf sumac	<i>Rhus copallinum</i>	SC	
346	Beaked rush	<i>Rhynchospora capillacea</i>	SC	
347	Northern currant	<i>Ribes hudsonianum</i>	T	
348	Lakecress	<i>Rorippa aquatica</i>	SC	
349	Curvepod yellowcress	<i>Rorippa curvipes</i>	SC	
350	Yellow cress	<i>Rorippa sinuata</i>	SC	
351	Prickly rose	<i>Rosa acicularis</i>	SC	
352	Wood's rose	<i>Rosa woodsii</i>	T	
353	Tooth cup	<i>Rotala ramosior</i>	SC	
354	Garden dewberry	<i>Rubus aboriginum</i>	T	
355	Stem flower dewberry	<i>Rubus caulifloris</i>	E	
356	Washington dewberry	<i>Rubus celer</i>	E	
357	Short-stalked dewberry	<i>Rubus curtipes</i>	T	
358	Southern dewberry	<i>Rubus enslenii</i>	T	
359	Iron River dewberry	<i>Rubus ferrofluvius</i>	T	
360	Common dewberry	<i>Rubus flagellaris</i>	T	
361	Fuller's bristly dewberry	<i>Rubus fulleri</i>	T	
362	Swamp dewberry	<i>Rubus hispidus</i>	E	
363	Missouri bristle-berry	<i>Rubus missouricus</i>	SC	
364	Recurved blackberry	<i>Rubus recurvans</i>	E	

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365	Downy dewberry	<i>Rubus satís</i>	T	
366	New England blackberry	<i>Rubus semisetosus</i>	E	
367	Bottomland dewberry	<i>Rubus serratus</i>	E	
368	Big Horseshoe Lake bristleberry	<i>Rubus stipulatus</i>	SC	
369	Uniform bristleberry	<i>Rubus uniformis</i>	E	
370	Western dock	<i>Rumex occidentalis</i>	SC	
371	Widgeon grass	<i>Ruppia cirrhosa</i>	T	
372	Prairie rose gentian	<i>Sabatia campestris</i>	SC	
373	Crested arrowhead	<i>Sagittaria cristata</i>	SC	
374	Shining willow	<i>Salix lucida</i>	E	
375	Bog willow	<i>Salix pedicellaris</i>	T	
376	Silky willow	<i>Salix sericea</i>	SC	
377	Sassafras	<i>Sassafras albidum</i>	SC	
378	Leathery grapefern	<i>Sceptridium multifidum</i>	T	
379	Tumblegrass	<i>Schedonnardus paniculatus</i>	SC	
380	Scheuchzeria	<i>Scheuchzeria palustris</i>	SC	
381	Hall's bulrush	<i>Schoenoplectiella hallii</i>	SC	
382	Smith's bulrush	<i>Schoenoplectiella smithii</i>	E	
383	Torrey's bulrush	<i>Schoenoplectus torreyi</i>	SC	
384	Pedicelled bulrush	<i>Scirpus pedicellatus</i>	SC	
385	Low nutrush	<i>Scleria verticillata</i>	T	
386	Downy skullcap	<i>Scutellaria incana</i>	E	
387	Veined skullcap	<i>Scutellaria nervosa</i>	E	
388	Wild stonecrop	<i>Sedum ternatum</i>	E	
389	Meadow spikemoss	<i>Selaginella eclipses</i>	E	
390	Rock spikemoss	<i>Selaginella rupestris</i>	SC	
391	Knotweed bristlegrass	<i>Setaria parviflora</i>	E	
392	Buffaloberry	<i>Shepherdia argentea</i>	T	
393	Annual skeletonweed	<i>Shinneroseris rostrata</i>	E	
394	Three-toothed cinquefoil	<i>Sibbaldiopsis tridentata</i>	E	
395	Needle-pointed blue-eyed grass	<i>Sisyrinchium mucronatum</i>	E	
396	Rough-leaved goldenrod	<i>Solidago patula</i>	E	
397	Bog goldenrod	<i>Solidago uliginosa</i>	E	
398	Burreed	<i>Sparganium androcladum</i>	SC	
399	Scarlet globemallow	<i>Sphaeralcea coccinea</i>	T	
400	Yellow-lipped ladies-tresses	<i>Spiranthes lucida</i>	E	
401	Hooded ladies-tresses	<i>Spiranthes romanzoffiana</i>	E	
402	Little ladies-tresses	<i>Spiranthes tuberosa</i>	E	
403	Spring ladies-tresses	<i>Spiranthes vernalis</i>	E	
404	Clandestine dropseed	<i>Sporobolus clandestinus</i>	SC	
405	Rough-leaved hedge-nettle	<i>Stachys aspera</i>	E	

	Common Name	Scientific Name	IA T/E/SC	Fed T/E
406	Rosy twisted-stalk	<i>Streptopus lanceolatus</i>	SC	
407	Pickering morning-glory	<i>Stylisma pickeringii</i>	E	
408	Snowberry	<i>Symphoricarpos albus</i>	E	
409	Rush aster	<i>Symphyotrichum boreale</i>	T	
410	Ricebutton aster	<i>Symphyotrichum dumosum</i>	SC	
411	Curved aster	<i>Symphyotrichum falcatum</i>	SC	
412	Prairie aster	<i>Symphyotrichum turbinellum</i>	SC	
413	Waxy meadowrue	<i>Thalictrum amphibolum</i>	E	
414	Western spiderwort	<i>Tradescantia occidentalis</i>	E	
415	Spiderwort	<i>Tradescantia virginiana</i>	SC	
416	Buffalo clover	<i>Trifolium reflexum</i>	SC	
417	Large arrowgrass	<i>Triglochin maritima</i>	T	
418	Small arrowgrass	<i>Triglochin palustris</i>	T	
419	Humped bladderwort	<i>Utricularia gibba</i>	SC	
420	Flat-leaved bladderwort	<i>Utricularia intermedia</i>	SC	
421	Small bladderwort	<i>Utricularia minor</i>	E	
422	Sessile-leaf bellwort	<i>Uvularia sessilifolia</i>	E	
423	Low sweet blueberry	<i>Vaccinium angustifolium</i>	E	
424	Velvetleaf blueberry	<i>Vaccinium myrtilloides</i>	E	
425	American brookline	<i>Veronica americana</i>	E	
426	Marsh speedwell	<i>Veronica scutellata</i>	SC	
427	Maple-leaved arrowwood	<i>Viburnum acerifolium</i>	E	
428	Black arrowwood	<i>Viburnum molle</i>	T	
429	Black haw	<i>Viburnum prunifolium</i>	SC	
430	Spurred violet	<i>Viola adunca</i>	E	
431	Large-leaved violet	<i>Viola blanda</i>	E	
432	Lance-leaved violet	<i>Viola lanceolata</i>	T	
433	Macloskey's violet	<i>Viola macloskeyi</i>	T	
434	Kidney-leaved violet	<i>Viola renifolia</i>	T	
435	Summer grape	<i>Vitis aestivalis</i>	T	
436	Frost grape	<i>Vitis vulpina</i>	E	
437	Rusty woodsia	<i>Woodsia ilvensis</i>	E	
438	Oregon woodsia	<i>Woodsia oregana</i>	E	
439	Yellow-eyed grass	<i>Xyris torta</i>	T	

Specific resources utilized by each taxonomic subcommittee during SGCN assessment:

In addition to the personal and professional survey and research results of individual taxonomic subcommittee members, the following sources of information were consulted in the conservation status assessment process.

Amphibians and Reptiles

References used by the Amphibian and Reptile Subcommittee include:

- The Natural History of the Turtles of Iowa, VanDeWalle & Bernstein (2025);
- The Natural History of the Snakes and Lizards of Iowa, VanDeWalle (2022);
- A Field Guide to the Amphibians and Reptiles of Iowa, LeClere (2013);
- Iowa Multiple Species Inventory and Monitoring Program;
- Christiansen and Bailey (1986, 1988, and 1991);
- [Partners for Amphibian and Reptile Conservation](#);
- [Herpmapper](#).

Birds

References utilized by the Bird Subcommittee include:

- *Birds in Iowa* (Kent and Dinsmore 1996);
- *Iowa Birds* (Dinsmore et al. 1984);
- Dinsmore & Dinsmore (2023);
- Iowa Multiple Species Inventory and Monitoring Program;
- *The Iowa Breeding Bird Atlas* (Jackson et al. 1996) and *The Iowa Breeding Bird Atlas II* (Dinsmore et al. 2020);
- *Trends in Iowa Wildlife Populations and Harvest*;
- USGS Breeding Bird Survey;
- [Road to Recovery - Saving Our Shared Birds](#).

Butterflies

References used by the Butterfly Subcommittee include:

- [Insects of Iowa webpage](#);
- The Butterflies of Iowa - Schlicht et al. (2007);
- Iowa Multiple Species Inventory and Monitoring Program;
- *A catalogue of the butterflies of the United States and Canada*, Pelham (2023).

Dragonflies and damselflies

References used by the Dragonfly and Damselfly Subcommittee include:

- [Iowa Odonata Survey](#);
- [Odonata Central](#);
- Iowa Multiple Species Inventory and Monitoring Program;
- Paulson et al. (2024).

Fish

References used by the Fish Subcommittee include:

- A review of distribution records in Iowa's Aquatic Gap fish database, Olson (2024);
- Range maps and proposed species status criteria for Iowa's SGCN and threatened/endangered fish species, Olson (2024);
- Iowa Biological Stream Monitoring Database ([BioNet](#)): the portal for all data collected as part of the state's Biological Monitoring and Assessment programs;
- Iowa DNR Fisheries Bureau survey data;
- Harlan and Speaker (1987);
- Page et al. (2023) (American Fisheries Society).

Mammals

References used by the Mammal Subcommittee include:

- Bowles *et al.* (1998);
- Iowa Multiple Species Inventory and Monitoring Program;
- Trends in Iowa Wildlife Populations and Harvest.

Mussels

References used by the Mussel Subcommittee include:

- Frest (1987a);
- Poole and Downing (2004);
- Statewide Freshwater Mussel Survey (J. Kurth);
- Mississippi River mussel sampling data (S. Gritters);
- Iowa Multiple Species Inventory and Monitoring Program.

Terrestrial Snails

Comparatively little is known about the distribution and status of this group in Iowa. References used by the Terrestrial Snail Subcommittee Include:

- Frest (1987b)
- Nekola and Coles (2010)
- Nekola *et al.* (2018)
- Turgeon *et al.* (1998)

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- VanDeWalle, T, and NP Bernstein. 2025. *The Natural History of the Turtles of Iowa*. University of Iowa Press, Iowa City, Iowa. 252 pp.
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Chapter Four

Habitats of Species of Greatest Conservation Need

Required Element #2: Descriptions of the extent and condition of habitats and community types essential to conservation of species of greatest conservation need.

Habitat availability, quantity, and quality are primary factors influencing the viability of wildlife populations. To protect and manage for species of greatest conservation need it is essential to identify the distribution of species within the state and the natural resources critical to their survival in and around occupied areas. Categorizing Iowa's habitat types and the SGCN species that depend on them will aid the design of effective management practices that will directly benefit Iowa's wildlife.

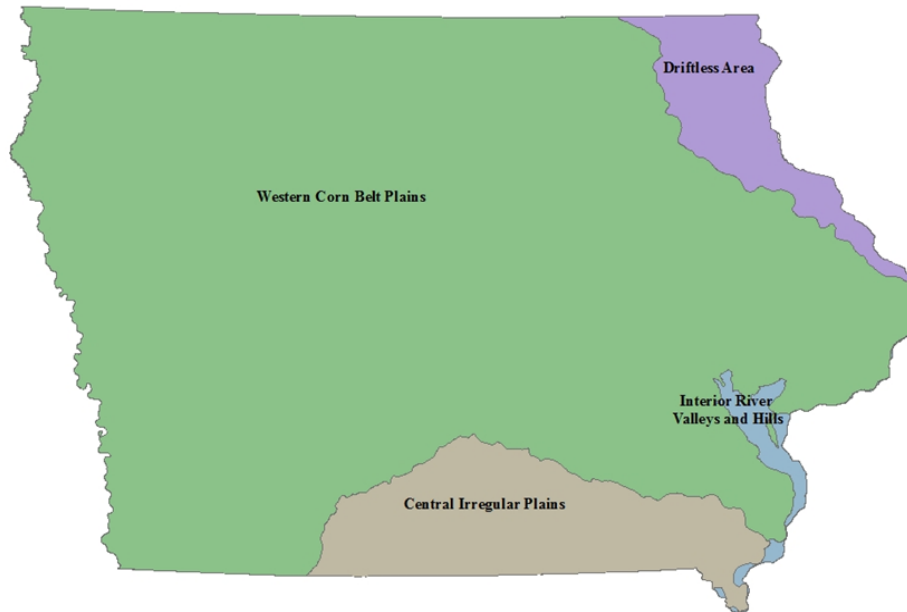
Organizing Frameworks - Ecoregions and Watersheds

In addition to hierarchical systems for classification of lifeforms (taxonomy) and habitat types, geographic classification frameworks are also used to organize natural resource management, research, and planning activities. Over the years, natural resource agencies have moved from using political (e.g., county or state) boundaries toward the use of more holistic, ecosystem-based (e.g., watershed or flyway) frameworks for planning and delivering conservation. Due to this shift in methodology, many potentially useful ecoregional classification systems have been developed. Using biotic and abiotic ecological principles and processes, numerous authors have developed hierarchical ecoregional classification systems for a range of geographical scales (Cleland et al 1997). The Iowa Wildlife Action Plan is intended to provide useful information to users of watershed- and ecoregional-based approaches, and to illustrate the complementary use of these frameworks. Previous iterations of the Plan (2012 and earlier) used the Landform Regions of Iowa (Iowa Geologic Survey, Iowa DNR) as a coarse-scale geographic framework, and watershed boundaries for some finer-scale analyses.

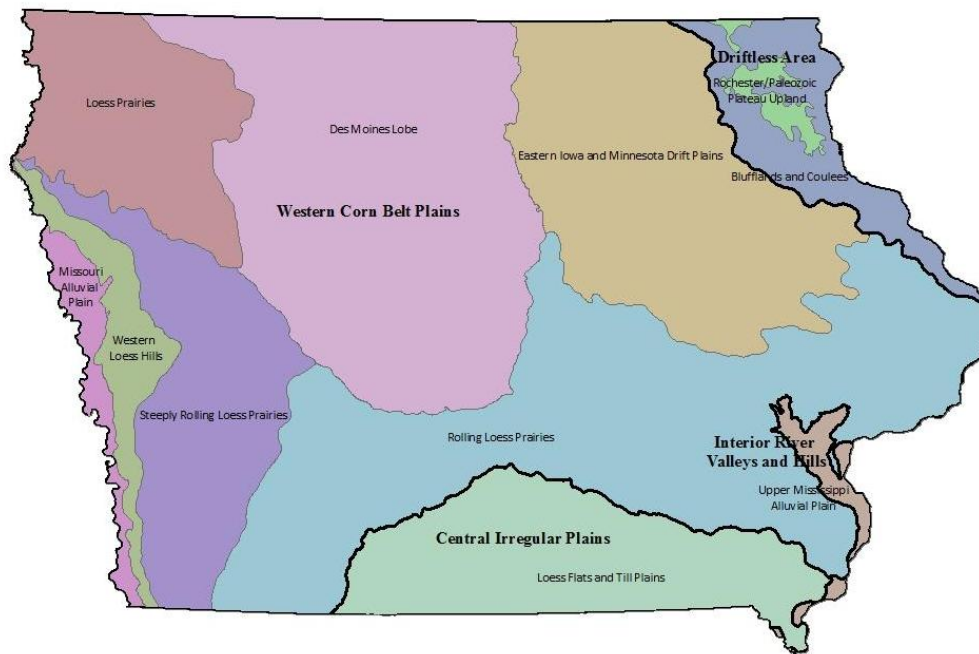
Ecoregions

One limitation of the Landform Regions of Iowa is that it was developed specifically for management and planning use in Iowa and, thus, does not follow a consistent hierarchical classification framework as other national ecoregional datasets. A variety of readily-available continental or national ecoregional datasets exist that were developed independent of political boundaries and are commonly used by conservation entities across the country. The Association of Fish & Wildlife Agencies (AFWA) recommends that for the development of State Wildlife Action Plans, resource managers "select classification systems, mapping units, and other such methodologies and data sources that will support the ultimate integration of SWAP priorities into future implementation of regional and national conservation initiatives..." (AFWA, 2012). Although developed at a coarser scale than the Landform Regions of Iowa the Environmental Protection Agency (EPA) Ecoregions of the Continental U.S. is a dataset capable of providing consistency for the development of SWAPs (U.S. EPA, 2013). For more seamless collaboration across state and federal lines, this Plan utilizes the EPA ecoregional framework for describing terrestrial and aquatic resources and conservation management and planning in Iowa (Map 4-1 and Map 4-2).

Map 4-1. Environmental Protection Agency Level III Ecoregions of the Continental U.S. mapped in Iowa



Map 4-2. Environmental Protection Agency Level IV Ecoregions of the Continental U.S. mapped in Iowa
(Large font denotes the names of Level III ecoregions and small font, Level IV ecoregions.)



Watersheds

A watershed is a geographic area of land for which all surface water (storm or base flow) drains or flows to a point of lower elevation. Watersheds come in many shapes and sizes and can be delineated at several scales. The U.S. Geological Survey has created and mapped a hierarchical classification of hydrologic units, individually identified at each successively smaller level by a [Hydrologic Unit Code \(HUC\)](#), for representing variable levels of surface drainage basins or distinct hydrologic features.

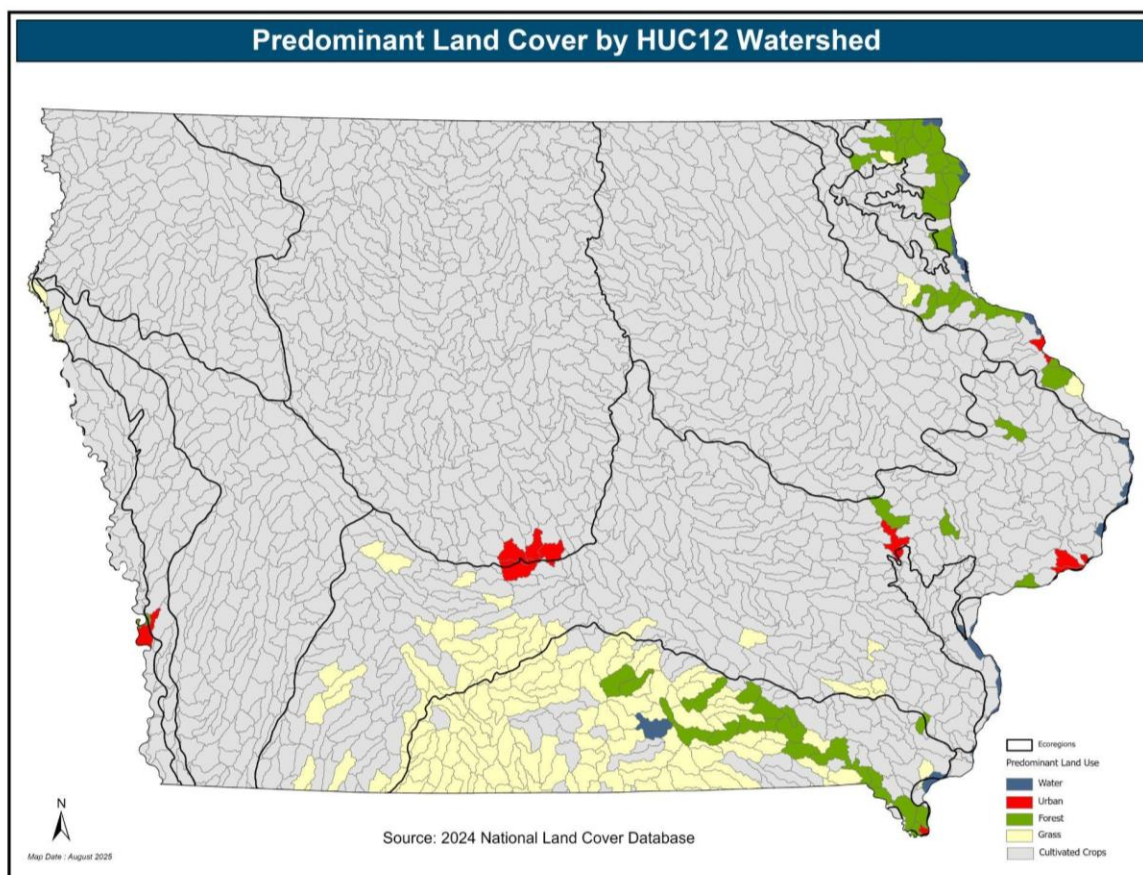
Watersheds are a useful spatial framework for establishing ecologically relevant boundaries for the evaluation of water quantity and quality, and subsequently aquatic habitats, across Iowa. The hierarchical nature of the HUC framework makes it scale-able to an issue of interest and the boundaries have been mapped and agreed-upon by most conservation entities in the U.S. Furthermore, HUCs are useful as units of evaluation because the water quantity and quality as measured at a given point along a flow line provides information about higher topographic areas from that point. Thus,

the effects of natural processes or of management of land and water within a watershed can be evaluated. For these reasons, watersheds are used for a variety of analyses within this Plan, particularly those analyses which specifically focus on aquatic organisms or require a finer spatial resolution than the ecoregions provide.

Organizing Frameworks - Terrestrial and Aquatic Habitat Classes

Iowa has a variety of land use and land cover datasets useful in analysis of the extent and location of Iowa's wildlife habitat. A look at the predominant land use by watershed provides a current overview of the big picture of Iowa's habitat (Map 4-3).

Map 4-3. Predominant modern land use by U.S. Geological Survey Hydrologic Unit Code (HUC) 12 watersheds as determined from the 2024 National Land Cover Database



Terrestrial Habitat Classes

The 2006 and 2012 versions of the IWAP utilized nine terrestrial vegetation classes defined by Iowa GAP as the basis for evaluating terrestrial wildlife habitats. Vegetation classes were mapped from digital remote sensing of 30 Landsat 5 Thematic Mapper (TM) images spanning 12 scenes across the state for obtaining statewide coverage and two to three images per scene from between 1990 and 1994 (Kane et al. 2003). The 2015 version of the plan used the Iowa 2009 High Resolution Land Cover dataset to display land use, and the habitat classes used in the 2015 edition of this plan were modeled after the Iowa 2009 HRLC.

This version of the Plan uses the 2024 National Land Cover Database which is described in Table 4-1 and provides more recently updated land cover information. The National Land Cover Database is mapped at a 30 meter pixel scale, which is a lower resolution than what we used in 2015, but it is much more up to date than the Iowa 2009 high resolution land cover product. That Iowa specific product is being updated, but isn't completed yet at the time of this edition of the Plan.

Table 4-1. 2024 National Land Cover Database Class Legend and Description (adapted for Iowa)

Class/Value	Classification Description
Water	
11	Open Water - areas of open water, generally with less than 25% cover of vegetation or soil.
Developed	
21	Developed, Open Space - areas with a mixture of some constructed materials, but mostly vegetation in the form of lawn grasses. Impervious surfaces account for less than 20% of total cover. These areas most commonly include large-lot single-family housing units, parks, golf courses, and vegetation planted in developed settings for recreation, erosion control, or aesthetic purposes.
22	Developed, Low Intensity - areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20% to 49% percent of total cover. These areas most commonly include single-family housing units.
23	Developed, Medium Intensity - areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 50% to 79% of the total cover. These areas most commonly include single-family housing units.
24	Developed High Intensity - highly developed areas where people reside or work in high numbers. Examples include apartment complexes, row houses and commercial/industrial. Impervious surfaces account for 80% to 100% of the total cover.
Barren	
31	Barren Land (Rock/Sand/Clay) - areas of bedrock, desert pavement, scarps, talus, slides, volcanic material, glacial debris, sand dunes, strip mines, gravel pits and other accumulations of earthen material. Generally, vegetation accounts for less than 15% of total cover.
Forest	
41	Deciduous Forest - areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. More than 75% of the tree species shed foliage simultaneously in response to seasonal change.
42	Evergreen Forest - areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. More than 75% of the tree species maintain their leaves all year. Canopy is never without green foliage.
43	Mixed Forest - areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. Neither deciduous nor evergreen species are greater than 75% of total tree cover.
Shrubland	
52	Shrub/Scrub - areas dominated by shrubs; less than 5 meters tall with shrub canopy typically greater than 20% of total vegetation. This class includes true shrubs, young trees in an early successional stage or trees stunted from environmental conditions.
Herbaceous	
71	Grassland/Herbaceous - areas dominated by graminoid or herbaceous vegetation, generally greater than 80% of total vegetation. These areas are not subject to intensive management such as tilling, but can be utilized for grazing.
Planted/Cultivated	
81	Pasture/Hay - areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops, typically on a perennial cycle. Pasture/hay vegetation accounts for greater than 20% of total vegetation.
82	Cultivated Crops - areas used for the production of annual crops, such as corn, soybeans, vegetables, tobacco, and cotton, and also perennial woody crops such as orchards and vineyards. Crop vegetation accounts for greater than 20% of total vegetation. This class also includes all land being actively tilled.

Class/Value	Classification Description
Wetlands	
90	Woody Wetlands- areas where forest or shrubland vegetation accounts for greater than 20% of vegetative cover and the soil or substrate is periodically saturated with or covered with water.
95	Emergent Herbaceous Wetlands- Areas where perennial herbaceous vegetation accounts for greater than 80% of vegetative cover and the soil or substrate is periodically saturated with or covered with water.

The proportion of each land cover type mapped in Iowa is provided in Table 4-2.

Table 4-2. Proportion of each land cover type mapped within Iowa from the 2024 National Land Cover Database

Land Cover Type	Acres	Percent of Iowa
<u>Agricultural & Grassland</u>		
Cultivated Crops	24,542,939	68%
Pasture/Hay	4,839,442	13%
Barren	64,138	0.2%
Grassland/Herbaceous	193,573	1%
All Agricultural & Grassland	29,640,092	82%
<u>Forest</u>		
Deciduous Forest	2,460,205	6.83%
Evergreen Forest	22,482	0.06%
Mixed Forest	47,807	0.13%
Shrub/Scrub	37,776	0.1%
All Forest	2,568,270	7%
<u>Developed</u>		
Developed, Open Space	1,087,558	3%
Developed, Low Intensity	1,275,624	4%
Developed, Medium Intensity	345,282	1%
Developed, High Intensity	73,133	0.2%
All Developed	2,781,597	8%
<u>Aquatic</u>		
Open Water	316,210	1%
Woody Wetlands	417,692	1%
Emergent Herbaceous Wetlands	294,081	1%
All Aquatic	1,027,983	3%
TOTAL SURFACE AREA	36,017,942	100%

Distribution of Terrestrial Habitats

Wildlife habitats are not uniformly distributed throughout the state (Table 4-3). Agriculture dominates all ecoregions and ranges from 29% of the land cover in the Loess Flats & Till Plains ecoregion to 80% in the Northwest Iowa Loess Prairies ecoregion. The largest total proportions of wooded, grassland, and wetland habitats exist in the Loess Flats & Till Plains and the Paleozoic Plateau/Coulee Section ecoregions, and comprise 67% and 66% of the total land cover in each region, respectively. The Northwest Iowa Loess Prairie, Des Moines Lobe, and the Missouri Alluvial Plain contain the least total proportions of wooded, grassland, and wetland habitats, which together comprise 17%, 19%, and 19% of the total land cover in each ecoregion, respectively.

Table 4-3. Proportion of 2024 National Land Cover Database major cover types by Environmental Protection Agency Level III and IV Ecoregions in Iowa.

Ecoregion ¹	Acres in Iowa	% of State	Major land cover classes for ecoregions, as a proportion of each ecoregion's land area				
			Wooded	Grassland	Wetland	Total	Cultivated Crops
40. Central Irregular Plains	3,620,563	10%	21%	40%	1%	63%	30%
40a. Loess Flats & Till Plains	3,620,563	10%	21%	40%	1%	63%	30%
47. Western Corn Belt Plains	30,171,226	84%	4%	11%	2%	17%	74%
47a. Northwest Iowa Loess Prairies	2,804,513	8%	1%	5%	1%	7%	85%
47b. Des Moines Lobe	7,814,565	22%	2%	6%	2%	9%	82%
47c. Eastern IA & MN Drift Plains	5,444,713	15%	3%	6%	2%	11%	79%
47d. Missouri Alluvial Plain	636,685	2%	1%	4%	5%	9%	79%
47e. Steeply Rolling Loess Prairies	3,337,773	9%	2%	8%	1%	11%	83%
47f. Rolling Loess Prairies	9,120,039	25%	8%	20%	2%	30%	60%
47m. Western Loess Hills	1,012,938	3%	15%	18%	0%	33%	58%
52. The Driftless Area	1,783,771	5%	25%	20%	2%	47%	43%
52b. Paleozoic Plateau/ Coulee Section	1,492,085	4%	29%	22%	3%	54%	36%
52c. Rochester/ Paleozoic Plateau Upland	291,686	1%	4%	9%	0%	13%	80%
72. Interior River Valleys & Hills	426,908	1%	3%	7%	14%	24%	59%
72d. Upper Mississippi Alluvial Plain	426,908	1%	3%	7%	14%	24%	59%
Total Acres	36,002,468	100%	-	-	-	-	-

¹See Map 4-1 and Map 4-2 for locations of ecoregions. See Chapter 2 for more detailed descriptions of ecoregions. The remainder of the landcover for each Ecoregion is a combination of developed areas and open water.

Aquatic Habitat Classes

The aquatic habitat types chosen for use in the IWAP are displayed in Table 4-4. In the natural world, there is no clear delineation between these aquatic habitat classes. Creeks grade into streams and streams grade into rivers. There are many sizes of water bodies between small ponds and large lakes. Shallow natural lakes, or open water marshes, provide a significant transition between lakes and streams. They are extremely sensitive to fluctuations in water quality, water level and invasive species. Aquatic classes may show differences in flow rate, bottom substrate, water quality and clarity, water temperature and dissolved oxygen content as well as differences in associated plant and animal species. Aquatic species utilizing vegetated herbaceous wetlands are included in the Wetland habitat class (Table 4-1).

Defining aquatic habitat classes helps describe the ecological need of aquatic species in a way that allows conservationists to focus on undertaking conservation actions in the right places for the right species. In addition, the following classes are all able to be mapped and therefore these classifications can be used to stratify the survey designs for aquatic organisms.

Table 4-4. Aquatic Habitat Classes Used in the IWAP

Aquatic Habitat	Description
River	Large flowing bodies of water. Third order and lower (larger). The Mississippi is a 10 th order river.
Stream A. Warm Water B. Cold Water	Smaller flowing bodies of water that serve as tributaries to rivers. The stream class includes first and second order streams. Also referred to as headwater streams.

Aquatic Habitat	Description
On-stream Impoundment	Slowly flowing bodies of water formed from artificial damming of a river, or stream, generally less than 500 acres in size and having a watershed to lake ratio >80:1.
Federal Flood Control Reservoirs	Iowa has 4 federal flood control reservoirs: Saylorville, Red Rock, Coralville, and Rathbun.
Mississippi River Pools	Pools on the Mississippi River caused by the construction of the lock and dam system.
Backwater	Slow flowing bodies of water associated with larger river systems. Back-channel low-lying areas filled with water during high flow events but may be completely isolated from the river during low flow and may exhibit no flow during these periods. They are especially prevalent on the Mississippi River.
Oxbow	A sub-class of backwaters, they are water bodies formed in old river channels that are now cut off from the main channel and flow of a river.
Lake A. Natural B. Constructed	Large bodies of water exhibiting little or no flow with emergent vegetation over less than 25% of the surface area. "Publicly owned lake" means any constructed or natural lake having a watershed acreage-to-lake surface area ratio of less than 80 to 1 and owned by an Iowa county or municipal government or by the state of Iowa. (IAC 571 Chapter 31)
Shallow lake	Open freshwater systems where maximum depth is less than 10 feet. Normally in a permanent open water state due to the altered hydrology of watersheds and unmanaged outlet structures that maintain artificially high water levels. May be fringed by a border of emergent vegetation in water depths less than 6 feet. When clear, they are dominated by emergent and submergent vegetation.
Pond	Smaller standing body of water, less than 10 acres in size.
Surface Mines	Surface mines are artificial water bodies in excavated basins, often the result of sand and gravel mining operations, or resulting from excavations to provide fill materials for roadway construction like overpass ramps on major highways.

Iowa has over 19,000 miles of interior rivers and streams. There are 87 cold water streams located in northeast Iowa with a combined length of 266 miles. The 25 largest interior rivers extend over 3,500 miles and numerous smaller creeks and streams feed each.

All interior rivers and streams are part of either the Mississippi or the Missouri River systems. The Mississippi River watershed is 38,860 square miles (69 % of Iowa's surface area). The Missouri River drains 17,379 square miles (31%).

An oxbow is formed when a river channel changes course and sediments block the entrance and exit of a meander in the old channel. Large oxbows are found along the Missouri and Mississippi Rivers and smaller, pond-like oxbows are found along many interior rivers and streams.

There are four U.S. Army Corps of Engineers flood control reservoirs on Iowa rivers, including two on the Des Moines River (Saylorville and Red Rock reservoirs), one on the Iowa River (Coralville Reservoir) and one on the Chariton River (Rathbun Reservoir).

Natural lakes are most common in the Loess Prairies and the Des Moines lobe ecoregions. Thirty-one major natural lakes with a combined surface area of almost 29,000 acres and 17 marsh-like shallow lakes with over 3,000 acres of combined surface area are still present in Iowa in spite of the extensive drainage of the past 150 years.

Constructed lakes include recreational lakes, municipal water supplies, river impoundments and surface mine lakes. These are generally small; less than one-fourth of these are over 100 acres. More than 200 man-made dams on rivers, streams and creeks impound areas ranging from 15 acres to 19,000 acres.

There are more than 87,000 ponds statewide. Most are in the Rolling Loess Prairies and Central Irregular Till Plains ecoregions, south of Iowa Highway 92. Ponds are generally less than 10 acres. An estimated 53% of Iowa's surface water area is in private ownership, and that vast majority of that acreage is in farm ponds.

Wetlands are transitions between terrestrial and aquatic systems and have saturated soil for a majority of the growing season. All wetlands have three things in common: hydric soils, hydrology, and the presence of aquatic plants. Many different wetland classifications exist. In general, herbaceous wetlands can be classified as:

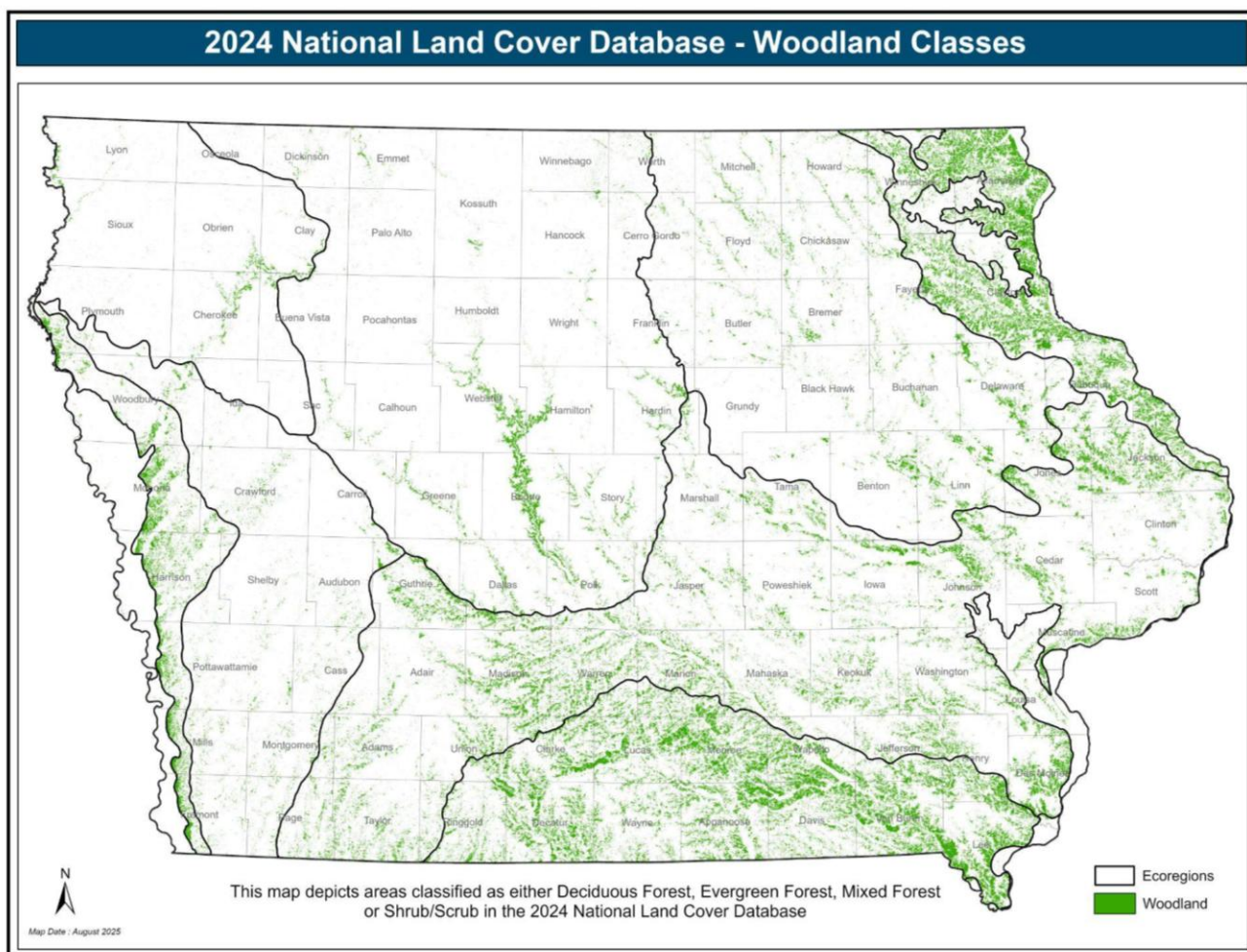
- Marshes, open and unforested wetlands dominated by cattails, sedges and grasses;
- Wet meadows which are dominated by sedges with very shallow water levels or are just saturated to soil level;
- Bogs and fens which are made up of unique living plants over partially decomposed organic matter (peat).

Wetlands in these categories are included with the terrestrial habitat classes under Emergent Herbaceous Wetlands (Table 4-1).

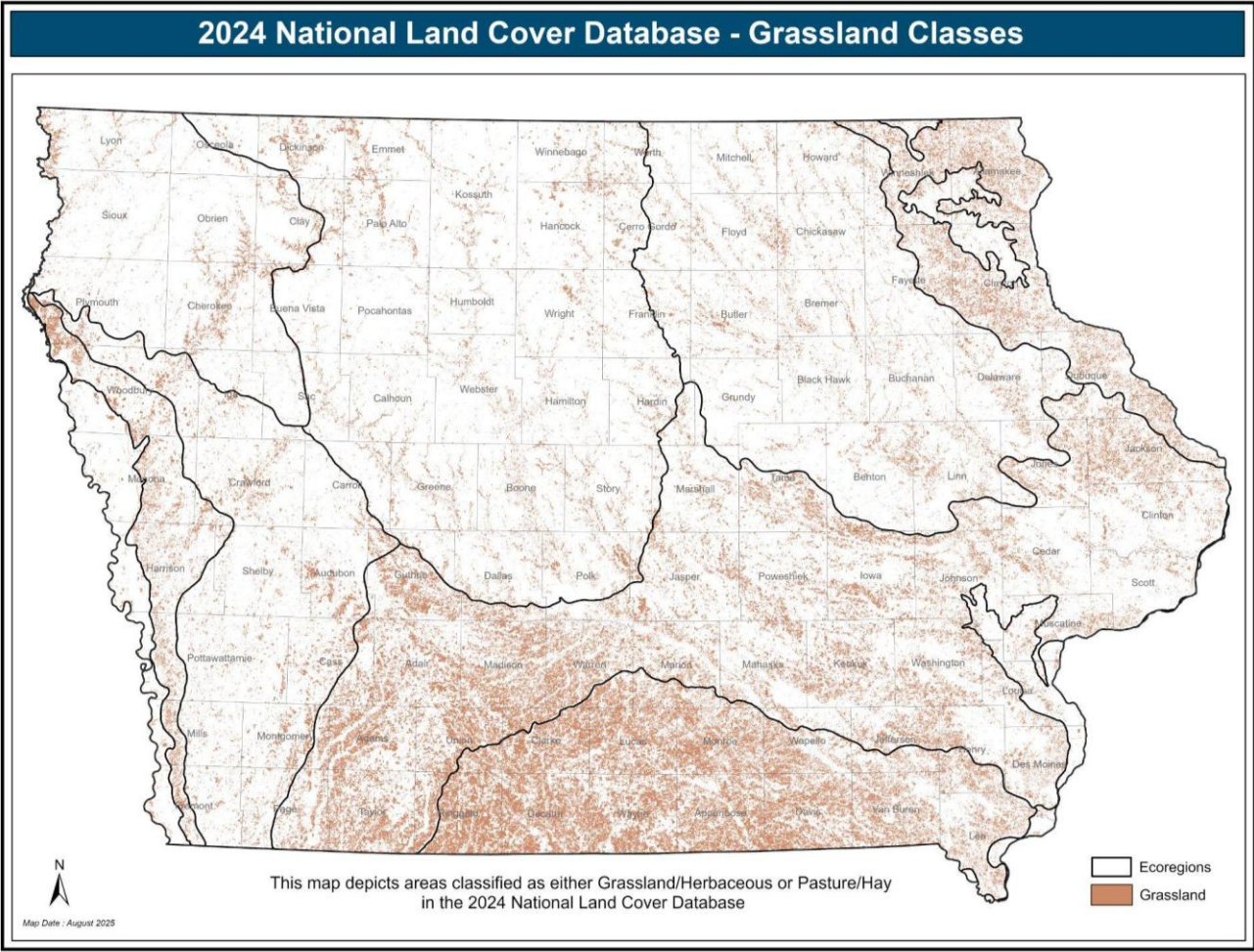
Habitat Maps

The maps on the following pages give a visual impression of the distribution of wildlife habitats, and they highlight two problems that are discussed later in the Plan. Most habitat blocks are small and highly fragmented compared to Iowa's original landscape. A century of sub-dividing the land for agricultural purposes has left few large blocks in any vegetative cover except for crops. This has implications for area-sensitive species that require large blocks of habitat to survive or reproduce successfully. It may also make it difficult for less mobile species to pioneer new habitats or to find replacement habitat if their habitat patch is destroyed or altered unacceptably.

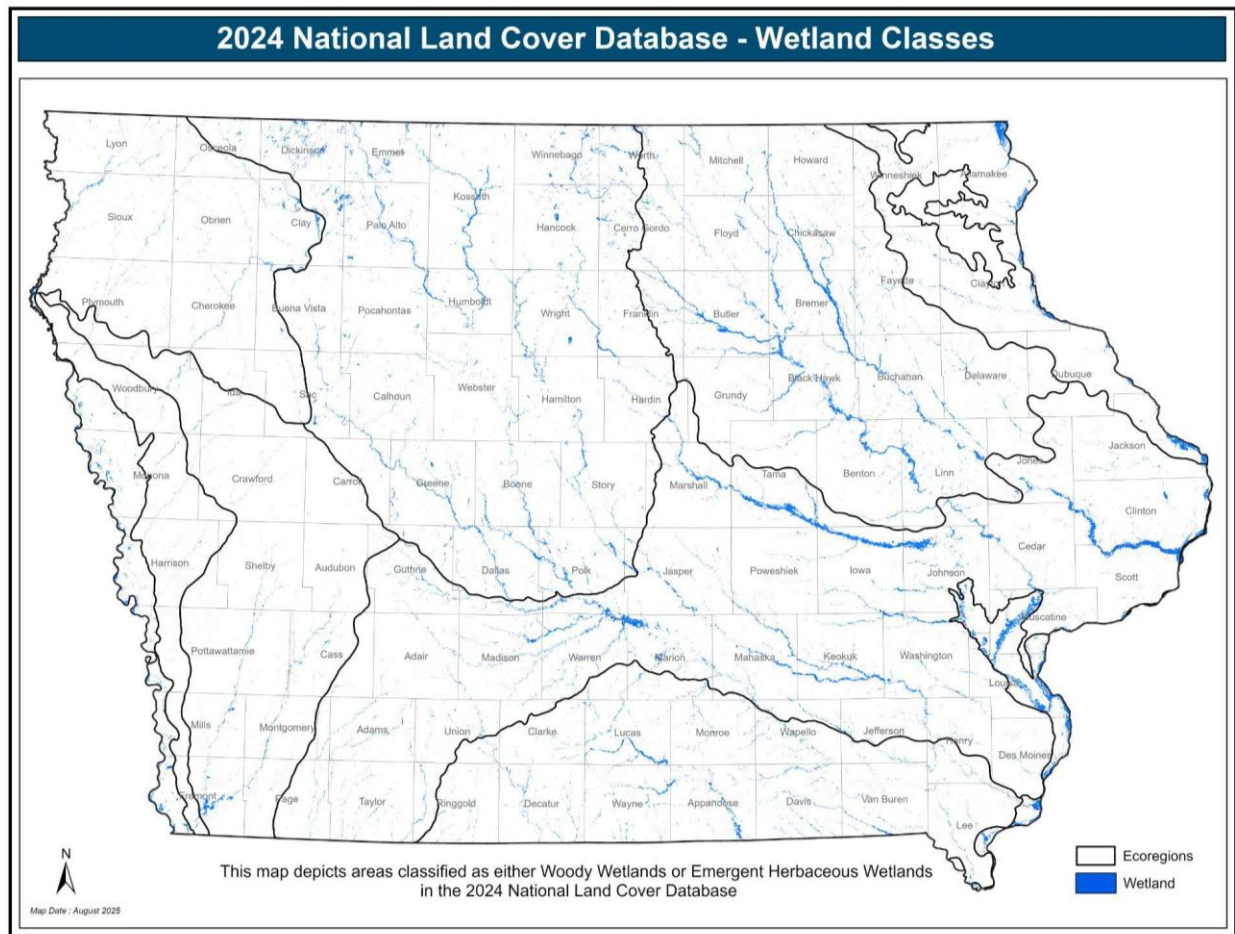
Map 4-4. Forest & Woodland Land Cover



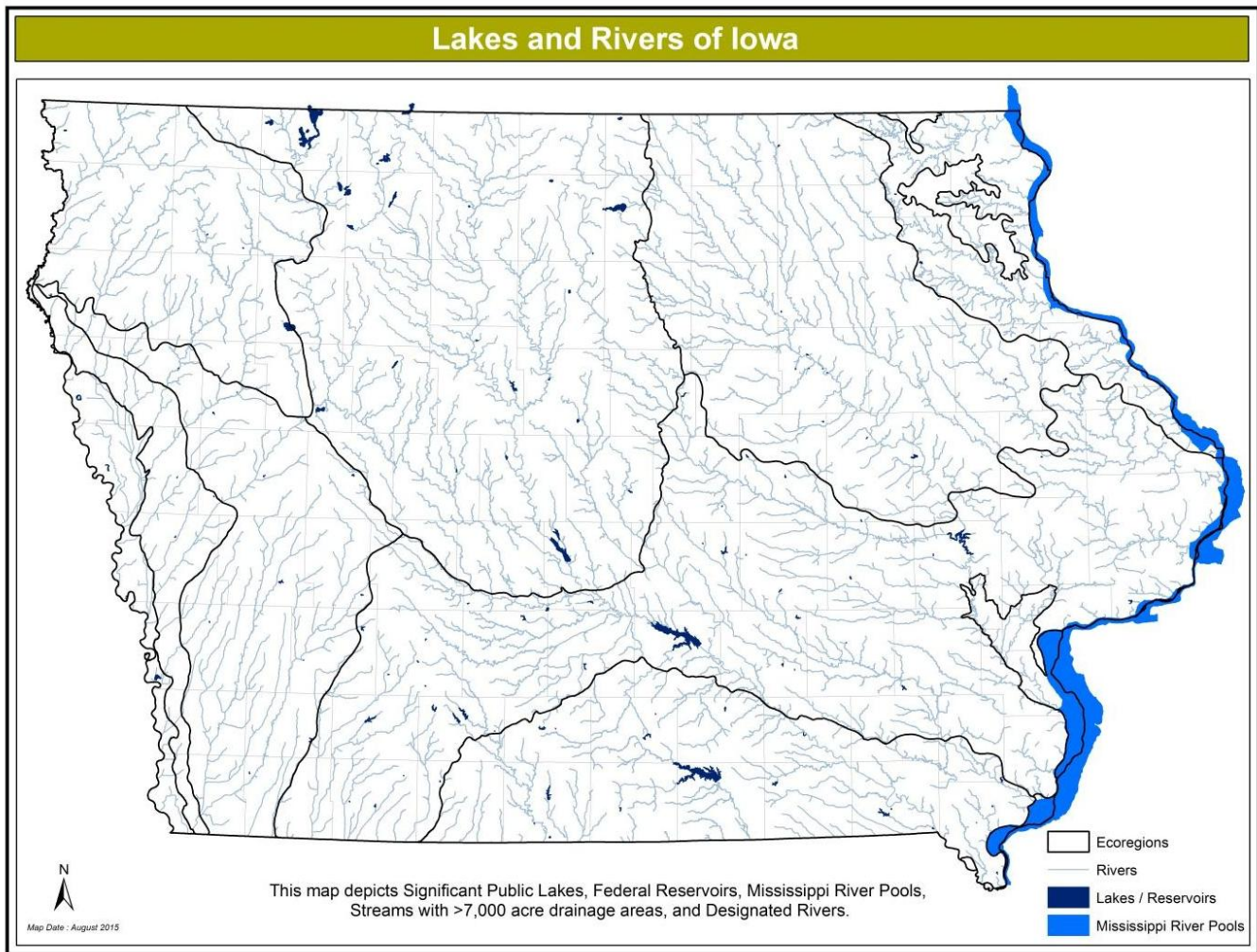
Map 4-5. Grassland Land Cover



Map 4-6. Wetland Land Cover



Map 4-7. Major Lakes and River Systems of Iowa (Source: Iowa DNR)



Habitat Preferences of SGCN

The Wildlife Working Groups' Taxonomic Subcommittees assigned each SGCN to a habitat class or classes. Aspects of each species' biology and behavior complicated this process. Some are generalists and can occupy a variety of habitats; others have very narrow habitat tolerances. Some species require different habitats at different stages in their life cycles, at different seasons of the year or at different times of the day. Working Groups identified those habitats that were considered to be the most critical or limiting to the species distribution and abundance in Iowa. Habitat preferences are taken from the existing literature and do not necessarily include all of the terrestrial and aquatic habitat classes listed in this Plan. Habitat preferences for individual SGCN are found in Appendix 18.

Appendix 19 displays SGCN with common habitat preferences grouped into the habitat classes used in this Plan. Species with more than one preferred habitat were listed in each class. Groupings of SGCN by habitat class give a very general overview useful for identifying habitat protection or restoration priorities at the landscape level. Detailed habitat management plans for SGCN must consider their entire individual habitat needs. Habitat management guidance documents are developed and updated as information becomes available, and therefore not provided within the Plan. Flowing water aquatic habitats had the greatest number of SGCN of any habitat class, followed by grasslands (Appendix 19).

Priorities for Habitat Protection

Given the lack of natural areas remaining in Iowa, general strategies for prioritization of habitat protection tend to focus on enlarging the size of habitat complexes, reducing fragmentation, and increasing connectivity between larger areas of habitat. However, there are many species that have very specific habitat requirements, and some of those specialist

species require habitats that are rare in Iowa or particularly sensitive to human disturbance. Thus, conservation of wildlife will require an approach that addresses both coarse-scale as well as fine-scale habitat needs.

Landscape-Scale Prioritization

Land protection not only provides habitat for wildlife and recreational opportunities for people, but also offers opportunities to maintain and restore ecosystem functions such as water filtration, flood abatement, carbon storage, etc. Intact ecosystems tend to provide more benefits and are more resilient to outside stressors. Therefore, land protection efforts in Iowa should continue to focus on the following principles:

1. Development of functional landscapes - adding parcels to existing protected areas to create core areas of fish and wildlife habitat.
2. Decreasing fragmentation - using land protection to decrease the number of edges between habitat and non-habitat areas.
3. Increasing connectivity - protecting and/or managing for wildlife use of areas between existing habitat core areas to facilitate movement between these areas.
4. Protection of native sod - protecting and/or managing for remnant prairies or other areas which have not been previously plowed. (See Iowa Tallgrass Prairie Working Group, 2013 for more information on this principle and how it's applied.)

Rare and Sensitive Communities

Land protection and management efforts in Iowa should also continue to focus on preservation of rare and/or sensitive ecological communities, which in turn support rare wildlife species. Some of Iowa's unique landforms or natural communities are of global significance. For example, the Loess Hills of western Iowa comprise one of the most extensive Loess deposits in the world. Below are descriptions of important rare and sensitive communities in Iowa.

The following descriptions are all adapted from NatureServe Explorer (Faber-Langendoen et al. 2012).

1. Sand Prairie -This system is found in the northern Midwest, particularly in Minnesota, Wisconsin, Michigan, and possibly ranging into Ontario. It is often found on glacial features such as kames, eskers, moraines, lakeplains (though excluding the Great Lakes lakeplain) and sandplains, and along eolian dunes. In contrast to the deeper, richer soils supporting other tallgrass systems in the region, the underlying soils in this system tend to be more shallow, sandy, rocky, and/or gravelly outwash soils. Organic content is significantly lower. Fire and drought are the major dynamics influencing this system. If fire and periodic drought are not present, woody species begin to invade this system, especially in the eastern parts of its distribution. Wind can also play a role, especially on examples found on sandplains and/or eolian dunes. (From NatureServe North-Central Interior Sand and Gravel Tallgrass Prairie).
2. North-Central Interior Shrub-Graminoid Alkaline Fens - This fen system is found in the glaciated portions of the Midwest and southern Canada. Examples of this system can be located on level to sloping seepage areas, in pitted outwash or in kettle lakes associated with kettle-kame-moraine topography. Groundwater flows through marls and shallow peat soils, and groundwater is typically minerotrophic and slightly alkaline. Examples of this system contain a core fen area of graminoids surrounded by shrubs. Alterations in wetland hydrology and agricultural development can threaten examples of this system. (From NatureServe Explorer - North-Central Interior Shrub-Graminoid Alkaline Fen).

Algific Talus Slopes and Goat Prairies - This system is found in the driftless regions of southeastern Minnesota, southwestern Wisconsin, and northern Iowa and Illinois. This region was not glaciated like the surrounding areas and thus is predominated by rolling hills and bluff outcrops. This system is found primarily on bluffs and dry upper slopes along the Upper Mississippi River. This system contains a mosaic of woodlands, savannas, prairies and sparsely vegetated limestone, dolomite, and/or sandstone outcrops, with occasional talus, especially algific talus. Soils range from thin to moderately deep and are moderately to excessively well-drained with a high mineral content. Historically, fire was the most important dynamic maintaining these systems, however, fire suppression within the region has allowed more canopy cover and thus very few prairie openings remain. Algific

talus harbors a number of unusual Pleistocene relict species, including plants and snails. (From NatureServe Paleozoic Plateau Bluff and Talus).

3. Prairie remnants -

- a. *Central Tallgrass Prairies* - this system is found primarily in the Central Tallgrass Prairie ecoregion ranging from eastern Kansas and Nebraska to northwestern Indiana. This system differs from other prairie systems to the north and south by being the most mesic with primarily deep, rich Mollisol soils. These soils are usually greater than 1 meter deep. This system is dominated by tallgrass species such as *Andropogon gerardii*, *Sorghastrum nutans*, and *Panicum virgatum*. These species typically grow to 1-2 m tall in the rich soils found in this system. Other mid- and shortgrass species, such as *Bouteloua curtipendula*, *Hesperostipa spartea*, and *Schizachyrium scoparium*, are usually present and can be common or locally dominant on patches of this system, particularly slopes or other areas with drier habitats. Several forb species are also associated with this system making it one of the most diverse grassland systems. As many as 300 herbaceous plant species could occur in this system across its range. The environment and habitat of this system do not prevent invasion by shrubs and trees. High-quality examples of this system have trees and shrubs widely scattered or clustered in areas that are wetter and/or more sheltered from fire than the surrounding grassland. Fire, drought, and grazing are the primary natural dynamics influencing this system and help prevent woody species from invading. However, conversion to agriculture has been the prime disturbance since post-European settlement. The rich soils and long growing season make this an ideal location for farming row crops, and as a result very few examples of this system remain.
- b. *Northern Tallgrass Prairie* - This system is found primarily in the Northern Tallgrass ecoregion ranging along the Red River basin in Minnesota and the Dakotas to Lake Manitoba in Canada. It constitutes the northernmost extension of the "true" prairies. Similar to Central Tallgrass Prairie (described above) this system is dominated by tallgrass species such as *Andropogon gerardii*, *Sorghastrum nutans*, and *Panicum virgatum*. However, the soils in this region are not as rich or deep, and thus this system does not have as much species diversity as grasslands to the south. This system is often found on well-drained, drier soils. Grazing and fire influenced this system historically. Much of this system has been converted to agriculture with very few unaltered and highly fragmented examples remaining.

4. *Great Plains Prairie Potholes* - The prairie pothole system is found primarily in the glaciated northern Great Plains of the United States and Canada, and is characterized by depressional wetlands formed by glaciers scraping the landscape during the Pleistocene era. This system is typified by several classes of wetlands distinguished by changes in topography, soils and hydrology. Many of the basins within this system are closed basins and receive irregular inputs of water from their surroundings (groundwater and precipitation), and some export water as groundwater. Hydrology of the potholes is complex. Precipitation and runoff from snowmelt are the principal water sources, with groundwater inflow secondary. Evapotranspiration is the major water loss, with seepage loss secondary. Most of the wetlands and lakes contain water that is alkaline (pH >7.4). The concentration of dissolved solids result in water that ranges from fresh to extremely saline. The flora and vegetation of this system are a function of the topography, water regime, and salinity. In addition, because of periodic droughts and wet periods, many wetlands within this system undergo vegetation cycles. This system includes elements of aquatic vegetation, emergent marshes, and wet meadows that develop into a pattern of concentric rings. This system is responsible for a significant percentage of the annual production of many economically important waterfowl in North America and houses more than 50% of North American's migratory waterfowl, with several species reliant on this system for breeding and feeding. Much of the original extent of this system has been converted to agriculture, and only approximately 40-50% of the system remains undrained. (From NatureServe Great Plains Prairie Potholes).
5. *Oak Savanna* - This system is found primarily in the northern glaciated regions of the Midwest with the largest concentration in the prairie-forest border ecoregion. It is typically found on rolling outwash plains, hills and ridges. Soils are typically moderately well- to well-drained deep loams. This system is typified by scattered trees over a continual understory of prairie and woodland grasses and forbs. *Quercus macrocarpa* is the most common tree species and can range from 10-60% cover. The understory is dominated by tallgrass prairie species such as *Andropogon gerardii* and *Schizachyrium scoparium* associated with several forb species. Historically,

frequent fires maintained this savanna system within its range and would have restricted tree canopies to 10-30%. Fire suppression in the region has allowed trees to establish more dense canopies. Periodic, strong wind disturbances and browsing also impact this system. Much of this system has also been converted to urban use or agriculture, and thus its range has decreased considerably. (From NatureServe North Central Interior Oak Savanna).

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Chapter Five

Conservation Challenges Facing Iowa's Wildlife and Habitats

Required Element #3: “Descriptions of problems which may adversely affect the state’s wildlife species identified in required element #1 or their habitats...”

Assessing Threats to Iowa’s Wildlife and Habitats

For the 2025 revision, the analysis of threats that had been conducted in 2015 was reviewed. We decided that it was still relevant and to keep it as the basis for this edition’s threat assessment. We also added an analysis for the taxa groups that are new for this version, and made a few updates to the organization in order to capture changes that have been made to the Conservation Measures Partnership (CMP) Threats Classification System since 2015. During the 2015 revision process, DNR fisheries and wildlife biologists, along with Implementation Committee and Working Group members that had the appropriate expertise and experience, identified and evaluated the most important problems facing Iowa’s wildlife today. Four threat impact levels - Low, Medium, High, or Very High - were used to evaluate the relative importance of each threat, taking into account both the scope and the severity of each threat (Table 5-1). Separate evaluations were made for each taxonomic class (Table 3-1) and each habitat class (Table 4-1 and Table 4-5). The results of these evaluations are summarized in Table 5-4 through Table 5-15.

Table 5-1. Definitions of Threat Impacts (after the International Union for Conservation of Nature [IUCN] Threat Classification System for calculating threat impact scores).

Threat Impact Calculation		Scope			
Severity		Pervasive	Large	Restricted	Small
	Extreme	Very High	High	Medium	Low
	Serious	High	High	Medium	Low
	Moderate	Medium	Medium	Low	Low
	Slight	Low	Low	Low	Low

The items on the list represent *potential* threats, which require interpretation based on the biology of the species or habitats being evaluated. The list of threats should not be interpreted as a list of things that are bad for wildlife. Rather, it is a framework from which to evaluate potential threats, stresses, or conservation challenges for wildlife for the purpose of identifying the most effective means of conserving healthy wildlife populations.

Defining Threats

In 2002, a coalition of global conservation practitioners joined together and formed the [Conservation Measures Partnership \(CMP\)](#). The Partnership’s mission is to ‘advance the practice of conservation by developing, testing, and promoting principles and tools to credibly assess and improve the effectiveness of conservation actions’. The partnership includes non-governmental conservation organizations such as National Audubon Society, The Nature Conservancy, Wildlife Conservation Society, and World Wildlife Fund, as well as governmental entities such as the U.S. Fish and Wildlife Service.

In 2004, CMP developed the first edition of the “Open Standards for the Practice of Conservation” which has since been updated in 2007, 2013, and 2024.

One outcome of this partnership is the development of a “standard lexicon” for conservation, including taxonomies, or hierarchies, for both threats and conservation actions (Salafsky et al. 2008, 2024). Adopting the use of the standard terminology allows conservationists operating at any spatial scale to share information and experiences, facilitating learning and improvement among conservation practitioners. The 2015 and 2025 editions of the IWAP make use of this standard lexicon for the classification of threats and actions in order to increase the ability of our threats and actions to be compared across state lines or other political boundaries. This helps make clear how the IWAP fits in as one piece of regional, national, or even global efforts to conserve wildlife. Aside from a small number of additions, the use of this

taxonomy does not substantially change the threats listed in the 2012 or 2006 versions of the IWAP; rather, it clarifies some of them and re-organizes them into a multilevel system. This terminology was updated in 2025 to reflect the 2024 version of the taxonomy changes. Before listing these threats, it will be helpful to review relevant definitions which describe the general elements of conservation projects. These definitions will be relevant to this chapter as well as the following chapter which addresses conservation actions.

Definitions

(adapted from Salafsky et al. 2008 & 2024)

- **Focal Conservation Target or Biodiversity Focal Value:** The biological entities (species, communities, or ecosystems) that are the focus of one or more conservation actions.
- **Biophysical factor:** Ecological or geophysical element of a natural system.
- **Stress:** A stress is not a threat in and of itself, but rather a degraded condition or “symptom” of the target that results from a direct threat.
- **Direct Threat:** Human action that is the cause of destruction, degradation, and/or impairment of focal conservation targets (e.g., unsustainable fishing or logging). Direct threat is synonymous with *source of stress*, *proximate pressure*, and *direct driver*.
- **Contributing Factors:** Element of a human socioeconomic system that leads to a direct threat. There is typically a chain of contributing factors behind any given direct threat. Synonymous with *driver* and *root cause*.
- **Conservation Actions:** Interventions undertaken by conservationists designed to achieve conservation goals (e.g., establishing an ecotourism business or setting up a protected area). Actions can be applied to contributing factors, direct threats, or directly to the targets themselves.
- **Project Teams:** The groups of people involved in designing, implementing, managing, and monitoring projects (e.g., a partnership between a local nongovernmental organization and a community or the staff of a national park).

Threats Taxonomy

For the full list and definitions of Level I and II Threats, as developed for the global conservation community, please visit the [Conservation Measures Partnership](#) webpage. Several of the threats included in the full list are, thankfully, not relevant or exceedingly improbable in Iowa within the next few decades (e.g. Geological Events such as Volcanoes or Avalanches). Table 5-3 lists these threats and provides examples and explanations relevant to Iowa.

For those threats that are negligible in Iowa (e.g. tsunamis and avalanches), The “Scope” portion of the assessments address the low likelihood or limited spatial distribution of these issues in Iowa. The “Severity” portion of the threat assessments take into account the *potential* impact that could occur. Thus, several items that appear clearly detrimental to wildlife will still be rated as “negligible” if they do not occur on at least 1% of Iowa’s landscape currently and have a low likelihood of occurring over the next 10-20 years. Similarly, several low and moderate values may result in an overall ranking of high due to the fact that multiple threats may interact with each other resulting in a combined effect that is worse than any of the threats on its own (Table 5-2).

Table 5-2. Algorithm for assigning overall threat impact for a target across all threats (after the International Union for Conservation of Nature [IUCN] Threat Classification System for calculating threat impact scores).

Impact Values of Level 1 Threat Categories	Overall Threat Impact
≥1 Very High, OR ≥2 High, OR 1 High + ≥2 Medium	Very High
1 High, OR ≥3 Medium, OR 2 Medium + 2 Low, OR 1 Medium + ≥3 Low	High
1 Medium, OR ≥4 Low	Medium
1-3 Low	Low

Table 5-3. Threat taxonomy for Iowa's wildlife and habitats, adapted from Salafsky et al. 2008 & 2024.

Level I Threats	Iowa-specific explanations and examples
A. Use of Lands & Waters - Human uses of land and water areas that have a substantial spatial footprint. Includes effects from their construction (e.g. ecosystem conversion), ongoing use, and abandonment.	
1. Residential, Commercial, and Recreation Areas	Threats from human settlements, industrial areas or other non-agricultural land uses with a substantial footprint.
1.1 Residential Areas	• Conversion of natural vegetation to residential uses, resulting in less area for wildlife to occupy. • As the amount of impervious surfaces increases, the amount of land with infiltration capacity is reduced, causing stormwater runoff to end up in rivers and streams. • Changes to shorelines of waterbodies that may result in loss of vegetation and increased bank erosion.
1.2 Commercial & Industrial Areas	• Conversion of natural vegetation to industrial uses, resulting in less area for wildlife to occupy and reduction of infiltration capacity of land as impervious surfaces increase.
1.3 Recreation & Tourism Areas	• Degradation or destruction of habitat for the purpose of fulfilling recreational goals in an area and the increased risk of negative human-wildlife interactions associated with human use of an area. The threats associated with this vary in severity depending on recreational goals. For example, the landscape changes and land use practices associated with golf courses have a more significant impact on wildlife than hiking trails.
2. Agriculture & Aquaculture	Farming and ranching including agricultural expansion and intensification, including tree plantations, mariculture and aquaculture.
2.1 Annual & Perennial Non-Timber Crops	• Large fields lacking natural vegetation cover (exposing bare soil) for many months of the year, and supporting corn and soybeans during the growing season. • Fragmentation of large tracts of a given habitat type into smaller areas. • Loss of connectivity by the introduction of breaks into linear habitats that had previously connected areas of habitat to each other. • The removal of vegetation in or adjacent to bodies of water which may lead to increased flooding, siltation, and water temperatures. • Removal of wildlife species associated with negative impacts on agricultural productivity.
2.2 Wood & Pulp Plantations	• Stands of trees planted for wood or pulp industries. Assessments reflect the relatively small scope and <i>potential</i> severity of the wood and pulp industry, which is currently very limited in Iowa.
2.3 Terrestrial Animal Farming, Ranching, & Herding	• The use of grazing in such a way that it is detrimental to wildlife, for example, using too heavy of a stocking rate, grazing too early or late in the growing season resulting in habitat loss, including loss of residual winter cover for wildlife and alteration of the species composition of pastures and woodlands. • Physical damage to stream banks and riparian vegetation caused by livestock, which increases the risk of erosion in an area.
2.4 Marine & Freshwater Aquaculture	• Potential impacts of stocking predatory fishes on populations of other fishes, amphibians, and dragonflies and damselflies. • Removal of predators to fish such as otters.
3. Energy Production & Mining	Extraction of non-biological resources, often widely dispersed across the landscape.
3.1 Oil & Gas Exploration & Extraction	• Exploring for, developing, and producing oil or gas. Assessments reflect the relatively small scope and <i>potential</i> severity of the oil and gas drilling industry, which is currently very limited in Iowa
3.2 Mining & Quarrying	• Rock/gravel mines can open up suitable habitat for some species but destroy suitable habitat for others through forest clearing, earth removal, and water collection on site. • Frack sand mine development.
3.3 Renewable Energy	• Wind or solar energy development that reduces the suitability of habitat by altering how wildlife uses an area and causes direct mortalities through collisions (esp. birds and bats) of wildlife with wind turbines or solar panels. • Corn ethanol production (leading to increased acres in corn). Removal of corn stover from cropfields for biofuel production, use of non-native plants for biofuel development, harvest of native grasses for biofuel production.

Level I Threats	Iowa-specific explanations and examples
4. Transportation, Service, & Security Corridors	Linear infrastructure such as long, narrow service or transport corridors, including associated wildlife mortality.
4.1 Roads & Railroads	- Habitat loss, fragmentation, and the opening of blocks of habitat to detrimental intrusions. - Direct mortality of wildlife being struck by vehicles. - Increased risk to habitat of spills on roadways or railroads and restriction of potential for habitat restoration in an area.
4.2 Utility & Service Lines	- Fragmentation of habitat associated with opening up an area for erecting wires and constructing service roads. - Direct mortality through collisions of wildlife with wires (esp. birds).
4.3 Shipping Lanes	Dredging to maintain shipping channels. Development of shipping lanes was the primary reason for channelization of the Missouri River and development of the lock and dam system in the Mississippi River, altering the natural processes of Iowa's border rivers.
4.4 Atmospheric & Space Activities	- Destruction and fragmentation of habitat that occurs when establishing an airport. - Removal of species that may attempt to use an airport facility for breeding or foraging. - Restriction of habitat restoration potential associated with an area near an airport due to efforts to prevent wildlife related accidents on site. - Collisions with airplanes.
4.5 Fencing & Walls	Fencing and walls causing barriers to wildlife movement.
B. Use / Management of Species & Ecosystems - Human uses of biotic resources and disturbance from human presence or management actions in natural systems.	
5. Biological Resource Use & Control	Consumptive use of "wild" biological resources including both deliberate and unintentional harvesting effects as well as persecution of specific species.
5.1 Hunting / Collecting, & Controlling Terrestrial Animals	Illegal taking of any species as well as illegal pet trade (especially pertaining to turtles).
5.2 Gathering, Harvesting, & Controlling Terrestrial Plants & Fungi	Gathering plants from natural areas impacting the natural vegetation.
5.3 Logging, Harvesting & Controlling Trees	Timber harvest is not a threat <i>per se</i>, but the method, extent, and timing of harvest may affect the habitat available for wildlife, particularly SGCN.
5.4 Fishing, Harvesting & Controlling Aquatic Resources	Detrimental over-use of aquatic species for recreational or commercial purposes.
6. Human Intrusions & Disturbances	Human activities that alter, destroy and disturb ecosystems and species associated with non-consumptive uses of biological areas and resources.
6.1 Recreational Activities	- Detrimental over-use of natural areas that degrades wildlife habitat or deters wildlife from using an area. - Recreational activities conducted outside of designated areas that destroy sensitive habitat. - Direct wildlife mortality through collisions with motor-boats, snowmobiles, ATVs, etc.
6.2 Conflict, Civil Unrest & Security Activities	Assessments reflect the relatively small scope and <i>potential</i> severity of war and military exercises, which is currently very limited in Iowa.
6.3 Other Human Disturbances	People spending time in or traveling through natural environments. Includes legal activities such as research or holding events, or illegal, such as vandalism.
7. Natural System Management & Modifications	Human actions that modify ecosystem structures, composition, or regimes, either deliberately to improve human welfare / benefit certain species, or as a result of other activities. This category includes both construction of permanent or long-term structures and their operations as well as more transitory management practices.
7.1 Fire & Fire Management	- Excessive or untimely fire management that may kill individual animals, destroy habitats or alter habitats at critical life stages for SGCN. - The removal of fire as a natural succession resulting in the conversion of grasslands to woody habitat containing shrubs or trees.

Level I Threats	Iowa-specific explanations and examples
7.2 Dams & Water Management / Use	• Removal of surface water from lakes and wetlands (and associated alteration of water table and groundwater flows). • The inundation of terrestrial habitats caused by man-made dams and the alteration of natural seasonal occurrence of floods associated with these structures. • Structures on flowing rivers and streams that impound water, resulting in altered aquatic habitats, decreased flow rates and increased siltation above the structure as well as creating a barrier to fish movement. • 95% of pothole wetlands drained and converted to agriculture. • Channelization - The straightening of stream channels leading to decreased stream lengths, increased flow rates, and increased frequency of flooding. • Shoreline/bank erosion - siltation originating from the bank or shoreline of a body of water. • Loss of submerged/emergent plants - the loss of rooted plants in the water that may result in altered aquatic habitats. • Streambed degradation - the lowering of the bed of a flowing body of water due to increased scouring action resulting from increased flow rates and altered hydrology. • Levees and dikes disconnecting portions of the riparian area from the channel.
7.3 Earth & Sediment Management	• Sediment control measures that destroy habitat or restrict animal movement. • Rip-rap along shorelines of rivers and lakes. • Sand dune stabilization.
7.4 Weather & Climate Management	• Cloud seeding, frost prevention, carbon capture (except infrastructure)
7.5 Biological System Management	• Recreational mowing of roadside ditches and large lawns • Gating caves • Removal of snags from streams • Barriers to prevent fish passage • Using cattle to mimic natural grazing systems
7.6 Removing / Reducing Human Management	• Loss of management on Iowa's wetlands, grasslands, and forests leads to succession and invasive species encroachment. • Lack of fire, grazing, timber harvest, etc.
C. Additional Sources of Stress - Stressors in natural systems that have been altered by the effects of current or historical human actions.	
8. Invasive / Other Problematic Species, Genes & Pathogens	Threats from non-native and native plants, animals, pathogens/microbes, or genetic materials that have or are predicted to have harmful effects on biodiversity following their introduction, spread and/or increase in abundance or virulence.
8.1 Invasive Non-Native / Alien Species	• The proliferation of non-native species that outcompete or prey upon native species, or cause habitat degradation (e.g. feral hogs destroying habitat, household pets preying on wildlife, zebra mussels and other aquatic nuisance species outcompeting native aquatic species, exotic honeysuckle outcompeting native species, Emerald Ash Borer altering woodlands by killing ash trees, etc.).
8.2 Problematic Native Species	• The proliferation of native species that outcompete or prey upon other species, or cause habitat degradation (e.g. insect damage, encroachment of native woody species into grasslands, willows or cottonwood trees into wetlands, algal blooms, over-abundance of mesopredators impacting other species reproduction or survival, etc.).
8.3 Introduced Genetic Material	• Risk of pesticide resistance genes spreading to non-target species, genetic swamping of local populations through releases of lab-raised individuals (e.g. release of butterflies at special events), habitat restoration projects using non-local seed stock, genetically modified insects for biocontrol, genetically modified trees.
8.4 Pathogens	• Disease and pathogens that affect wildlife and their habitats (e.g. Chytrid fungus and ranavirus in amphibians, snake fungus disease in reptiles, white-nose syndrome decimating bat populations, highly pathogenic avian influenza in birds, chronic wasting disease in cervids, chronic wasting disease prions adhering to plants, oak wilt, bur oak blight, and Dutch elm disease)
9. Pollution	Introduction of exotic and/or excess materials or energy from point and nonpoint sources

Level I Threats	Iowa-specific explanations and examples
9.1 Water-Borne & Other Effluent Pollution	- Nutrient pollution - the excessive addition of nutrients into aquatic systems leading to accelerated eutrophication. - Chemical pollution - the introduction of harmful chemicals into aquatic ecosystems. Risk of oil-spills. - Deposition of silt and sediments in aquatic ecosystems. - Pesticides or herbicides applied to agricultural crops that eventually end up in aquatic ecosystems. These products can have direct impacts on animals (eg. Atrazine causing deformities in amphibians) or indirectly affect wildlife by harming the plants that comprise their habitat. - Tile drainage of agricultural fields leading to accelerated transport of surface water to rivers and lakes that decreases the ability of hydrological systems to tolerate large fluctuations in precipitation.
9.2 Garbage & Solid Waste	- Garbage and waste that is improperly disposed of and ends up in the natural environment posing a risk for wildlife and their habitats, (e.g. lead from ammunition, fishing tackle, or other sources being ingested by wildlife directly or by being taken up by plants in the environment, improperly discarded fishing line or other debris entangling wildlife). - Dumping garbage in natural areas.
9.3 Air-Borne Pollutants	Aerial application of pesticides in agricultural or urban/suburban areas and associated spray drift that ends up in areas that were not intended to be treated or affects non-target species.
9.4 Energy Emissions	Potential impacts of heated effluents discharged to Iowa's interior and border rivers, light pollution (e.g., attracting insects to unproductive areas such as gas stations), sound pollution from airports, highways, or other sources.
10. Natural Disasters	Potential catastrophic natural disturbances that conservation practitioners may still need to consider, particularly when managing small and / or remnant species populations or remnant ecosystems.
10.1 Geologic Events	- Assessments reflect the relatively negligible scope and <i>potential</i> severity of volcanic activity, which is currently improbable in Iowa (although even distant volcanic activity could impact Iowa). - Assessments reflect the relatively negligible scope and <i>potential</i> severity of earthquakes, which are currently infrequent and mild in Iowa. - Assessments reflect the relatively negligible scope and <i>potential</i> severity of avalanches, which are currently improbable in Iowa given the relative lack of topographic relief in the state.
10.2 Severe Weather Events	Fluctuations or extremes in precipitation in a geographical area (e.g., thunderstorms, tornadoes, ice storms, blizzards, dust storms). Even a normal flood or drought can decimate a small population.
11. Climate Change	Change in climate patterns resulting from increased atmospheric greenhouse gases.
11.1 Changes in Physical and Chemical Regimes	- In the Midwest, summertime precipitation is increasingly variable, leading to more frequent periods of drought and more frequent intense rainfall events. - As ranges of plant species contract, expand or shift, the plant communities that wildlife inhabit will change, and could encroach upon adjacent systems.
11.2 Changes in Temperature Regimes	Broad scale changes in temperature, fluctuations or extremes in temperatures in a geographical area. Even small increases in mean temperature are correlated with more frequent extreme temperature events. In Iowa, temperature increases have been more pronounced in winter and during nighttime.
11.3 Changes in Precipitation & Hydrological Regimes	- Broad scale changes in precipitation, fluctuations or extremes in precipitation in a geographical area. - Increases in mean precipitation have been most pronounced in the spring, and have been manifested through increasing frequency of intense precipitation events. In the Midwest, summertime precipitation has become more variable, leading to more frequent periods of drought and more frequent intense rainfall events. Intense precipitation events increase soil erosion and flood risk.
12. Unknown Threats	Threats that cannot be identified.

Table 5-4. Threats to Terrestrial Wildlife (including all habitat classes).

Impact level: L = Low, M = Medium, H = High, VH = Very High (Negligible threats demarked with a dash)

Level I Threats	Amphibians	Birds	Butterflies	Land Snails	Mammals	Reptiles
1. Residential, Commercial & Recreation Areas	H	H	M	M	M	H
2. Agriculture & Aquaculture	VH	VH	VH	M	VH	VH
3. Energy Production & Mining	L	H	L	L	M	M
4. Transportation, Service & Security Corridors	H	VH	M	M	H	VH
5. Biological Resource Use & Control	M	H	L	H	H-L	VH
6. Human Intrusions & Disturbances	VH	H	M	L	H	VH
7. Natural System Management & Modifications	VH	VH	VH	M	VH	VH
8. Invasive & Other Problematic Species, Genes and Pathogens	VH	VH	H	M	H	VH
9. Pollution	H	VH	H	L	VH	VH
10. Natural Disasters	-	-	-	-	-	-
11. Climate Change	VH	VH	VH	H	H	H

In the 2024 IUCN changes to the threats taxonomy, the Severe Weather category was moved from Climate Change to Natural Disasters. The Natural Disaster Category, as of 2024, is a combination of that criterion as well as the earlier Geologic Events criteria. It is possible that re-doing the assessments for each taxa would result in the Natural Disasters category moving from scores of “-” to another category, but the overall result of the impact matrix is not likely to change at the taxonomic scale. For example, flooding would move from “Climate Change” to “Natural Disasters” and floods can have a major impact on wood turtle (reptile) species nesting. This factor could result in Natural Disasters moving from “-” for reptiles to either “low” or “medium” depending on the experts opinions of how to weigh turtle impacts to the more terrestrial species of snakes and lizards. However, the impact of the change in timing of the flood (summer more likely now instead of early spring) would still be captured in the Climate Change category and, overall, it is unlikely that the threat assessment results have changed.

This revision does use, however, the new taxonomy to evaluate the threats for bumble bees and moths which are shown in Table 5-5.

Table 5-5. Threats to Bumble Bees & Moths (including all habitat classes).

Level I Threats	Bumble Bees	Moths
1. Residential, Commercial & Recreation Areas	VH	M
2. Agriculture & Aquaculture	VH	VH
3. Energy Production & Mining	L	L
4. Transportation, & Service & Security Corridors	M	M
5. Biological Resource Use	M	L
6. Human Intrusions & Disturbances	L	L
7. Natural System Management & Modifications	VH	VH
8. Invasive & Other Problematic Species, Genes & Pathogens	VH	Unknown
9. Pollution	VH	VH
10. Natural Disasters	H	M
11. Climate Change	VH	M

Table 5-6. Threats to Aquatic Wildlife (including all habitat classes)

Impact level: L = Low, M = Medium, H = High, VH = Very High (Negligible threats demarked with a dash)

Level I Threats	Crayfish	Dragonflies & Damselflies	Fish	Mussels
1. Residential, Commercial & Recreation Areas	M	H	H	M
2. Agriculture & Aquaculture	M	VH	H	VH
3. Energy Production & Mining	L	M	M	L
4. Transportation, Service, & Security Corridors	L	M	L	H
5. Biological Resource Use	L	L	L	M
6. Human Intrusions & Disturbances	-	L	-	M
7. Natural System Management & Modifications	VH	VH	VH	VH
8. Invasive & Other Problematic Species, Genes & Pathogens	H	M	H	M
9. Pollution	M	VH	M	H
10. Natural Disasters	-	-	-	-
11. Climate Change	H-M	VH	H	H

Table 5-7. Statewide Threats to Amphibians

Impact level: L = Low, M = Medium, H = High, VH = Very High (Negligible threats demarked with a dash)

Threats were assessed for habitat classes considered most relevant to amphibians.

Level I Threats	Grassland	Rowcrop	Wetland	Woodland
1. Residential, Commercial & Recreation Areas	M	L	M	H
2. Agriculture & Aquaculture	VH	NA	H	H
3. Energy Production & Mining	L	-	L	L
4. Transportation, Service, & Security Corridors	M	L	H	H
5. Biological Resource Use	L	-	M	M
6. Human Intrusions & Disturbance	L	VH	-	L
7. Natural System Management & Modifications	M	VH	H	H
8. Invasive & Other Problematic Species, Genes & Pathogens	L	Unknown	H	H
9. Pollution	L	M	H	M
10. Natural Disasters	-	-	-	-
11. Climate Change	H	H	H-M	L
Overall Threat	M	M	VH	VH

Table 5-8. Statewide Threats to Reptiles

Impact level: L = Low, M = Medium, H = High, VH = Very High (Negligible threats demarked with a dash)

Threats were assessed for habitat classes considered most relevant to reptiles.

Level I Threats	Grassland	River	Rowcrop	Wetland	Woodland
1. Residential, Commercial & Recreation Areas	M	L	L	M	M
2. Agriculture & Aquaculture	VH	H	NA	H	H
3. Energy Production & Mining	M	-	-	L	L
4. Transportation, Service, & Security Corridors	H	M	L	H	H
5. Biological Resource Use	H	VH	-	H	M-L
6. Human Intrusions & Disturbances	H	-	VH	L	M
7. Natural System Management & Modifications	VH	M	M	H	H

Level I Threats	Grassland	River	Rowcrop	Wetland	Woodland
8. Invasive & Other Problematic Species, Genes & Pathogens	H	H	Unknown	H-M	H
9. Pollution	M	H	L	H	L
10. Natural Disasters	-	-	-	-	-
11. Climate Change	M	H	M	H-M	M
Overall Threat	VH	VH	M	VH	H

Table 5-9. Statewide Threats to Birds

Impact level: L = Low, M = Medium, H = High, VH = Very High (Negligible threats demarked with a dash)

Threats were assessed for habitat classes considered most relevant to birds.

Level I Threats	Grassland	Shrubland	Rowcrop	Woodland	Wetland
1. Residential, Commercial & Recreation Areas	L	M	L	M	L
2. Agriculture & Aquaculture	VH	H	NA	H	H
3. Energy Production & Mining	M	-	M	L	M
4. Transportation, Service, & Security Corridors	M	M	M	H	H
5. Biological Resource Use	-	L	M	H-M	L
6. Human Intrusions & Disturbances	H	L	M	M	L
7. Natural System Management & Modifications	VH	H	VH	H	H
8. Invasive & Other Problematic Species, Genes & Pathogens	VH	H	Unknown	H	H
9. Pollution	H	M	M	H	M
10. Natural Disasters	-	-	-	-	-
11. Climate Change	H	M	H	M	H
Overall Threat	VH	VH	M	VH	VH

Table 5-10. Statewide Threats to Mammals

Impact level: L = Low, M = Medium, H = High, VH = Very High (Negligible threats demarked with a dash)

Threats were assessed for habitat classes considered most relevant to mammals.

Level I Threats	Grassland	Rivers	Rowcrop	Wetland	Woodland
1. Residential, Commercial & Recreation Areas	L	L	L	L	M
2. Agriculture & Aquaculture	VH	VH	NA	VH	H
3. Energy Production & Mining	L	-	L	L	L
4. Transportation, Service & Security Corridors	M	L	L	M	M
5. Biological Resource Use	L	-	-	-	H-L
6. Human Intrusions & Disturbances	M	-	M	-	M
7. Natural System Management & Modifications	H	H	L	VH	M
8. Invasive & Other Problematic Species, Genes & Pathogens	H	L	M	L	M
9. Pollution	L	H	L	H	L
10. Natural Disasters	-	-	-	-	-
11. Climate Change	M	H	L	H-M	Not a significant impact within next 10 years

Level I Threats	Grassland	Rivers	Rowcrop	Wetland	Woodland
Overall Threat	H	M	L	H	M

Table 5-11. Statewide Threats to Fish

Impact level: L = Low, M = Medium, H = High, VH = Very High (Negligible threats demarked with a dash)
Threats were assessed for all aquatic habitat classes together, which was considered most relevant to fish.

Level I Threat	All Aquatic Habitats
1. Residential, Commercial & Recreation Areas	H
2. Agriculture & Aquaculture	H
3. Energy Production & Mining	M
4. Transportation, Service & Security Corridors	L
5. Biological Resource Use	L
6. Human Intrusions & Disturbance	-
7. Natural System Management & Modifications	VH
8. Invasive & Other Problematic Species, Genes & Pathogens	H
9. Pollution	M
10. Natural Disasters	-
11. Climate Change	H
Overall Threat	VH

Table 5-12. Statewide Threats to Mussels

Impact level: L = Low, M = Medium, H = High, VH = Very High (Negligible threats demarked with a dash)
Threats were assessed for all aquatic habitat classes combined which is considered most relevant to mussels.

Level I Threats	All Aquatic Habitats
1. Residential, Commercial & Recreation Areas	M
2. Agriculture & Aquaculture	VH
3. Energy Production & Mining	L
4. Transportation, Service & Security Corridors	H
5. Biological Resource Use	M
6. Human Intrusions & Disturbances	M
7. Natural System Management & Modifications	VH
8. Invasive & Other Problematic Species, Genes & Pathogens	M
9. Pollution	H
10. Natural Disasters	-
11. Climate Change	H
Overall Threat	VH

Table 5-13. Driftless Area Threats to Terrestrial Snails

Impact level: L = Low, M = Medium, H = High, VH = Very High (Negligible threats demarked with a dash)
Threats were assessed for the woodland habitat class, which is the most relevant to terrestrial snails.

Level I Threats	Woodland
1. Residential, Commercial & Recreation Areas	M
2. Agriculture & Aquaculture	M
3. Energy Production & Mining	L
4. Transportation, Service & Security Corridors	M

Level I Threats	Woodland
5. Biological Resource Use	H
6. Human Intrusions & Disturbances	L
7. Natural System Management & Modifications	M
8. Invasive & Other Problematic Species, Genes & Pathogens	M
9. Pollution	L
10. Natural Disasters	-
11. Climate Change	H
Overall Threat	H

Table 5-14. Statewide Threats to Bumble Bees

Impact level: L = Low, M = Medium, H = High, VH = Very High (Negligible threats demarked with a dash)
Threats were assessed for habitat classes considered most relevant to bumble bees.

Level I Threats	Grassland	Rowcrop	Woodland
1. Residential, Commercial & Recreation Areas	H	H	L
2. Agriculture & Aquaculture	VH	VH	VH
3. Energy Production & Mining	M	M	M
4. Transportation, Service & Security Corridors	M	M	M
5. Biological Resource Use	L	L	L
6. Human Intrusions & Disturbances	L	L	L
7. Natural System Management & Modifications	VH	H	VH
8. Invasive & Other Problematic Species, Genes & Pathogens	H	H	H
9. Pollution	VH	VH	VH
10. Natural Disasters	H	M	M
11. Climate Change	VH	VH	VH
Overall Threat	VH	VH	VH

Table 5-15. Statewide Threats to Butterflies

Impact level: L = Low, M = Medium, H = High, VH = Very High (Negligible threats demarked with a dash)
Threats were assessed for habitat classes considered most relevant to butterflies.

Level I Threats	Grassland	Rowcrop	Wetland	Woodland
1. Residential, Commercial & Recreation Areas	L	L	L	L
2. Agriculture & Aquaculture	VH	NA	H	L
3. Energy Production & Mining	L	-	L	L
4. Transportation & Service Corridors	L	L	L	L
5. Biological Resource Use	L	-	-	L
6. Human Intrusions & Disturbance	M	M	L	-
7. Natural Systems Modification	H	L	H	M
8. Invasive & Other Problematic Species & Genes	M	Unknown	H	L
9. Pollution	H	M-L	M	L
10. Geological Events	-	-	-	-
11. Climate Change & Severe Weather	H-M	H	H	M
Overall Threat	VH	M	H	L

Table 5-16. Statewide Threats to Moths

Impact level: L = Low, M = Medium, H = High, VH = Very High (Negligible threats demarked with a dash)

Threats were assessed for habitat classes considered most relevant to moths.

Level I Threats	Grassland	Rowcrop	Wetland	Woodland
1. Residential, Commercial & Recreation Areas	M	L	L	M
2. Agriculture & Aquaculture	VH	VH	M	M
3. Energy Production & Mining	H	L	-	L
4. Transportation & Service Corridors	M	L	-	L
5. Biological Resource Use	L	L	L	L
6. Human Intrusions & Disturbance	L	-	L	L
7. Natural Systems Modification	VV	H	L	H
8. Invasive & Other Problematic Species & Genes	Unknown	Unknown	Unknown	Unknown
9. Pollution	H	H	M	M
10. Geological Events	M	L	L	M
11. Climate Change & Severe Weather	M	M	M	M
Overall Threat	VH	H	M	M

Table 5-17. Statewide Threats to Dragonflies & Damselflies

Impact level: L = Low, M = Medium, H = High, VH = Very High (Negligible threats demarked with a dash)

Threats were assessed for habitat classes considered most relevant to Dragonflies & Damselflies.

Level I Threats	Grassland	Rivers	Rowcrop	Wetland	Woodland
1. Residential, Commercial & Recreation Areas	M	L	-	L	L
2. Agriculture & Aquaculture	VH	L	NA	VH	H
3. Energy Production & Mining	L	L	-	L	L
4. Transportation, Service & Security Corridors	L	L	Not a Threat	M	-
5. Biological Resource Use	-	-	-	-	L
6. Human Intrusions & Disturbances	L	-	L	-	-
7. Natural System Management & Modifications	M	H	VH	VH	-
8. Invasive & Other Problematic Species, Genes & Pathogens	Unknown	Unknown	Unknown	M	Unknown
9. Pollution	L	VH	L	H	-
10. Natural Disasters	-	-	-	-	-
11. Climate Change	H	H	H	H	H
Overall Threat	H	VH	L	VH	H

Table 5- 18. Statewide Threats to Crayfish

Impact level: L = Low, M = Medium, H = High, VH = Very High (Negligible threats demarked with a dash)

Threats were assessed for habitat classes considered most relevant to crayfish.

Level I Threats	All Aquatic Habitats
1. Residential, Commercial & Recreation Areas	M
2. Agriculture & Aquaculture	M
3. Energy Production & Mining	L
4. Transportation, Service, & Security Corridors	L

Level I Threats	All Aquatic Habitats
5. Biological Resource Use	L
6. Human Intrusions & Disturbances	-
7. Natural System Management & Modifications	VH
8. Invasive & Other Problematic Species, Genes & Pathogens	H
9. Pollution	M
10. Natural Disasters	-
11. Climate Change	H-M
Overall Threat	H

References Cited in Chapter Five

- Conservation Measures Partnership. 2025. *Open standards for the practice of conservation*. Version 5.0. Last accessed September 4, 2025. www.ConservationMeasures.org
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Chapter Six

A Vision for Iowa's Wildlife

Required Element #4: "Descriptions of conservation actions proposed to conserve the identified species and habitats and priorities for implementing such actions."

Background

As described in Chapter 2, Iowa was once a land of unparalleled wildlife abundance and diversity. Early settlers discovered, however, that underneath Iowa's prairies lay the finest farmland in the world. In less than a century the prairies were plowed and with them went flocks of prairie chicken, herds of bison and elk and the cougars, gray wolves, black bear and bobcat that preyed on the other wildlife. Wetlands were drained and flocks of waterfowl numbering in the millions that nested here were diminished to a small fraction of their former numbers. Most of the forests were cleared, the white-tailed deer and wild turkey disappeared and once-uncountable flocks of passenger pigeons became extinct. Plowing freed the prairie soil to run into once-clear waters which caused game fish like brook trout, northern sunfish and grass pickerel to disappear. Once a wilderness, Iowa had become home to a multitude of small family farms. Only small animals like the bobwhite quail, rabbits, squirrels and the soon-to-be-introduced ring-necked pheasant thrived.

The 20th century brought its own changes driven by the constant improvement in farming technology. Ever-larger and more powerful farm equipment; the introduction of herbicides, pesticides, plant hybrids and genetically modified crops; and Federal farm programs that have rewarded all-out production eventually made much of the state unsuitable for even farm-adapted wildlife.

Wildlife conservation programs have returned adaptable wildlife like deer and wild turkey to our forests, Canada geese and Trumpeter swans to our wetlands, bald eagles and peregrine falcons to our skies, and river otters to our streams. Land conservation efforts have restored thousands of acres of grasslands, wetlands and forest. Federal farm programs have placed hundreds of thousands of acres under temporary conservation practices on private land.



Edwards hairstreak - Photo from the MSIM Program

But after more than eight decades of conservation, one-third of all of Iowa's fish and wildlife are still in need of conservation interventions to stop their numbers from eventually dwindling into threatened or endangered status. A host of less-visible wildlife - songbirds, lizards and snakes, frogs and salamanders, fish, freshwater mussels, bees, butterflies and moths, among others - is seriously threatened by the disappearance and degradation of their habitats. Iowa has less than 3 percent of its landscape in permanently protected wildlife habitat and managed under conservation practices. The remainder is privately held and subject to the whims of landowners as they respond to economic and societal pressures. The pace of conservation efforts has not been able to keep up with the habitat loss of the past century that still continues today. Without assistance to reverse these trends, more species will face a grim future - eventual disappearance from our state.

Iowa is Farming Country

Barring an environmental or economic collapse of global proportions, Iowa will remain one of the world's great agricultural regions. Agricultural production will continue to be a primary land use. Nothing in this Plan suggests returning Iowa to its pre-settlement state on any but a small portion of the land. But these efforts at wildlife conservation also provide benefits to the overall health and productivity of the land. The challenge for Iowans is to find a way to protect our remaining wildlife heritage and preserve a legacy for our heirs by creating viable and socially-acceptable wildlife living spaces within our primarily working-lands state.

A Vision for the Future

During development of the first edition of this plan, the Advisory Committee to the original Iowa Wildlife Action Plan developed a vision for the status of Iowa's wildlife in 25 years (2030) in order to establish a focus for future wildlife conservation activities. This Advisory Committee was made up of fish and wildlife professionals, educators, researchers, private conservation organizations, concerned citizens and representatives of the agricultural community. The vision statement has six elements that include benefits to fish and wildlife, the citizens who enjoy and support them, and the private landowners who must embrace them if the vision is to be realized. With each vision element the Advisory Committee developed specific conservation actions that need to be implemented to reach the Plan's goals in a 25-year framework. When the 10-year comprehensive review and revision process began, and again for the 20-year revision, the Implementation Committee determined that the six vision elements that were initially identified by the Advisory Committee should remain in place as the cornerstone of the Plan's conservation strategy. Implementation of this Vision over the first twenty years of the Plan is discussed in Chapter 11.

These vision elements, conservation strategies and conservation actions are not specifically designed to be implemented by DNR. They are designed to provide a broad framework of actions that can be undertaken by governmental agencies, conservation organizations, and by any individuals or entities with an interest in conservation. The conservation actions identified in the following pages will require a broad array of funding sources, skills and expertise. Partnerships and collaboration will continue to be a key part of conservation efforts in Iowa.

Defining Conservation Actions

As explained in Chapter 5, this plan categorizes both threats and conservation actions based on a classification, or taxonomy, developed by the [Conservation Measures Partnership \(CMP\)](#). In 2004, CMP developed the first edition of the "[Open Standards for the Practice of Conservation](#)" which has since been updated in 2007, 2013, and 2025.

One outcome of this partnership that is also a building block for increasing collaboration is the development of a "standard lexicon" for conservation, including classification systems for threats and conservation actions (Salafsky et al. 2008, 2024). The classification of threats was most recently updated to Version 4.0 in 2024 (Salafsky et al. 2024) and this update is used in Chapter 5. An update to the classification of conservation actions is in development at the time of this plan's completion; this version of the plan uses CMP Conservation Actions Classification Version 2.0, which was released in 2016.

Adopting the use of the standard terminology allows conservationists operating at any spatial scale to share information and experiences, facilitating learning and improvement among conservation practitioners. The 2015 and 2025 revisions of the IWAP makes use of this standard lexicon for the classification of threats and actions in order to increase the ability of our threats and actions to be compared across state lines or other political boundaries. This helps make clear how the IWAP fits in as one piece of regional, national, or even global efforts to conserve wildlife. The use of this classification system does not substantially change the actions listed in the 2012 or 2006 versions of the IWAP. Rather, this version provides the original visions, goals, strategies and actions, and then provides a list of potential conservation actions from the CMP Actions Classification that might be undertaken by any entity to implement that portion of the vision.

Definitions (adapted from the 2025 version of the Open Standards for the Practice of Conservation):

- Strategy: One or more actions and their associated activities, results and objectives, and focal values and goals. Often represented in a theory of change diagram.
- Action (intervention): A set of activities with a common focus that work together to achieve specific goals and objectives by targeting key intervention points, optimizing opportunities, and limiting constraints. A good action meets the criteria of being linked, focused, feasible, and appropriate.
- Activity: A set of tasks undertaken by project staff and/or partners to help implement an action.

Some of the Conservation Actions identified for this Plan are more accurately described as Strategies, so this Plan identifies them as "Conservation Strategies and Actions." The following visions and the associated conservation actions remain essentially the same as when they were originally developed in 2004, because they were designed to be 25-year strategies. For this revision, those involved with the Plan wished to maintain consistency in the overarching objectives agreed-upon originally formulated at the public forum in 2004. However, in order to make them easier to cross-walk

with the Conservation Measures Partnership’s Conservation Actions Classification, the plan displays each action followed by a description of where it fits within the classification. For definitions of each Level I and Level II action, check the [Conservation Measures Partnership website](#) for the most up-to-date version. **Table 6-1** also displays explanations and examples.

A Vision for Iowa’s Wildlife

By 2030 Iowa will have viable wildlife populations that are compatible with modern landscapes and human social tolerance.

Goals

- Common species will continue to be common.
- Populations of species of greatest conservation need will increase to viable (self-sustaining) levels.
- The abundance and distribution of wildlife will be balanced with its impact on the economic livelihood and social tolerance of Iowans.

Conservation Strategies and Actions

1. Develop scientifically reliable knowledge on the distribution, relative abundance and ecological needs of all wildlife species, including invasive species.
 - a. Follow up with monitoring so that knowledge stays current.

Crosswalk to the Actions Classification v 2.0:

Level I & Level II Actions	8. Research & Monitoring 8.1 Basic Research & Status Monitoring
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2. Develop a balanced program of wildlife conservation by increasing the emphasis on species of greatest conservation need.

Crosswalk to the Actions Classification v 2.0:

Level I & Level II Actions	6. Conservation Designation & Planning 6.4 Conservation Planning 7. Legal & Policy Frameworks 7.2 Policies & Guidelines
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3. Focus on protection, restoration, reconstruction, connection and enhancement of native plant communities and wildlife habitats.

Crosswalk to the Actions Classification v 2.0:

Level I & Level II Actions	1. Land/Water Management 1.1 Site/Area Stewardship 1.2 Ecosystem & Natural Process (Re)Creation 6. Conservation Designation & Planning 6.1 Protected Area Designation & /or Acquisition 6.2 Easements & Resource Rights
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4. Restore viable wildlife populations to suitable habitats through informed relocation and reintroduction programs.

Crosswalk to the Actions Classification v 2.0:

Level I & Level II Actions	2. Species Management 2.1 Species Stewardship 2.2 Species Re-Introduction & Translocation 2.3 <i>Ex-Situ</i> Conservation
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5. Develop methods to identify and reduce economic and social conflicts between wildlife and citizens.

Crosswalk to the Actions Classification v 2.0:	
Level I & Level II Actions	3. Awareness Raising 3.1 Outreach & Communications 5. Livelihood, Economic & Moral Incentives 5.1 Linked Enterprises & Alternative Livelihoods

Explanation

Achieving this goal requires improving scientific knowledge about many species whose biology, abundance and current distribution in Iowa are poorly understood, particularly nongame. It may require population and habitat restoration and enhancement over a broad geographic range and the development of new management techniques to protect the interests of the private landowner. If successful, it will aid the long-term viability of all wildlife, increase biodiversity, promote greater access to wildlife-associated recreation, and provide economic benefits to Iowans.

A Vision for Wildlife Habitats

By 2030 Iowa will have healthy ecosystems that incorporate diverse, native habitats capable of sustaining viable wildlife populations.

Goals

- The amount of permanently protected wildlife habitat in Iowa will be doubled to 4% of the state's land area.
- Protected habitats will be diverse, representative, native plant communities in large and small blocks on public and privately owned land and waters.

Conservation Strategies and Actions

1. Identify habitats, landscapes and travel corridors important to species of greatest conservation need in all regions of the state.
 - a. Coordinate with all government natural resource agencies and non-governmental organizations to identify areas at regional, state, and local scales.

Crosswalk to the Actions Classification v 2.0:	
Level I & Level II Actions	6. Conservation Designation & Planning 6.3 Land/Water Use Zoning & Designation 10. Institutional Development 10.3 Alliance & Partnership Development

2. Permanently protect, restore, reconstruct and enhance large public and private areas of wildlife habitat - systems that include large core tracts, watershed and greenbelt corridors, and other associated travel corridors - that can be managed for biodiversity.
 - a. Develop a series of core habitat blocks in the range of 3,000 - 5,000 acres of permanently protected and managed habitat.
 - b. Evaluate existing permanently protected areas for potential expansion.
 - c. Work with legislators to implement *smart growth* efforts in these designated core areas.

Crosswalk to the Actions Classification v 2.0:	
Level I & Level II Actions	6. Conservation Designation & Planning 6.1 Protected Area Designation &/or Acquisition 6.2 Easements & Resource Rights 6.4 Conservation Planning 7. Legal & Policy Frameworks 7.2 Policies & Guidelines

3. Ensure that long-term Federal and State land conservation programs meet the needs of landowners and wildlife on privately owned lands and waters.
 - a. Use existing tools and create new tools to permanently protect private lands and waters and expand outreach efforts.
 - b. Encourage Federal land conservation programs that allow existing native habitats to be enrolled.
 - c. Work to mandate Federal and state wildlife agency involvement in the prioritization, design, and implementation of the Federal programs.
 - d. Staff a state position to coordinate wildlife priorities and all Federal land conservation programs with emphasis placed on habitats for species of greatest conservation need.
 - e. Integrate this Plan with existing Federal programs.
 - f. Expand existing Federal and State programs that focus on water quality of streams and rivers but allow flexibility for local issues to be addressed.

Crosswalk to the Actions Classification v 2.0:	
Level I & Level II Actions	5. Livelihood, Economic & Moral Incentives 5.1 Linked Enterprises & Alternative Livelihoods 5.3 Market-Based Incentives 5.4 Direct Economic Incentives 6. Conservation Designation & Planning 6.2 Easements & Resource Rights 7. Legal & Policy Frameworks 7.1 Laws, Regulations, & Codes 7.2 Policies & Guidelines 10. Institutional Development 10.3 Alliance & Partnership Development 10.4 Financing Conservation

4. Provide technical guidance and supplemental cost share programs to private landowners to maximize the benefits to wildlife from Federal and State land conservation programs.
 - a. Utilize habitat developments on private land to supplement government habitat protection programs. Use USDA farm programs to improve connectivity between habitats by targeting landowners in key areas.
 - b. Expand DNR's Private Lands Program efforts to meet the needs of SGCN outlined in this Plan.
 - c. Provide for improved coordination of all Federal, state, county and non-governmental organizations private lands programs to efficiently deliver technical assistance to landowners.
 - d. Provide incentives to landowners to implement practices that benefit SGCN in targeted areas. Provide additional incentives to neighboring landowners who put adjacent land into a program so larger tracts of land or corridors are created.
 - e. Educate all natural resource agencies' staff about the Plan.
 - f. Create a central site for all resources of the Plan and make available to natural resource agencies and landowners.

Crosswalk to the Actions Classification v 2.0:	
Level I & Level II Actions	6. Conservation Designation & Planning 6.2 Easements & Resource Rights 9. Education & Training 9.2 Training & Individual Capacity Development 10. Institutional Development 10.1 Internal Organizational Management & Administration 10.2 External Organizational Development & Support 10.3 Alliance & Partnership Development

5. Coordinate public land acquisition and private land habitat programs to provide habitat on a landscape scale.
 - a. Use the Plan as a tool for private lands and public land natural resource protection, management and restoration efforts.

Crosswalk to the Actions Classification v 2.0:	
Level I & Level II Actions	1. Land/Water Management 1.2 Ecosystem & Natural Process (Re)Creation 3. Awareness Raising 3.1 Outreach & Communications 6. Conservation Designation & Planning 6.1 Protected Area Designation &/or Acquisition 6.2 Easements & Resource Rights 6.3 Land/Water Use Zoning & Designation 6.4 Conservation Planning

Explanation

As of 2024, about 3.26% of Iowa's wildlife habitats are permanently protected - 961,310 acres by state, county, or Federal ownership (2.67%) and 212,686 acres on private land in permanent easements (0.59%). To reach the goal of 4% permanently protected habitat (double the estimated amount in 2005) by 2030, protection through acquisition or easements, restoration, reconstruction and enhancement of critical habitats must be accelerated to 53,333 acres annually (~3.8 times the current pace). Fragmentation must be minimized by developing large blocks of habitat connected by corridors for the free exchange of organisms. Landowner education and cost sharing programs must be expanded to increase the amount of permanently protected habitat on private lands and waters. Ensuring that the short-term benefits provided by Federal land conservation programs are continued must be a high priority for all stakeholders as the long-term goals are pursued. Watershed and hydrologic alterations must be restored wherever necessary and feasible to benefit all wildlife.

A Vision for Wildlife Management

Diverse wildlife communities will be developed on public and private lands and waters through the use of adaptive ecological management principles.

Goal

- Wildlife and fisheries management will be based on science.

Conservation Strategies and Actions

1. Establish wildlife population and habitat management goals for public and private lands and evaluate their effectiveness.

Crosswalk to the Actions Classification v 2.0:	
Level I & Level II Actions	6. Conservation Designation & Planning 6.2 Easements & Resource Rights 9. Education & Training 9.2 Training & Individual Capacity Development 10. Institutional Development 10.1 Internal Organizational Management & Administration 10.2 External Organizational Development & Support 10.3 Alliance & Partnership Development

2. Develop and implement management plans on public and privately-owned lands and waters that promote biodiversity and improve the status of species of greatest conservation need.
 - a. Provide coordination and implement activities that involve all in-state land management agencies (state, county and Federal) across state lines and include the Missouri and Mississippi River systems.
 - b. Coordinate all Federal, state, county and NGO's private lands programs to efficiently provide management plans to landowners.

- c. Implement a statewide private lands management coordination committee.
- d. Educate natural resource management staff on management needs of species of greatest conservation need.
- e. Develop standard elements for all public and private land management plans.
- f. Acquire tools and gather reference materials and make them easily accessible to all natural resource managers and landowners.
- g. Expand and create local habitat working teams to implement the plans on private and public lands and waters. Provide these teams and private contractors' incentives for equipment.
- h. Expand the DNR's Prairie Seed Harvest Program to meet the demand of the state's public land managers for local eco-type prairie seed.
- i. Develop and implement a statewide strategy to eradicate invasive species.

Crosswalk to the Actions Classification v 2.0:	
Level I & Level II Actions	6. Conservation Designation & Planning 6.4 Conservation Planning 9. Education & Training 9.2 Training & Individual Capacity Development 10. Institutional Development 10.1 Internal Organizational Management & Administration 10.2 External Organizational Development & Support 10.3 Alliance & Partnership Development

3. Coordinate habitat management messages and objectives among all layers of conservation agencies and groups to promote goals of the plan and work toward compatible policies.

Crosswalk to the Actions Classification v 2.0:	
Level I & Level II Actions	10. Institutional Development 10.1 Internal Organizational Management & Administration 10.2 External Organizational Development & Support 10.3 Alliance & Partnership Development

4. Work with legislators to address liability issues related to landowners' usage of outside contractors to implement management practices on their land.

Crosswalk to the Actions Classification v 2.0:	
Level I & Level II Actions	7. Legal & Policy Frameworks 7.1 Laws, Regulations, & Codes 7.2 Policies & Guidelines

5. Educate other government land management and protection agencies on the Plan so it may be used in conjunction with their work activities (ex. DOT, IACCB, USFWS).

Crosswalk to the Actions Classification v 2.0:	
Level I & Level II Actions	9. Education & Training 9.2 Training & Individual Capacity Development 10. Institutional Development 10.1 Internal Organizational Management & Administration 10.2 Organizational Development & Support 10.3 Alliance & Partnership Development

6. Provide funding and staff positions to carry out the actions of the Plan.

Crosswalk to the Actions Classification v 2.0:	
Level I & Level II Actions	10. Institutional Development 10.1 Internal Organizational Management & Administration 10.4 Financing Conservation

7. Protect ecosystem stability by developing invasive species management plans that provide early detection strategies to control exotic invasive species.

Crosswalk to the Actions Classification v 2.0:	
Level I & Level II Actions	1. Land/Water Management 1.2 Site/Area Stewardship 6. Conservation Designation & Planning 6.4 Conservation Planning 8. Research & Monitoring 8.1 Basic Research & Status Monitoring

Explanation

When the habitat goal is met, the vast majority of land in Iowa will still be in private ownership and used for agricultural purposes. Meeting the wildlife population goal will require intensive and carefully planned management on lands and waters protected for wildlife, whether in public or private ownership. Management for all species must be coordinated using ecological principles that can be evaluated and adapted if population or landowner objectives are not met. Landowners and conservationists must work in harmony so that environmentally sustainable agriculture is practiced and all land is managed using sound conservation practices.

A Vision for Wildlife-Associated Recreation

More Iowans will participate in wildlife-associated recreation, and all Iowans will have access to publicly owned recreation areas to enjoy wildlife in its many forms.

Goals

- The number of Iowans participating in wildlife-associated recreation (wildlife viewing, photography, hiking, outdoor classrooms, hunting, fishing etc.) should increase 50 percent by 2030;
- Wildlife-associated recreation will be available to all Iowans on public lands near their home;

Conservation Strategies and Actions

1. Understand market-based research to determine the wildlife-associated recreational interests of all Iowans, especially non-traditional users like minority and ethnic groups and citizens with disabilities.
 - a. Gather information from Statewide Comprehensive Outdoor Recreation Plan (SCORP) survey

Crosswalk to the Actions Classification v 2.0:	
Level I & Level II Actions	8. Research & Monitoring 8.1 Basic Research & Status Monitoring 8.2 Evaluation, Effectiveness Measures & Learning

2. Expand training programs in wildlife-associated recreation skills to increase citizen participation and improve public health.
 - a. Work with the DNR outdoor skills committee and associated partners to complete the development of outdoor skills modules,
 - b. Create a network of lending sites for recreation equipment to teach programs,
 - c. Provide training for interested teachers, youth leaders, and other educators through formal and non-formal venues.

Crosswalk to the Actions Classification v 2.0:	
Level I & Level II Actions	9. Education & Training 9.2 Training & Individual Capacity Development 10. Institutional Development 10.1 Internal Organizational Management & Administration 10.2 External Organizational Development & Support 10.3 Alliance & Partnership Development

3. Coordinate wildlife population, habitat and management goals for public lands with potential recreational uses to assure that all recreation is compatible with sound wildlife management, minimizes conflicts between users and protects critical habitat from overuse.

Crosswalk to the Actions Classification v 2.0:	
Level I & Level II Actions	6. Conservation Designation & Planning 6.3 Land/Water Use Zoning & Designation 6.4 Conservation Planning 7. Legal & Policy Frameworks 7.2 Policies & Guidelines 10. Institutional Development 10.1 Internal Organizational Management & Administration 10.2 External Organizational Development & Support 10.3 Alliance & Partnership Development

Explanation

When the 2005 version of this plan was created, it was estimated that 1.3 million people participated in wildlife-associated recreation in Iowa. A survey of Iowans indicated that 81% of respondents had an interest in wildlife viewing in the future, even if they weren't currently participating, and additionally 59% indicated an interest in fishing, and 30% in hunting (Dietsch et al. 2018). To accommodate additional users, public access for a variety of wildlife-associated recreational uses must be assured on public and private lands and waters wherever these activities are compatible with sound management for all wildlife. Access will be improved around urban areas and in counties where it is lacking today. Outreach programs must be developed so that all Iowans regardless of race or gender will find wildlife-associated recreation activities that are enjoyable and available to them.

A 2022 survey of Iowans indicates high rates of participation in outdoor recreation, and even higher rates of interest in future participation. Wildlife-associated recreation plays a significant role, with over 1 million anglers, over 433,000 hunters, and nearly 842,000 people travelling to view wildlife (Responsive Management 2022). For more information about outdoor recreation in Iowa, please visit Iowa's [Statewide Comprehensive Outdoor Recreation Plan \(SCORP\)](#).

A Vision for Wildlife Education

Iowans will respect wildlife for its many values and they will advocate effectively for conservation of wildlife and wildlife habitats.

Goals

Iowans will understand the relationships of:

- a) land use, and its impacts on wildlife diversity & abundance
- b) land use, and its impacts on quality of life for all citizens
- c) land use, and its impacts on Iowa's economic sectors related to wildlife recreation
- d) wildlife diversity & abundance, and its impacts on quality of life in Iowa
- e) wildlife diversity & abundance, and its impacts on Iowa's economy
- f) quality of life for all citizens, and its impacts on Iowa's economy
- g) Iowa's economic decisions and their impacts on wildlife-based contributions to quality of life for all citizens

Conservation Strategies and Actions

1. Work with stakeholders to develop consistent messages about the value of wildlife and their associated habitats that convey health, wellness, economic, and other *quality of life* benefits (tourism and economic development, departments of health, physicians, wellness coordinators, etc.)

Crosswalk to the Actions Classification v 2.0:	
Level I & Level II Actions	3. Awareness Raising 3.1 Outreach & Communications 5. Livelihood, Economic & Moral Incentives 5.1 Linked Enterprises & Alternative Livelihoods

Crosswalk to the Actions Classification v 2.0:	
	5.4 Direct Economic Incentives 5.5 Non-Monetary Values

2. Refine and expand current wildlife education efforts targeted to formal and non-formal education venues. Focus on:
 - a. Priorities established in this Plan,
 - b. Needs identified by the formal education community (e.g., through direct contact with the Iowa Department of Education and Area Education Agencies),
 - c. Information collected through teacher focus groups
 - d. Needs of other potential target audiences.

Crosswalk to the Actions Classification v 2.0:	
Level I & Level II Actions	9. Education & Training 9.1 Formal Education 9.2 Training & Individual Capacity Development

3. Determine appropriate target audiences based on the overarching goals of this Plan.
 - a. Determine audience needs through needs assessments
 - b. Develop appropriate informational materials and distribution venues

Crosswalk to the Actions Classification v 2.0:	
Level I & Level II Actions	8. Research & Monitoring 8.1 Basic Research & Status Monitoring 8.2 Evaluation, Effectiveness Measures & Learning 9. Education & Training 9.2 Training & Individual Capacity Development

4. Secure additional staff to coordinate educational efforts across the state
 - a. Materials development,
 - b. Staff training and assistance,
 - c. Maintenance of regional partnerships to facilitate implementation of educational efforts.

Crosswalk to the Actions Classification v 2.0:	
Level I & Level II Actions	10. Institutional Development 10.1 Internal Organizational Management & Administration 10.2 External Organizational Development & Support 10.3 Alliance & Partnership Development 10.4 Financing Conservation

5. Develop training programs for professionals in fields that affect land use (agriculture, engineering, community planning, developers, etc.) and community leaders to inform them of the impacts of development on wildlife habitats and the quality of life for citizens on a local level.

Crosswalk to the Actions Classification v 2.0:	
Level I & Level II Actions	3. Awareness Raising 3.1 Outreach & Communications 5. Livelihood, Economic & Moral Incentives 5.1 Linked Enterprises & Alternative Livelihoods 9. Education & Training 9.2 Training & Individual Capacity Development

6. Pro-active wildlife education for K-12 classrooms as well as post-secondary and adult conservation education and outdoor skills must be expanded through aggressive outreach programs.

Crosswalk to the Actions Classification v 2.0:	
Level I & Level II Actions	9. Education & Training 9.1 Formal Education

Explanation

To attain these visions, political leaders must be made aware of the economic and social benefits that are achieved through scientific management of Iowa's wildlife and provide the necessary funding. Pro-active wildlife education for K-12 classrooms as well as post-secondary and adult conservation education and outdoor skills must be expanded through aggressive outreach programs. Educational programs must be developed for professionals in other disciplines and for state, regional and community leaders that make decisions on the development and use of natural resources that impact wildlife.

A Vision to Fund Wildlife Conservation

Stable, permanent funding will be dedicated to the management of wildlife at a level adequate to achieve the visions of this plan.

Goals

- Government (Federal, state, and county) and private conservation spending will be increased so that the goals of this Plan are reached by 2030.
- Funding will be dependable, secure, and appreciated as a powerful economic and social investment.

Conservation Strategies and Actions

1. Develop a marketing campaign that will convince citizens, conservation professionals, and activists in private conservation groups, community leaders and politicians that funding this Plan will be an important step in helping to solve a myriad of social and economic problems in Iowa.

Crosswalk to the Actions Classification v 2.0:	
Level I & Level II Actions	3. Awareness Raising 3.1 Outreach & Communications

2. Expand membership in the coalition of traditional wildlife and agricultural groups that is lobbying Congress for Federal farm conservation programs on private land to include nongame and recreational interests.

Crosswalk to the Actions Classification v 2.0:	
Level I & Level II Actions	7. Legal & Policy Frameworks 7.1 Legislation 7.2 Policies & Guidelines 10. Institutional Development 10.2 Institutional & Civil Society Development 10.3 Alliance & Partnership Development

3. Develop a broad-based coalition of conservation leaders, educators, politicians and local economic interests to identify and secure passage of permanent funding mechanisms that will provide sufficient funding to meet Plan goals in 25 years.

Crosswalk to the Actions Classification v 2.0:	
Level I & Level II Actions	7. Legal & Policy Frameworks 7.1 Legislation 7.2 Policies & Guidelines 10. Institutional Development 10.1 Organizational Management & Administration 10.2 Institutional & Civil Society Development

Crosswalk to the Actions Classification v 2.0:	
	10.3 Alliance & Partnership Development 10.4 Financing Conservation

4. Leverage conservation dollars and make use of private dollars as well as public funds

Crosswalk to the Actions Classification v 2.0:	
Level I & Level II Actions	10. Institutional Development 10.3 Alliance & Partnership Development 10.4 Financing Conservation

Explanation

Achieving the visions outlined in this plan will require cooperation from public-private partnerships at all levels of government (Federal, state and local) and from all private stakeholders. Funding from all sources will have to reach a greater level than at any time in the past. The bulk of funding for wildlife programs in Iowa comes from hunters and anglers through license fees and excise taxes. In 2023, Iowa's outdoor recreation sector was responsible for 46,000 jobs and \$2.19 billion in wages (U.S. Bureau of Economic Analysis 2024). The costs for implementing the Plan should be shared by all Iowans. Increasing wildlife habitat reduces soil erosion, improves water quality, and reduces drinking water costs for all citizens. All Iowans will receive tangible and intangible benefits when the IWAP is implemented.

Conservation Actions Taxonomy

Table 6- 1 lists conservation actions and provides some explanation and a few examples that may have relevance in Iowa. A few of the actions included in the full list are not applicable or appropriate for governmental agencies to engage in (e.g. Protests & Civil Disobedience). This Plan is implemented by a wide array of entities (individuals, non-profit organizations, municipal, state or federal agencies, educational institutions, etc.). The actions listed are not all applicable to every type of conservation entity. However, any individual or organization with an interest in implementing the Plan should hopefully be able to find a way to contribute to making the Plan's visions a reality.

Because this Conservation Actions taxonomy was developed to be inclusive of all types of conservation across the globe, some actions listed below may not be particularly relevant to Implementation of this Plan, and inclusion here does not imply that this Plan recommends or supports undertaking any of the following actions. **Recommended actions are listed above**, and are cross-walked to the Conservation Actions Classification v 2.0 presented in this table. The purpose of providing the Conservation Actions Classification is to provide an organizational framework by which conservation efforts can be presented across species groups or ecosystem types, across entities, and across states and regions.

Table 6-1. Conservation Actions as defined by the Conservation Measures Partnership, with some explanation and examples.

Conservation Actions	Iowa-specific explanation and examples
A. Target Restoration/Stress Reduction Actions	Actions to directly restore a target or mitigate a stress
1. Land/Water Management	Actions directed at conserving or restoring sites, ecosystems and the wider environment
1.1 Site/Area Stewardship	Enhancing viability / mitigating stresses for particular sites and/or ecosystem targets (e.g. maintaining natural vegetation, removing invasive species, etc.)
1.2 Ecosystem & Natural Processes (Re)Creation	Restoring missing or degraded ecosystems and ecosystem functions and processes (e.g. planting and maintaining natural vegetation, conducting prescribed fires, wetland drawdowns and other actions to restore degraded hydrologic regimes, etc.). Some overlap with 1.1 but typically on a larger scale.
2. Species Management	Actions directly managing or restoring specific species or taxa groups
2.1 Species Stewardship	Conserving specific species within their current range (e.g. providing and maintaining artificial nest structures, management of game species, provision of food plots, etc.)
2.2 Species Re-Introduction & Translocation	Transferring species or genetic material to places where they formerly occurred or to suitable future habitat or benign introductions of species to an ecosystem (e.g. species re-introduction projects such as Trumpeter Swans or Greater Prairie-chickens).

Conservation Actions	Iowa-specific explanation and examples
2.3 <i>Ex-Situ</i> Conservation	Protecting specific taxa in artificial settings with the aim of ultimately restoring them to their natural settings (e.g. propagation programs for rare mussels, seed banking, etc.)
B. Behavioral Change / Threat Reduction Actions	Actions to reduce direct threats or increase positive behaviors
3. Awareness Raising	Actions making people aware of key issues and/or feeling desired emotions, leading to behavior change
3.1 Outreach & Communications	Promoting desired behavioral change by providing information through various media and other channels (e.g. naturalist programming, press releases, educational webpage development, etc.)
3.2 Protests & Civil Disobedience	Promoting desired behavioral change by conducting protests or other confrontational means (e.g. petitions, protest marches, etc.)
4. Law Enforcement & Prosecution	Monitoring and enforcing compliance with existing laws, policies at all levels to deter threats or compel conservation action
4.1 Detection & Arrest	Detecting and/or directly stopping violations of existing laws, policies/regulations and standards/legal codes (e.g. conservation officer patrols)
4.2 Criminal Prosecution & Conviction	Ensuring appropriate application of sanctions for violations of existing laws & policies (e.g. following up on arrests)
4.3 Non-criminal Legal Action	Threatening or bringing non-criminal legal action to get individuals, organizations, agencies, or firms to change or deter undesired behavior or compel conservation action (e.g. legal actions carried out in civil arena)
5. Livelihood, Economic & Moral Incentives	Actions using livelihood, other economic and moral incentives to directly influence attitudes and behaviors
5.1 Linked Enterprises & Livelihoods	Developing enterprises that directly depend on the maintenance of natural resources or provide substitute livelihoods as a means of changing attitudes and behaviors (e.g. supporting eco-tourism or other non-damaging natural resource-based businesses)
5.2 Better Products & Management Practices	Developing, promoting and/or providing more environmentally-friendly products or practices that substitute for environmentally damaging ones (e.g. grass banking, wetland mitigation, recycling and use of recycled materials, etc.)
5.3 Market-Based Incentives	Using market mechanisms to change behaviors and attitudes (commodity certification programs like “wildlife-friendly” meat products, boycotts of products such as non-dolphin safe tuna, etc.)
5.4 Direct Economic Incentives	Using direct or indirect payments for ascribing economic value to change behaviors and attitudes (tax incentives for conservation, compensation for provision of ecosystem services)
5.5 Non-Monetary Values	Using intangible and moral values to change behaviors and attitudes (development of religious or cultural arguments for conservation, linking conservation to human health and well-being)
C. Enabling Condition Actions	Actions that create the conditions necessary for other conservation efforts to succeed
6. Conservation Design & Planning	Actions directly protecting sites and/or species
6.1 Protected Area Designation &/or Acquisition	Legally or formally establishing or expanding public or private parks, reserves, and other protected areas roughly equivalent to IUCN Categories I-VI (expanding or creating new areas of National Wildlife Refuges, National Parks, Forests, State, County, or City Wildlife Areas, Forests, Parks, private protected areas, etc.)
6.2 Easements & Resource Rights	Legally or formally establishing protection of some specific aspect of the natural resources on public or private lands (Conservation Easements through Farm Bill programs such as Conservation Reserve Program, Wetland Reserve Easement, other programs through land trusts etc.)
6.3 Land/Water Use Zoning & Designation	Designating land/water uses or designating conservation areas outside of IUCN Categories I-IV (e.g. formal planning and zoning by Councils of Government, as well as non-regulatory conservation area designation such as Bird Conservation Areas, Important Bird Areas, and Amphibian & Reptile Conservation Area, etc.)
6.4 Conservation Planning	Planning for management of sites, species, or thematic conservation projects (e.g. development of management plans for National Wildlife Refuges or Wildlife Management Areas, or for specific species)

Conservation Actions	Iowa-specific explanation and examples
6.5 Site Infrastructure	Building or maintaining the physical infrastructure for protected areas and other conservation sites (e.g. maintaining parking areas, roads, fences, signs, etc. in conservation areas)
7. Legal & Policy Frameworks	Actions to develop, change, and influence formal legislation, regulations, and voluntary standards
7.1 Laws, Regulations & Codes	Creating, amending, or influencing laws, regulations and codes at all levels (e.g. providing information to policy-makers, influencing congressional or legislative appropriations processes, developing permitting systems)
7.2 Policies & Guidelines	Creating, amending, or influencing policies and guidelines at all levels (e.g. providing input into agency plans or regulations, working with communities to implement zoning, etc.)
8. Research & Monitoring	Basic and applied research to support conservation work
8.1 Basic Research & Status Monitoring	Collecting, managing and analyzing data and creating information about any conservation-related factors (e.g. ecological research on the habitat requirements of a specific species or suite of species)
8.2 Evaluation, Effectiveness Measures & Learning	Assessment of and learning about the effectiveness of conservation work (e.g. research designed to assess the effectiveness of conservation strategies or actions)
9. Education & Training	Enhancing knowledge and skills of specific individuals
9.1 Formal Education	Enhancing knowledge and skills of students in a formal degree program (e.g. public schools, colleges and universities, continuing education programs)
9.2 Training & Individual Capacity Development	Enhancing knowledge, skills and information exchange for practitioners, stakeholders, and other relevant individuals in structured settings outside of degree programs (e.g. workshops and training for carrying out management, developing guidelines or manuals for natural resource managers, etc.)
10. Institutional Development	Creating the institutions needed to support conservation work
10.1 Internal Organizational Management & Administration	Doing the work needed to establish and operate conservation organizations and agencies (e.g. hiring & managing staff for conservation agencies at any level of government)
10.2 External Organizational Development & Support	Creating or providing non-financial support & capacity building for conservation organizations (developing local land trusts or other conservation organizations, starting public-private partnerships, starting prescribed fire cooperatives, etc.)
10.3 Alliance & Partnership Development	Forming and facilitating partnerships, alliances, and networks of organizations (e.g. holding meetings, conferences, engaging stakeholders, developing networks and communities of practice, etc.)
10.4 Financing Conservation	Raising and providing funds for conservation work

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Chapter Seven

Research, Survey, Inventory and Monitoring

Required Element #5: Proposed plans for monitoring Species of Greatest Conservation Need and their habitats, for monitoring the effectiveness of the conservation actions proposed in (4), and for adapting these conservation actions to respond appropriately to new information or changing conditions.

Required Element #3: Descriptions of problems that may adversely affect SGCN or their habitats, and priority research and survey efforts needed to identify factors that may assist in their restoration and improved conservation of these species and habitats.

Background

The lack of species-specific information on the abundance and distribution of SGCN was one of the greatest challenges faced when initially developing this Plan prior to 2005. In some cases species were added to the list simply because information was outdated or unavailable. This continues to occur today despite much progress being made over the past two decades, which is why the 2015 and 2025 versions of the Plan identify Data Deficient species. Because of the dearth of information for the majority of Iowa species, inventory and monitoring for fish and wildlife species became the top priority for implementation of the Plan in 2005. For the taxonomic groups covered by the Plan in 2015, we reduced the number of data deficient species by 19 (primarily amphibians, reptiles, and crayfish) for this edition. However, we have added several new taxa into the 2025 edition, including 19 moth species as data deficient, so the total number of data deficient species has stayed stable while the number of taxa included has increased.

Iowa is fortunate to have a strong spatial data program. The amount and distribution of potential wildlife habitat is comparatively well known. As we continue to implement this Plan, we will continue to acquire more wildlife data to relate to our spatial datasets, thereby becoming better equipped to identify qualitative differences among habitats and track qualitative changes over time.

Iowa recognizes that monitoring is critical to the determination of the status of species, not only those of greatest conservation need, but also the more common species. By monitoring the effects of conservation actions on wildlife, adaptive management decisions can be made to continue to improve, or to cease to harm wildlife species.

For clarity, *inventory, survey and monitoring* are defined as (Thompson et al. 1998):

- **Inventory** - Process of making an itemized list of species occurring within a given area.
- **Survey** - An incomplete count of individuals, objects, or items within a specified area and time period.
- **Monitoring** - A repeated assessment of some quality, attribute, or task for the purpose of detecting a change in average status within a defined area over time.

Long-term monitoring programs give the best picture of the status of wildlife populations over time. Well-designed short-term surveys and inventories can indicate the current status and distribution of wildlife but are often valid only in the area where they are conducted and may quickly become obsolete if habitat or other critical factors change. In Iowa the rapid change in habitat availability on agricultural lands as USDA farm programs change is a frequent example.

Many research studies too numerous to list have provided information on the presence of individual species or groups of species. Prior to the first version of this Plan, virtually all monitoring programs in Iowa have focused on game species, T&E species, common bird surveys (e.g., Breeding Bird Survey), and evaluations of wildlife restorations. This left a large majority of Iowa's fauna out of long-term monitoring programs, making an assessment of trends very difficult.

Statewide Wildlife Inventory – Iowa's Multiple Species Inventory and Monitoring Program

When this Plan was initially developed in 2005, the Steering Committee and the Monitoring Working Group agreed that the first priority for monitoring and research was to inventory Iowa's permanently protected wildlife habitats and a sample of habitat on private lands within the state. In addition, virtually all wildlife specialists involved in developing this

Plan agreed that inventories, surveys, and monitoring of SGCN to guide habitat and population conservation actions was an essential component for managing Iowa's wildlife into the future. Therefore, in order to meet these needs, the Multiple Species Inventory and Monitoring Program (MSIM) was established in a partnership between Iowa DNR and Iowa State University (ISU). This program, which was launched in 2006, incorporates permanent sampling sites situated on public (federal and state owned) lands, in addition to properties owned by counties, cities, NGOs and private individuals which are not surveyed as often. The design of this program is based on the US Forest Service's "Multiple Species Inventory and Monitoring Guide" (Manley et al. 2006).

**Brown-belted bumblebee -
Photo by Meryl Sudeith**



Taxa Which Still Need Initial Inventory Work

Difficulties with development of an effective sampling protocol for terrestrial snails and a comparative lack of experts in identification of individual snail species has remained a hurdle. Therefore, the inventory phase for terrestrial snails is not completed as of 2025. Sampling protocols for crayfish have been developed, tested, and implemented since 2015. Bumble bee protocols were developed and tested in 2025 for deployment beginning in 2026. Moth protocols are still in the discussion phase of development. If potential additional taxa are added to the list of SGCN, then survey protocols for those taxa will also need to be developed and tested for integration into the MSIM framework for Iowa.

Multiple Species Inventory and Monitoring Program

There are five specific objectives which the MSIM Program is designed to address. They are outlined below.

Objective 1a: Current Inventory of Wildlife in Iowa

This objective is primarily concerned with estimating the statewide spatial distribution of species. Species occurrence and distribution have been derived from the use of several short-duration, high-intensity searches at a large number of areas scattered widely across the state with locations randomly chosen based on the 19 habitat classifications designated in the 2005 version of this Plan. Although new properties are surveyed (and therefore inventoried most years), the 2015 Plan moved away from the original 19 habitat classifications and properties are now selected randomly without being pre-assigned to a habitat type. While one of the original 19 habitat types are assigned post-selection, we rely on GIS spatial data and on-the ground habitat data collected at each property to better define 'habitat' within the analytical models.

The design of the MSIM Program has provided the ability to estimate the spatial distribution and status of many species. The overall protocol determines how widespread or isolated a species is within the state and relates distribution to the condition of habitats. Permanent monitoring plot locations were chosen from protected properties based on the original stratified random sampling design using quadrant of the state and habitat classification as the stratifications. For a property to be considered it had to contain at least 101 ha (250 ac) of protected land or water within a contiguous boundary (i.e., smaller state-owned areas with adjoining CRP, WRP, NRCS lands were included in potential locations). This design is based on the US Forest Service's *Multiple Species Inventory and Monitoring Guide* (Manley et al. 2006). This Guide outlines monitoring techniques for vertebrate species on National Forest Land. This design allows collection of both vertebrate wildlife data and also plant species composition and habitat data (Manley et al. 2006).

By stratifying the plot locations based upon habitat classifications, we are able to monitor multiple SGCN associated with each habitat type. With the development and implementation of MSIM, Iowa now has nearly 20 years of data on the distribution and abundance of wildlife species including amphibians, small and meso-mammals, butterflies, odonates, freshwater mussels, reptiles, fish and birds.

Private lands sampling sites are mostly focuses on lands with wildlife conservation purposes (i.e. lands enrolled in conservation easement programs such as the Conservation Reserve Program or Wetlands Reserve Program, or managed by conservation entities such as The Nature Conservancy or the Iowa Natural Heritage Foundation). Beginning in 2012, the DNR and ISU have joint responsibility for coordinating this statewide survey and monitoring program, with

assistance from other partners and land management agencies (USFWS, US Army Corps of Engineers, Iowa National Guard, Iowa County Conservation Boards, Iowa Cooperative Fish and Wildlife Research Unit, non-governmental organizations, etc.)

We have adapted the Forest Service Guide to include protocols for additional taxa included within this Plan. Within each permanent terrestrial sampling plot, several techniques are utilized to collect data on a wide variety of wildlife (Figure 7-1). Briefly, specific procedures include pre-field work analysis of GIS coverages and selection of station (bird point count, trap placements) locations. Field work data collection has used trapping, timed track searching, and remote cameras for mammals; acoustic bat detectors for bats; visual encounter surveys, coverboards, and trapping of amphibians and reptiles; point counts and timed searching for birds; walking transects and timed searching for butterflies; visual encounter surveys for odonates; electroshocking and trawling for fish; and quadrat surveys and visual encounter surveys for mussels. In addition, data are collected on weather conditions, vegetative characteristics, aquatic variables, and habitat attributes. This allows us to collect information at the microhabitat scale to draw more specific correlations between species occurrence and habitat characteristics/environmental variables.

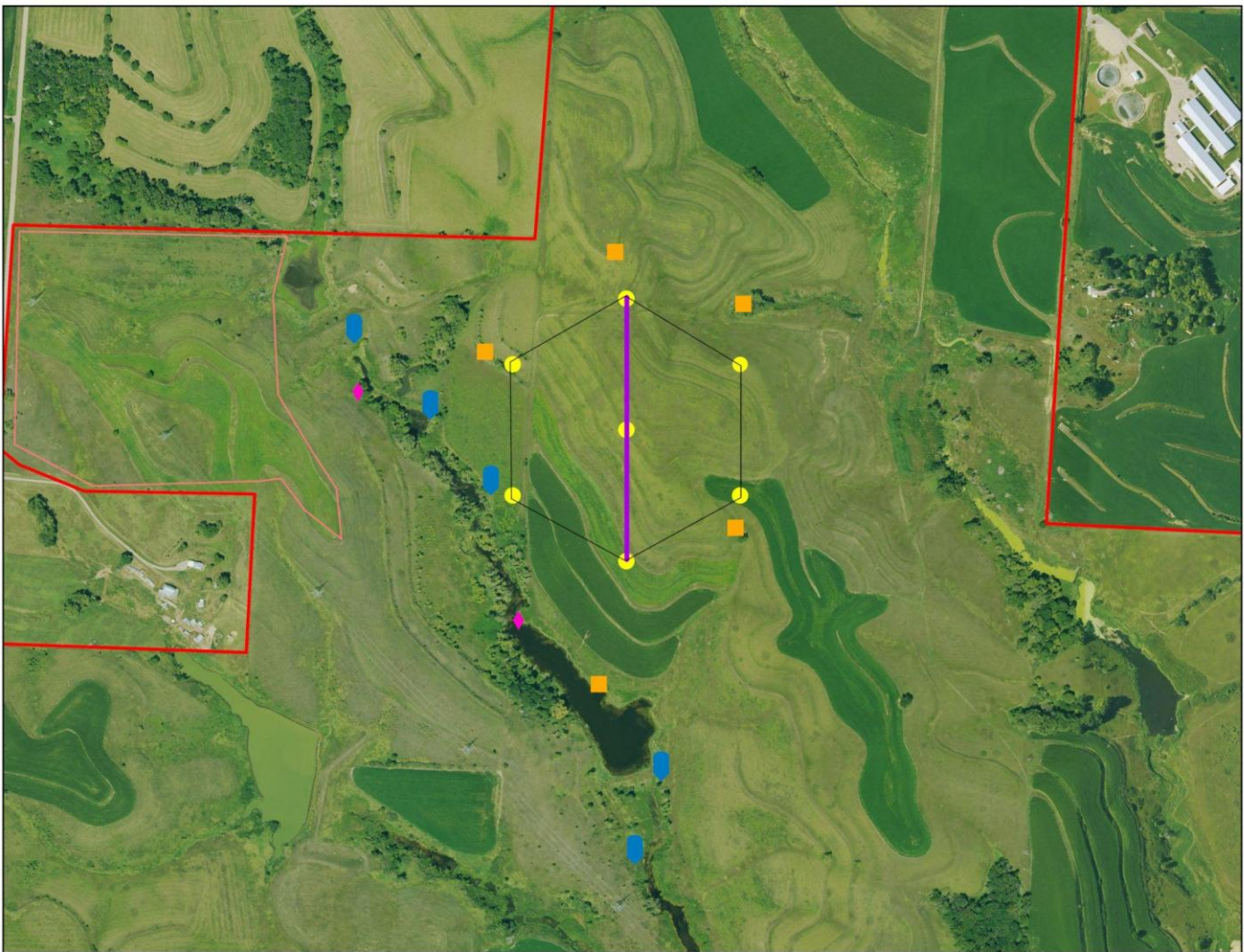


Figure 7-1. Diagram of permanent sampling location.

Bird point counts (yellow circles) are conducted at each point of the hexagon, including the middle point. Small mammal traps are set along the edge transects (thin black line) as well as the middle transect (purple line connecting the north and south points). The middle transect (purple line) is walked for butterflies. Coverboards for herpetofauna are illustrated with orange squares. Wetlands (blue flags) are searched using time constrained visual encounter surveys for amphibians, dragonflies, and damselflies. Waterbodies are also electroshocked (where applicable) for fish and quadrats

are used to search for mussels. Pink squares represent trailmaster camera locations and the pale pink outline represent a field on the western side of the property searched as part of visual encounter surveys.

Objective 1b: Inventory of Habitat

The above described habitat data collection is done in addition to analyzing statewide landcover data sets. The DNR does not have the financial or staff resources to create Iowa specific landcover classification data similar to 2009's High Resolution Landcover. Moving forward, the DNR will rely on the [Annual National Land Cover Database](#) which uses Landsat data to provide timely, long-term, and detailed land surface change information. This allows the DNR to track the percentages of habitat types and, over time, changes in these percentages across the state. At this time, we anticipate this evaluation to be the primary method for monitoring broad scale changes in habitats. In addition to the GIS data, we collect habitat variables around each bird point count (BPC) location and at least one additional location near BPC1. These data include tree species and dbh, 1-m² quadrats where vegetation is identified to species (if possible) and assigned a cover class (e.g. 1-5%, 6-25%, etc.), litter depth, canopy cover, for example. When the two types of data are combined, we have a more complete assessment of the habitat available to use as covariates in our predictive models for wildlife use.

Objective 2: Monitoring Species and Their Habitats

The primary parameter of interest in these designs is the proportion of habitat occupied. Simply knowing species occurrence patterns may not provide sufficient information for managing these species. MacKenzie et al. (2006) suggests that presence and absence data can be used as a substitute for species abundance as long as the detection probability for the species can be estimated. Estimation of species abundance would require more intense sampling protocols. This design would be expected to generate less information per species because fewer sampling areas and a smaller group of species would be surveyed due to the higher cost per sampling unit. In addition, although providing more in-depth examination of a group of species, the number of taxonomic groups surveyed would be smaller due to the higher costs associated with this more intensive effort.

The initial inventory and survey was completed prior to 2015. Since then, the same sites have begun to be re-visited using the same protocols. This set of subsequent visits, which began during the field season of 2015, converts the inventory into the monitoring program. Depending on funding, a subset of sites are visited every year to ensure continuity. In addition, new (not previously sampled) properties as well as properties surveyed previously but not annually, are selected each year to be included for data collection.

The number of sites to be visited per year is dependent upon funding available. A factor in the decision of the number of sites to be visited per year depends upon the percent change (increase or decrease in species occurrence) prudent for determining the status of wildlife populations within Iowa. To detect a smaller percent change, we would need to monitor more sites (Manley et al. 2006).

Data collected within the monitoring program will determine the change in area occupied by a given species (whether sites are being colonized or populations are going extinct) (MacKenzie et al. 2003), the change in the spatial distribution of species, changes in community composition, and changes in habitat. Knowing both changes in habitat and changes in species occurrence allows for inferences to be drawn about correlations between the two. We emphasize, however, that this could be the impetus for future research as opposed to definitive conclusions.

Data collection is conducted by field technicians who are under the direction of ISU and DNR as paid technicians. All field technicians undergo training that includes species identification and handling techniques, habitat classification techniques, and other training specific to the data being acquired. Data analysis is conducted collaboratively by ISU and DNR.

Data Management and Archiving

DNR developed and maintains a database to house data collected through the MSIM program. This database can house information gathered by any entity using the MSIM protocols. The database is secured, but permission to access various reports can be requested. All DNR wildlife biologists have access to records of MSIM species records by property name or county name, for example.

In addition, observations of species tracked by the Natural Areas Inventory program (mostly State and Federally Threatened and Endangered Species) are entered into Iowa’s Natural Areas Inventory (NAI) Database, which is used in environmental reviews and other planning processes.

Reporting, Periodic Review, and Evaluation

The monitoring protocols underwent a peer review process prior to implementation. The protocols undergo an internal review every few years and if problems are noticed, advice is sought from outside sources (e.g., university faculty and non-government organization scientists). In addition to the DNR review, information from the monitoring program is presented to the taxonomic subcommittees under the IWAP Wildlife Working Group. At that time any problems encountered with the data collection protocol were addressed and specific directions for research recommendations were suggested. An additional benefit that results from periodic review is the opportunity to evaluate current objectives and establish new objectives and goals of the program in order to adequately meet the changing needs of Iowa’s wildlife.

We did expect that some species would likely be missed by the inventory and monitoring programs, but believe that the information gained on a large number of species outweighs this short-coming. We have identified a small number of species that are not being adequately monitored. In some cases, we have solicited proposals to do true research projects with these species (examples include research projects on occurrence of secretive marsh birds, and on Leonard’s and Ottoe skippers). In other cases we have collaborated with experts to tweak sampling protocols to allow MSIM to sample these species (e.g., adding timed track searches to look for meso-mammals instead of the baited, boxed track plates, adding gopher mound counts to document pocket gopher occurrence, adding timed searches for butterflies in addition to the transects). Figure 7-2 illustrates how we implement the decision making process concerning SGCN research and action needs to progress.

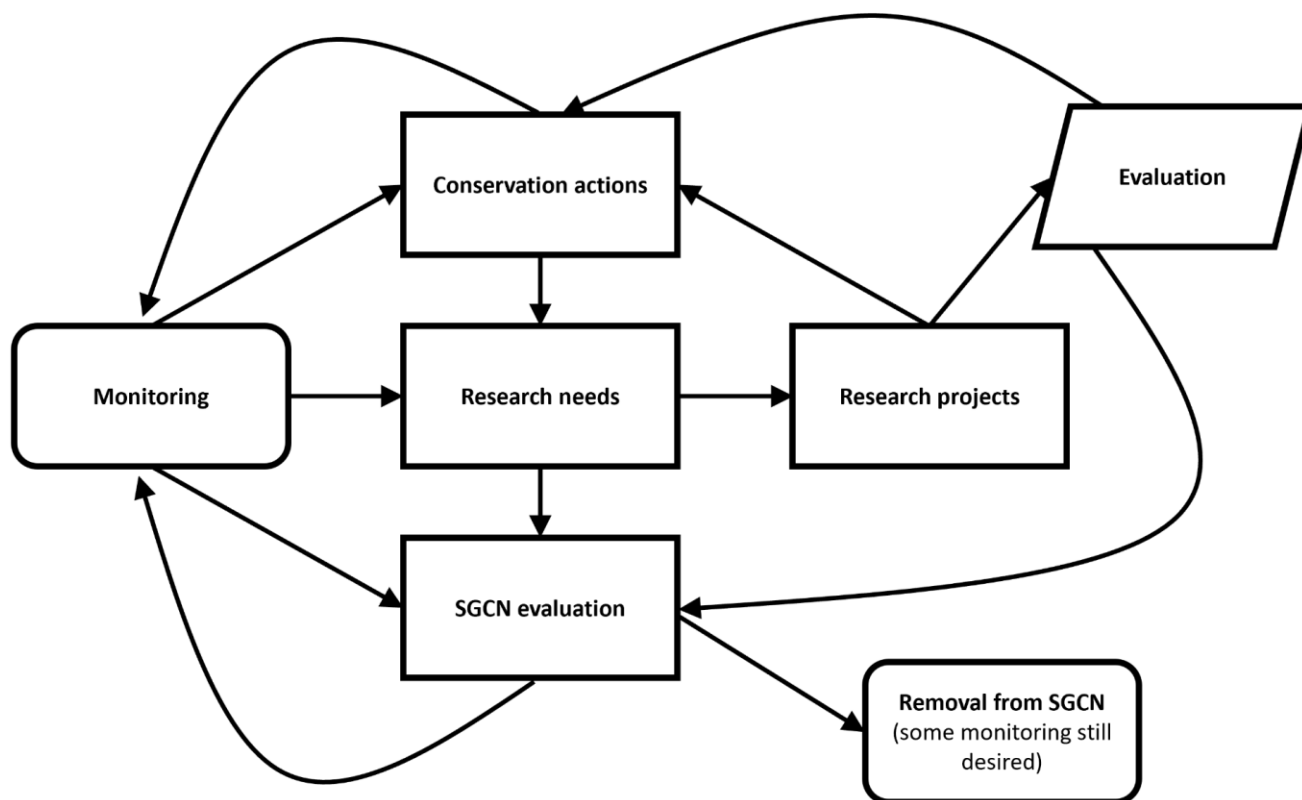


Figure 7-2. Decision making process concerning SGCN

Additional Benefits

Additional potential objectives of the inventory and monitoring plans which may be able to be addressed through the monitoring data collection include the following (Objectives 3-5).

Objective 3: Strengthening Species Distribution Models

The Gap Analysis Program (2003) predicted species occurrences based upon given habitat classification and locations throughout the state of Iowa. Terrestrial GAP models are only available for birds, mammals, amphibians, and reptiles. Aquatic GAP models have been developed for fish. The terrestrial models were created by the use of a combination of range maps and Wildlife Habitat Relationship models, which used 25 ancillary data characteristics (e.g., wetland buffer area, ecotone intersection areas, soil type, highway, elevation) combined with the 29 landcover classes (e.g., eastern red cedar forest, pine forest, evergreen forest, artificial high vegetation, artificial low vegetation, open water [from page 18 of the *Iowa GAP Report*, Kane et al. 2003]) to create predicted areas of occurrence for birds, mammals, amphibians, and reptiles.

In order to develop predictive species distribution models for taxa not included in GAP, or to update predicted distributions based on more recent land cover data, data from the MSIM program can be and has been used. Information from the MSIM program includes geographic locations, species occurrence probabilities, and habitat parameters, which are used to build predictive mathematical models. With funding from a State Wildlife Action Plan Enhancement State Wildlife Grant in 2015, we used the predictive mathematical models to create predictive species distribution maps similar to GAP. Developing these maps is time consuming and requires a large amount of computing resources. In 2022, we secured another State Wildlife Action Plan Enhancement grant to complete additional predictive maps (Box 7-1, for example) as well as creating an interactive tool to assist field staff with decision making (currently in progress).

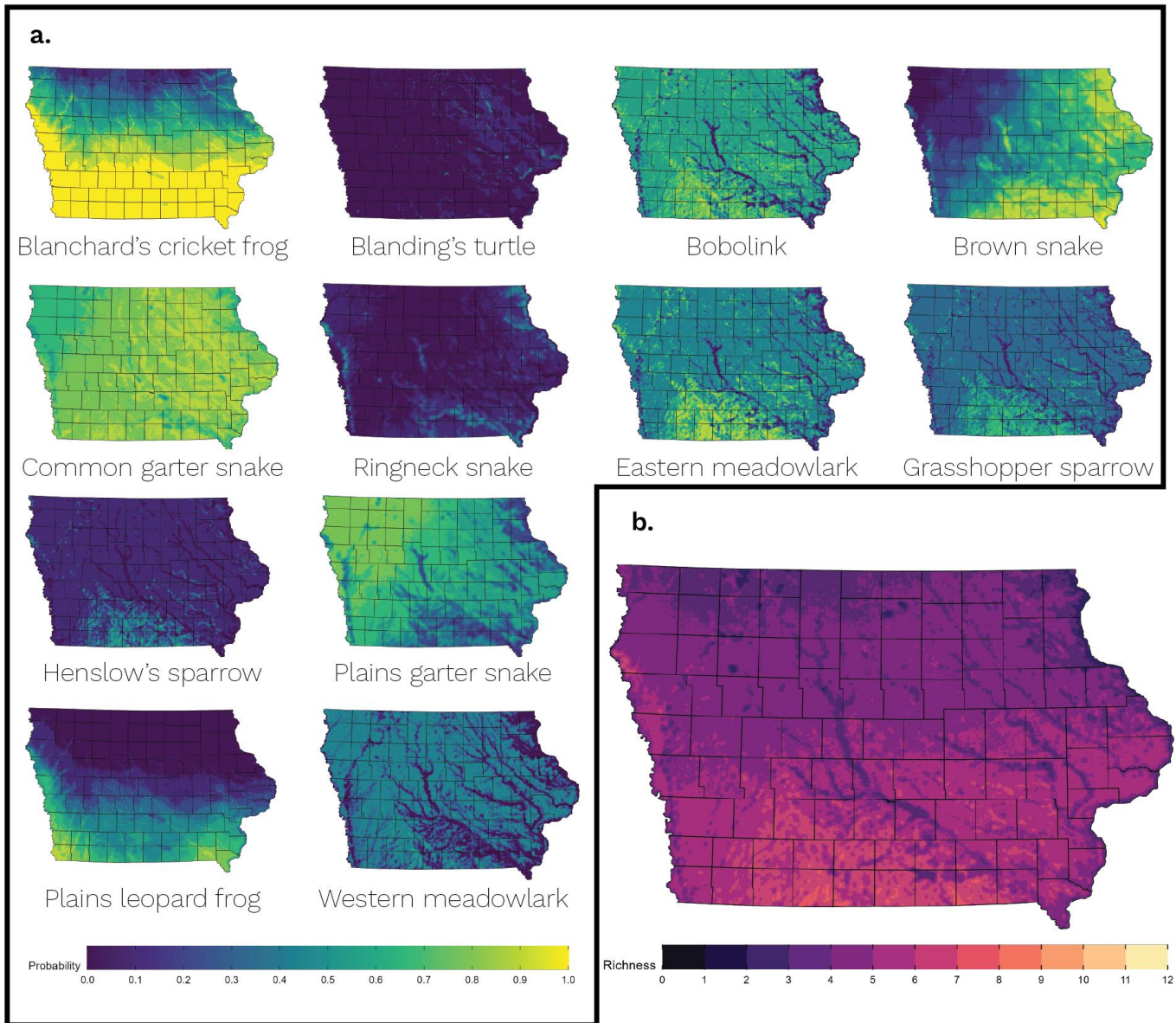
These spatial models, based upon landscape variables and microhabitat variables, will be beneficial in the implementation of the revision. Using these predictive maps, we should be able to more effectively focus conservation efforts for priority SGCN. We plan to have these maps peer-reviewed by our taxonomic experts. Following that, we plan to develop specific management guidelines for the public lands within the predicted 'hot spots' for species occurrence, as well as site specific monitoring recommendations for both habitat and species changes.

This objective should help Iowa further prioritize and set goals for the Action Plan by advancing the utility of the IWAP in a couple of ways. First, the exercise allowed us to produce a density layer of hot spots by overlaying various predictive maps for SGCN which could help inform land protection. Second, individual species maps can be used to assist in focusing management actions suggested from the MSIM data microhabitat models.

Box 7-1

Putting Iowa's SGCN on the map

Iowa DNR partnered with Iowa State University to use data from the Multi-species Inventory and Monitoring (MSIM) Program and land cover to predict the distribution of species of conservation concern across Iowa (a). The maps can be combined to generate composite estimates of species richness across the state, as shown with grassland species (b).



Objective 4: Impact and Threat Assessment

The third required element for State Wildlife Action Plans includes, “descriptions of problems which may adversely affect species of greatest conservation need, and priority research and survey efforts needed to identify factors which may assist in restoration and improved conservation of these species and their habitats.” Therefore, the impact assessment objective would primarily be concerned with estimating the impact of threats to wildlife and habitats.

A passive approach to this objective would involve recording impacts that may occur within study sites while the monitoring program is on-going and correlating these impacts to changes seen with species population occurrence. It may be prudent to then initiate specific research projects on these areas to examine the result of the impact.

A more research-oriented, experimental sampling design for this objective would be to measure species presence, diversity, and/or populations in areas of 1) habitats lacking the specified threat, 2) areas where steps have been taken to ease/prevent the threat, and 3) areas where the threat is allowed to go forward un-impeded. It may be possible that this can be accomplished within the framework of MSIM, in some cases.

This objective and Objective 5 address the consequences of specific impacts and therefore, will require more intensively designed protocols. Species occurrence alone may not be sufficient to determine the impacts of the threats or of management programs.

Objective 5: Evaluation of Management Protocols and Restoration Programs (*Adaptive Resource Management*)

Regardless of what habitat management protocol is followed (e.g., burning, logging, re-planting, mowing, grazing, or the prevention of any human alterations), different species will be expected to respond in different ways. Within each management unit, it will continue to be important to evaluate the results of management decisions on specified groups of species. For example, long-term research to evaluate the effects of a variety of pasture management regimes (e.g., patch-burn grazing, early-intensive grazing, etc.) has been conducted on public and private lands in the Grand River Grasslands, a landscape critical for prairie-chickens and other SGCN in southern Iowa. Another project, at the Spring Run Wildlife Management Area, to evaluate avian SGCN use of restored or recreated prairie and other grassland types in northern Iowa's prairie pothole region was first conducted between 2008-2010 and then again 2015-2017 on the same areas once the planted prairies were considered 'mature'. Projects in Northeast Iowa's Driftless Area have evaluated the use of restored areas of open woodlands and goat prairies by birds, reptiles, and butterflies. Bird use of Wetland Reserve Program properties has also been evaluated first 2007-2009 and again 2022-2023.

In some cases, the same protocols and procedures would be used for this objective as for Objective 4. However, as habitat management impacts result from planned programs, there are sometimes opportunities to design manipulative experiments or more formal applications of adaptive resource management protocols. Ideally, management regimes are outlined, and the assumptions underlying the planned management activities are clearly stated. Then, questions of interest are generated with regards to expected outcomes for target species, and potential impacts of the management on other species that may be of conservation concern. Then, (ideally) data can be collected for several years pre- and post-implementation of the management regime. Again, if species occurrence (or possibly density) was the parameter of interest, it may be possible to address this objective within the MSIM program, however, if more specific questions arise, (e.g., the effect of restoration on survival rates of a given species) then a more intensive sampling regime may be required.

Once the data have been collected and analyzed, decisions regarding the effectiveness of the actions studied can be made. Through this process of adaptive management, we can decide whether the action should be continued to be utilized or not. If it has been determined that the action helped the species targeted by the conservation action, then the action could be implemented elsewhere. Should it be determined that the action did not help the species, then that action would most likely not be implemented on other lands.

Adaptive Resource Management

The inventory and monitoring programs and research projects described in this chapter will support efforts to implement this Plan in an Adaptive Resource Management (ARM) framework (Vision Element #3). Figure 7-3 displays the steps in an ARM framework, which are organized into a loop rather than a sequential list. The loop framework helps conservationists conceptualize the process of management as a learning process that informs future management.



1. ASSESS

- Purpose & team
- Scope, vision, & focal values
- Critical threats
- Conservation situation

2. PLAN

- Goals, actions, assumptions, & objectives
- Monitoring plan
- Operational plan

3. IMPLEMENT

- Team structure & process
- Work plan & timeline
- Budget
- Implement plans

4. ANALYZE & ADAPT

- Data preparation
- Analysis
- Adaptation of plans & budgets

5. SHARE

- Documentation of learning
- Sharing learning
- Fostering learning

Figure 7-3. Conservation Measures Partnership's Open Standards for the Practice of Conservation project cycle, version 5.0.

Long Term Effectiveness Monitoring of Conservation Actions

In addition to biological monitoring, monitoring the effectiveness of conservation strategies described within the Plan is an important component of implementation. Tracking the accomplishments of the IWAP so that political and financial support can be maintained is a priority. A system for tracking accomplishments has been developed by DNR. In addition, for Plan Implementation projects funded through the USFWS Office of Conservation Investment, Iowa tracks programmatic accomplishments through the USFWS's system, called Tracking and Reporting Actions for the Conservation of Species (TRACS). It is our current understanding that the TRACS system will continue to maintain a public viewer online for stakeholder review and use.

Having information about what has been accomplished is important, but represents only one component of effectiveness monitoring. A working group formed by The Association of Fish and Wildlife Agencies developed an Effectiveness Measures Framework, which was designed specifically for effectiveness monitoring of projects funded through the State and Tribal Wildlife Grants (SWG) Program. The Effectiveness Measures Framework serves as a very

helpful basis for tracking the effectiveness of all activities undertaken in support of SWAPs. The theoretical basis for the framework lies in the [Open Standards for the Practice of Conservation](#), developed by the [Conservation Measures Partnership](#).

The Effectiveness Measures Framework makes use of *results chains* to display the *theory of change* which links conservation actions through outcomes to ultimate impacts (Figure 7-4). Clearly identifying the theory of change for conservation actions is the key to measuring effectiveness. This is a key component of the Adaptive Resource Management cycle as explained above.

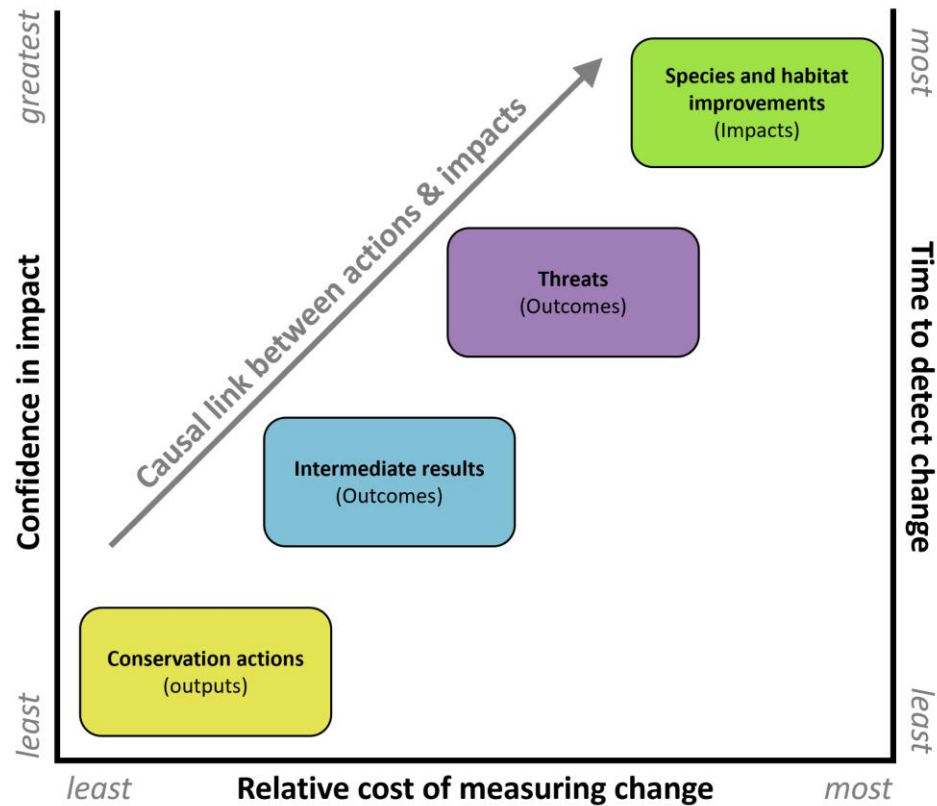


Figure 7-4. Adapted from AFWA (2011) and the Open Standards for the Practice of Conservation. This diagram illustrates the *theory of change* which links conservation actions to impacts.

The theory of change for overall Wildlife Action Plan effectiveness is displayed in Figure 7-5. The ultimate goal of the Plans is to improve the conservation of wildlife and wildlife habitat. The pathways from development of SWAPs to eventual impacts may rely on certain assumptions (e.g., increased funding). Clearly stating assumptions at the outset makes the process of conservation transparent, and allows stakeholders and decision-makers to understand what will be required for the impact to occur. Identifying points along the path that require evaluation facilitates the process of Adaptive Resource Management.

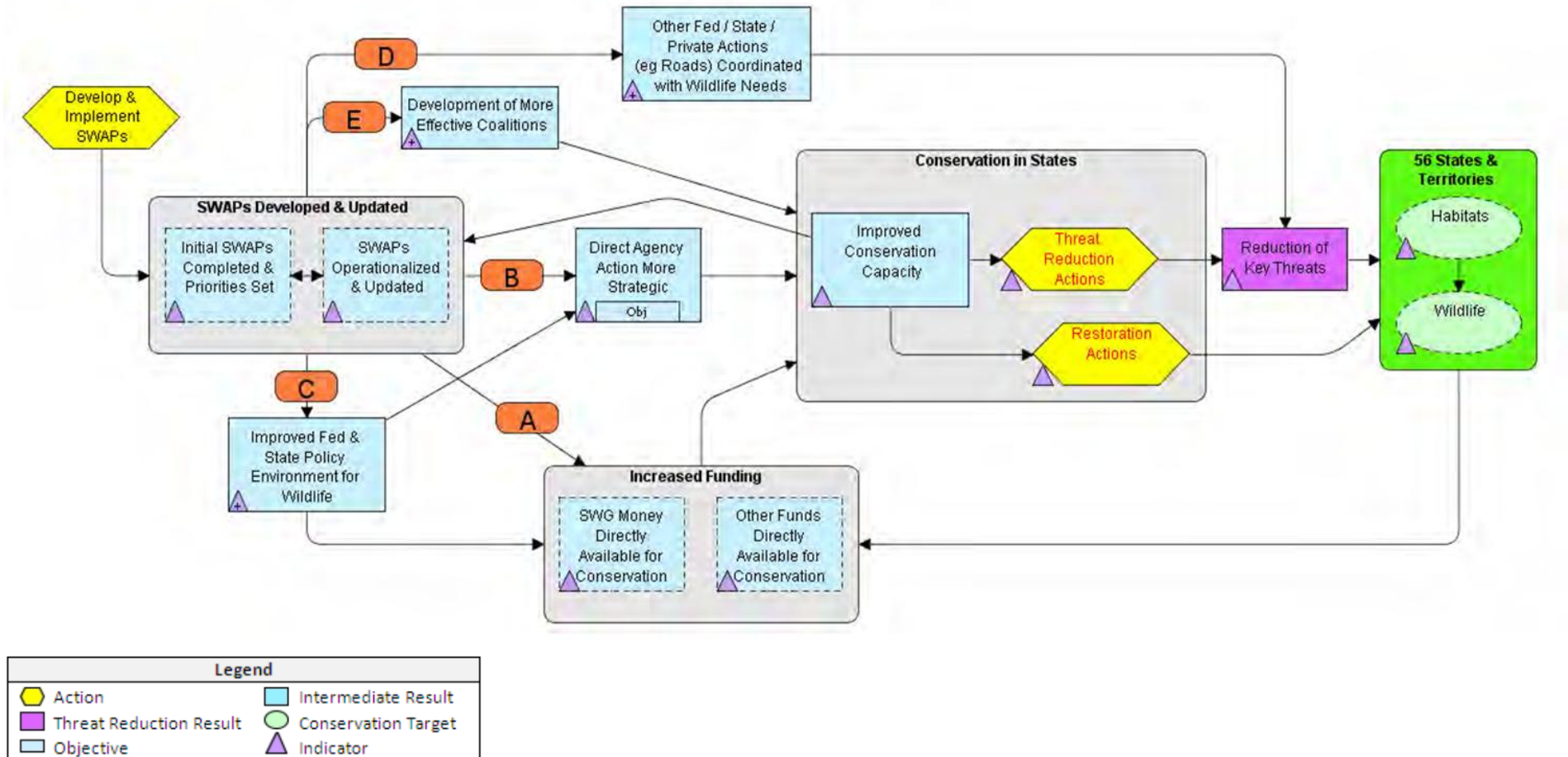


Figure 7-5. Results chain for overall State Wildlife Action Plan effectiveness, from AFWA (2011)

Research Priorities

Statewide distribution and status information is a priority for all SGCN. Additional areas for research continue to be identified as the results of the inventory and monitoring program become available. DNR and other knowledgeable wildlife researchers regularly work together to identify additional priority projects. The initial plan included lists of priority research needs, and progress on addressing these needs has been steady. For this version, the lists of priority research will remain more high-level or strategic to maintain their relevance through the 10-year timeframe of the Plan prior to the next required revision (Table 7-1). Projects carried out to fulfill research needs on the lists should be rigorously designed from a statistical standpoint, and will require collaboration between researchers and wildlife managers.

Adapting Conservation Actions in Response to New Information or Changing Conditions

Iowa will use new information or changing conditions to adapt our conservation actions. When new threats or actions arise, they will be addressed in a manner that is in accordance with this Plan and the approach and steps outlined herein. Periodic meetings of the Implementation Committee and its Working Groups and Subcommittees allow a collaborative approach to addressing changing conditions. At times, an ad-hoc committee may need to be established to work collectively to address a need on behalf of the larger Working Group or Committee.

The ultimate measure of success for the IWAP will be its impact on the wildlife resources of the state. Long term monitoring of all wildlife is necessary to demonstrate the reversal in declining trends of SGCN and to document that common species are remaining common. This can be accomplished only through application of rigorously-designed, long term monitoring programs like the Multiple Species Inventory and Monitoring Program that is currently being used to track the status of Iowa's wildlife resources.

A formal review of the IWAP will be conducted every 10 years as described in Chapter 9. This review includes assessments of the status of wildlife and habitats, whether threats have been resolved or have intensified, and whether the conservation actions identified in the Plan are still the best strategies to mitigate those threats. The review is also an opportunity to gauge the public's acceptance of the IWAP and its achievements.

Table 7-1. Research Needs for implementation of Iowa's Wildlife Action Plan

Topic	Further Description
Taxa-Specific	Life history information, occurrence within Iowa, population trends, habitat associations for species
Examples:	- Moths, terrestrial snails, bees, dragonflies & damselflies - o These taxa need more initial survey work to complete an inventory and establish basic distributions of species within Iowa - o These taxa also need more research to inform population assessment, status, and habitat use of SGCN
	- Data Deficient Species - o Species listed as Data Deficient in all taxonomic groups need initial survey work to complete an inventory and establish basic distributions of species within Iowa - o Population assessment, status, and habitat use information for all Data Deficient Species
	- All SGCN - o Identifying habitat requirements, limiting factors, effective conservation strategies
	- Taxonomic Groups to Potentially Add to IWAP - o Basic information is needed for several taxonomic groups of conservation concern (e.g., additional bee & moth genera, aquatic snails, etc.) - o Within a given taxa, more initial survey work may be needed to complete an inventory and establish basic distributions of species within Iowa
Issue-Specific	Effects of the following items on species occurrence, density, or reproductive success or other demographic factors
Examples:	- Habitat Management - response of both habitat and also species of interest - o Methods or techniques - o Management regimes (i.e., timing, duration, or frequency)

Topic	Further Description
	- Habitat Restoration or New Habitat Projects - o Pre-and-post effects of restoration - for both habitat and species of interest - o Feasibility assessments for species re-introductions or re-locations
	- Landscape Ecology - o Evaluating connectivity between core habitat areas - o Evaluating landscape permeability - o Quantifying ecosystem functioning
	- Land Use - o Renewable energy development - o Farming practices - o Effects of urbanization on species
	- Climate
	- Invasive species
	- Farm bill programs
	- Wildlife diseases
	- Environmental contaminants
Area-Specific	Research or monitoring projects which rely on spatial datasets
Examples:	- Identifying critical habitat components - o Landscape factors affecting species of greatest conservation need (structural features, landscape configurations, and amounts of habitat)
	- GIS and landscape modeling - o Continued predicted species distribution map development - o Assessments of land use and/or land cover change - o Monitoring amount, location, and quality of habitat
Human Dimensions	Sociological research relating to wildlife and wildlife habitat
Examples:	- Sociological research to evaluate Iowan's values, behaviors, or attitudes with regards to wildlife conservation programs - Studies to enhance understanding of patterns of participation in wildlife-associated recreation (e.g., barriers or opportunities to overcome barriers to participation) - Development and improvement of methods for stakeholder engagement

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Chapter Eight

Priorities for Conservation Actions

Required Element #4: Descriptions of conservation actions proposed to conserve the identified species and habitats and priorities for implementing such actions.

In 2005, this Plan was originally conceived to be a 25-year strategic plan. Specific operational priorities are beyond the scope of this Plan. Operational plans that identify shorter-term (1-5 year) priorities for implementing the conservation actions identified in Chapter 6 may be developed by individual entities contributing to the plan, or by IWAP Implementation Committee or its Working Groups or Subcommittees.

For example, using this Plan as a foundation, DNR's Wildlife Bureau developed more specific plans for each of its three sections (Public Lands Wildlife Management, Research, and Private Lands Wildlife Management). This process was valuable in focusing the Bureau's efforts. The process of stepping the IWAP visions and goals into a plan for a specific organization also makes it more explicit how various portions of the organization can most effectively contribute to the realization of the Plan's visions, and how these roles weave together to make an impact.

While this plan does not identify detailed, near-term priorities, this first part of this chapter describes the broad-scale priorities for each of the six Vision Elements, and the second part depicts the geographic priorities of this plan, which culminate in Map 8-25 "High Opportunity Areas for Cooperative Conservation." Iowa needs to continue building a diverse, resilient habitat base to support sustainable wildlife populations. When the IWAP was originally developed, it established habitat protection, restoration and enhancement as the foundation for improving the status of SGCN. At the time, the Plan stressed that at least three general approaches need to be taken:

- 1) Protect and enhance existing habitats that benefit SGCN.** This approach gives priority to areas of the state with existing habitat for SGCN or that can be suitable with habitat enhancements. Areas with the greatest existing species diversity should be targeted, land acquired or permanent conservation easements developed, and the appropriate management plans implemented. This approach is the most cost-effective way to benefit the most species in the short term. But SGCN are declining with the amount of existing habitat available today. Enhancing these habitats may slow the decline in local populations, but in the Steering Committee's view will not by itself reverse statewide or regional declines.

The greatest potential to apply this approach is for SGCN that inhabit wooded habitats and some grasslands. These existing habitats are most abundant in the Driftless Area, the Central Irregular Plains, the Loess Hills, and along the interior river systems (Map 2-1). The Central Irregular Plains, Rolling Loess Prairies, and Steeply Rolling Loess Prairie ecoregions have many acres of mostly cool season grasslands enrolled in the short-term Conservation Reserve Program that could be permanently protected and enhanced to improve habitat for SGCN. Few if any wetlands or wetland-grassland complexes exist in private ownership.

- 2) Develop new habitats for SGCN in areas where these habitats do not exist.** This approach would provide new habitat for SGCN but at a higher cost. Establishing new habitats and restoring populations will extend the range of these species, provide the potential for greater genetic diversity and interaction between populations, and reduce the chances of local population extinctions if travel corridors are also provided. It will also be necessary to meet the recreation goals (50% increase in wildlife-associated recreation in areas near home).

Partnerships between DNR, USFWS, Iowa County Conservation Boards and private conservation organizations have had many successes restoring wildlife habitats on agricultural land. Agricultural lands too steep or too wet for economical farming have been targeted for acquisition or protection, then wetlands and grasslands have been restored or grazed pastures allowed to revert to forest.

Opportunities to restore habitats for SGCN exist statewide. The Des Moines Lobe currently has the greatest

acreage of restored wetland-grassland complexes in the state and nearly unlimited opportunities for further conservation activities. Similar opportunities exist on a more restricted basis in the Loess Prairies and the Eastern Iowa and Minnesota Drift Plains. Riparian wetlands can be restored along most of the interior river systems.

- 3) Improving the status of aquatic SGCN will require a more broadly-applied conservation effort.** Habitat in rivers, streams, lakes, impoundments and wetlands can be improved only if soil erosion, siltation and all the associated problems are reduced (Chapter 5). Targeting areas to protect and restore habitats for terrestrial SGCN will help with this process but will not protect enough land by itself to help all aquatic systems. Vegetative cover must be returned to more of the landscape to hold soil in place. Existing soil-retention programs like terracing, buffer strips and no-till agriculture need to be expanded and new approaches explored to make soil conservation more widely acceptable and financially attractive to the farming community.

Targeting individual watersheds with a comprehensive conservation effort to improve the status of all SGCN and to serve as demonstration areas is the best initial approach to build support for more-widespread efforts. DNR in cooperation with Iowa Department of Agriculture and Land Stewardship (IDALS), Iowa's County Conservation Boards (CCBs), U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS) and Farm Services Agency (FSA), Iowa Soil & Water Conservation Districts, U.S. Environmental Protection Agency (EPA) and local government entities has had success in restoring selected watershed to provide a variety of wildlife, recreational, social and economic benefits to local communities.

A blend of all three approaches will continue to be necessary to accomplish all the goals of the IWAP. The plight of all SGCN in Iowa is caused by the loss of native vegetation from the landscape that provided wildlife habitat and kept soil and associated products out of the waters. Protecting existing habitats is a good strategy to prevent further losses, but it alone will not return SGCN to their former range or raise populations to a viable level. Habitats for SGCN need to be restored in socially acceptable places. Widespread conservation practices will be needed to address water quality issues and are best approached on a watershed basis.

Priorities for Vision Elements

Wildlife Vision

Iowa will have viable wildlife populations that are compatible with modern landscapes and human social tolerance.

Goal 1

Common species will remain common.

Priorities: Continued monitoring will be necessary to detect downward trends in abundance or contractions of area occupied within the State. Current examples of common Iowa species experiencing recent population declines include Common Nighthawk, Chimney Swift, and Tiger Salamander.

The first goal is most likely to be achieved by taking a broad, habitat-based approach to conservation as opposed to highly localized actions targeting specific species. Conservation activities to address the first goal should be directed to regions of the state identified in the map of High Opportunity Areas for Collaborative Conservation (Map 8-25). In these areas there are many opportunities to leverage funding, making each conservation dollar go further.

Goal 2

Populations of SGCN will increase to viable levels

Priorities: To achieve this goal the second approach to habitat protection must be taken - creating new habitats for SGCN through land protection and management and by taking specific conservation actions designed to improve the status of SGCN that need more intensive assistance. This will take a combination of habitat protection, habitat management and scientific inventory and monitoring.

The habitat protection issues are discussed under the habitat vision goals below. The inventory and monitoring issues are discussed in Chapter 7. Once the distribution and abundance of SGCN are more fully understood, conservation actions can be tailored to their recovery. Specific habitat management prescriptions can be defined to assist key species, populations may need translocation to newly created habitats or to isolated tracts of existing habitat, connections may need to be developed between habitat blocks, etc.

Goal 3

The abundance and distribution of wildlife will be balanced with its impact on the economic livelihood and social tolerance of Iowans.

Priorities: Past experience has shown that human social tolerance to wildlife must be cultivated and considered when implementing new conservation actions in a landscape dominated by private land. For example, concentrated populations of white-tailed deer and giant Canada geese have created problems for citizens in some circumstances, precipitating a need for the Wildlife Depredation Program. Wildlife management in Iowa always takes place in the context of relationships and being respectful of neighbors. Examples include managing water levels on public wetlands during periods of heavy rainfall to reduce the risk of flooding on adjacent private lands and notifying local residents in advance of prescribed burns. Potential issues need to be considered when implementing the conservation actions outlined in this Plan and steps taken to minimize impacts on neighboring landowners.

Research on Iowa's Wildlife Value Orientations (WVO) and tolerances for certain species and conservation actions was conducted in 2012-2013 (Stephenson et al. 2013). Iowa's WVOs were assessed again in 2018 (Dietsch et al. 2018). Periodic follow-up on this project to track trends or changes in Iowa's WVOs and to address specific issues of current relevance would be helpful in achieving this goal.

Habitat Vision

Iowa will have healthy ecosystems that incorporate diverse, native habitats capable of sustaining viable wildlife populations.

Goal 1

By 2030, the amount of permanently protected wildlife habitat in Iowa will be doubled.

Priorities: Coordination with other wildlife and biodiversity conservation plans prepared by natural resource agencies and private conservation organizations should continue to be a high priority. Prioritization criteria used by these organizations differ and may include different classes of species or different regional boundaries. Their cumulative site priorities are important in identifying significant locations for future habitat protection actions through partnerships (Map 8-3 through Map 8-24).

In the past, land acquisition efforts in Iowa were directed at purchasing the highest quality habitats available at the time funds were available. Too frequently this resulted in scattered small tracts of land that provided limited opportunity for biodiversity management, had little connectivity, and were difficult to manage logistically. Habitat blocks were too small to manage for more than one habitat class (e.g. grasslands or forest) on the area. If multi-species management was attempted the resulting habitat patches were too small to attract area-sensitive species. The Neal Smith National Wildlife Refuge is a notable example of a large-scale restoration (by Iowa standards) that is attempting to establish a functional tallgrass prairie ecosystem.

Since the 1980's habitat acquisitions have focused on the eventual development of major conservation areas of 3,000 - 5,000 acres in more or less continuous blocks. Experience has shown that areas of this size allow management for biodiversity between habitat classes and provide the ability to manage for multiple successional stages within one habitat class. This approach benefits multiple SGCN that need different successional stages on the same site or single species whose habitat needs change throughout the year. It also benefits game species that typically are more abundant in early successional stages as well as nongame. Partners In Flight has adopted a similar approach in designing Bird Conservation Areas, an initiative which Iowa has been implementing since 2001.

Expanding existing large core conservation areas to the desired size should be given priority over work in smaller areas. Map 8-2 shows the location of existing habitat complexes of 2,000 acres or larger that are in public ownership that could reach the 3,000-acre threshold with comparative ease. These are permanently protected conservation lands owned by DNR, county conservation boards, the federal government (U.S. Fish and Wildlife Service - National Wildlife Refuges and Waterfowl Production Areas, U.S. Army Corps of Engineers), The Nature Conservancy, Iowa Natural Heritage Foundation or protected under long-term federal wetland easements.

Land (or funding) is seldom available for acquisition in blocks of this size, so initial purchases in a new geographical area should be screened for expansion potential. Conservationists working in target areas to acquire large tracts must exhibit patience. State government in Iowa relies on willing sellers to acquire or protect land. Projects of this size can take a decade or longer to complete.

Map 8-2 also shows extensive areas of the state that do not have core habitat blocks to meet the habitat or recreation goals of this Plan. The Loess Prairies, Steeply Rolling Loess Prairies, and west-central portion of the Des Moines Lobe ecoregions are notably devoid of these areas, as is the northern third of the Eastern Iowa & Minnesota Drift Plains ecoregion. Smaller geographic areas without permanently protected conservation lands can be found in all the other ecoregions as well.

Not all habitat protection efforts can be vested in acquiring large core blocks of habitat. Once the distribution of more SGCN is better understood, key smaller tracts of habitat may be identified that are required for the protection of exceptionally imperiled SGCN. Connectivity needs to be established between large core areas that are isolated from other tracts. A more dispersed approach may be needed to protect target watersheds and aquatic SGCN rather than concentrating efforts in one location. These decisions need to be made on a case-by-case basis.

Goal 2

Protected habitats will be diverse, representative, native plant communities in large and small blocks on public and privately-owned land and waters.

Priorities: While most terrestrial and aquatic habitat classes occur in every region of the state, certain habitat classes were historically more prevalent in specific landforms. Habitat-oriented conservation actions aimed at SGCN should primarily protect, restore, and enhance native habitats and native SGCN. Priority habitat classes by region are shown in Table 8-1.

Habitat protection and management decision-makers, however, must be realistic in assessing changes that have occurred since pre-settlement times. Many native habitats have been displaced from their original sites. Habitat reconstruction or restoration activities should be focused in areas with the most potential for successful reestablishment of ecosystem processes and maintenance of ecosystem function.

Table 8-1. Priority habitat classes by ecoregion

PRIORITY HABITAT CLASSES		
ECOREGION	TERRESTRIAL	AQUATIC
40a. Loess Flats and Till Plains	• Savanna • Grasslands • Shrublands	• Rivers • Streams • Ponds • Lakes (constructed)
47a. Northwest Iowa Loess Prairies	• Grasslands • Wetlands	• Streams
47b. Des Moines Lobe	• Grasslands • Wetlands • Riparian Forest • Savanna	• Rivers • Oxbows

PRIORITY HABITAT CLASSES		
ECOREGION	TERRESTRIAL	AQUATIC
47c. Eastern Iowa and Minnesota Drift Plains	- Grasslands - Wetlands - Riparian Forest	- Rivers - Streams (cold, cool or warm water)
47d. Missouri Alluvial Plain	Forest	- Missouri River Channel - Oxbows
47e. Steeply Rolling Loess Prairies	- Grasslands - Shrublands - Savanna	- Rivers - Streams - Ponds
47f. Rolling Loess Prairies	- Grasslands - Shrublands - Savanna	- Rivers - Streams - Ponds - Lakes (constructed)
47m. Western Loess Hills	- Grasslands (northern 1/3) - Woodlands (southern 2/3) - Savanna	Streams
52b. Paleozoic Plateau/ Coulee Section	- Open Woodland - Grassland - Forest	- Coldwater Streams - Rivers - Backwaters
52c. Rochester/ Paleozoic Plateau Upland	- Goat Prairie - Deciduous Forests - Open Woodland	Coldwater Streams
72d. Upper Mississippi Alluvial Plain	Riparian Forest	- Rivers - Backwaters

Management Vision

Diverse wildlife communities will be developed on public and private lands and waters through the use of adaptive ecological management principles.

Goal 1

Wildlife management will be based on science.

Priorities: Strategies within this vision stress educated partners working together. The following elements are key to the success of this goal.

- Conservation actions adopted as part of the IWAP should be based on the best available science. Research, inventory, survey, and monitoring needs for SGCN are identified in Chapter 7.
- Prior to implementation of management actions, the purpose, intended outcomes, and assumptions underlying the actions should be made explicit, and the possibility for evaluation of the action in an Adaptive Resource Management framework should be explored.
- Better communication must be developed between wildlife scientists, the staff of government land management agencies at all levels, public land managers, and private landowners to assure that an adaptive approach is built into land management decisions.

Recreation Vision

More lowans will participate in wildlife-associated recreation, and all lowans will have access to publicly owned recreation areas to enjoy wildlife in its many forms.

Goal 1

The number of lowans participating in wildlife-associated recreation (wildlife viewing, hunting, fishing, photography, hiking, outdoor classrooms, etc.) will increase 50 percent by 2030.

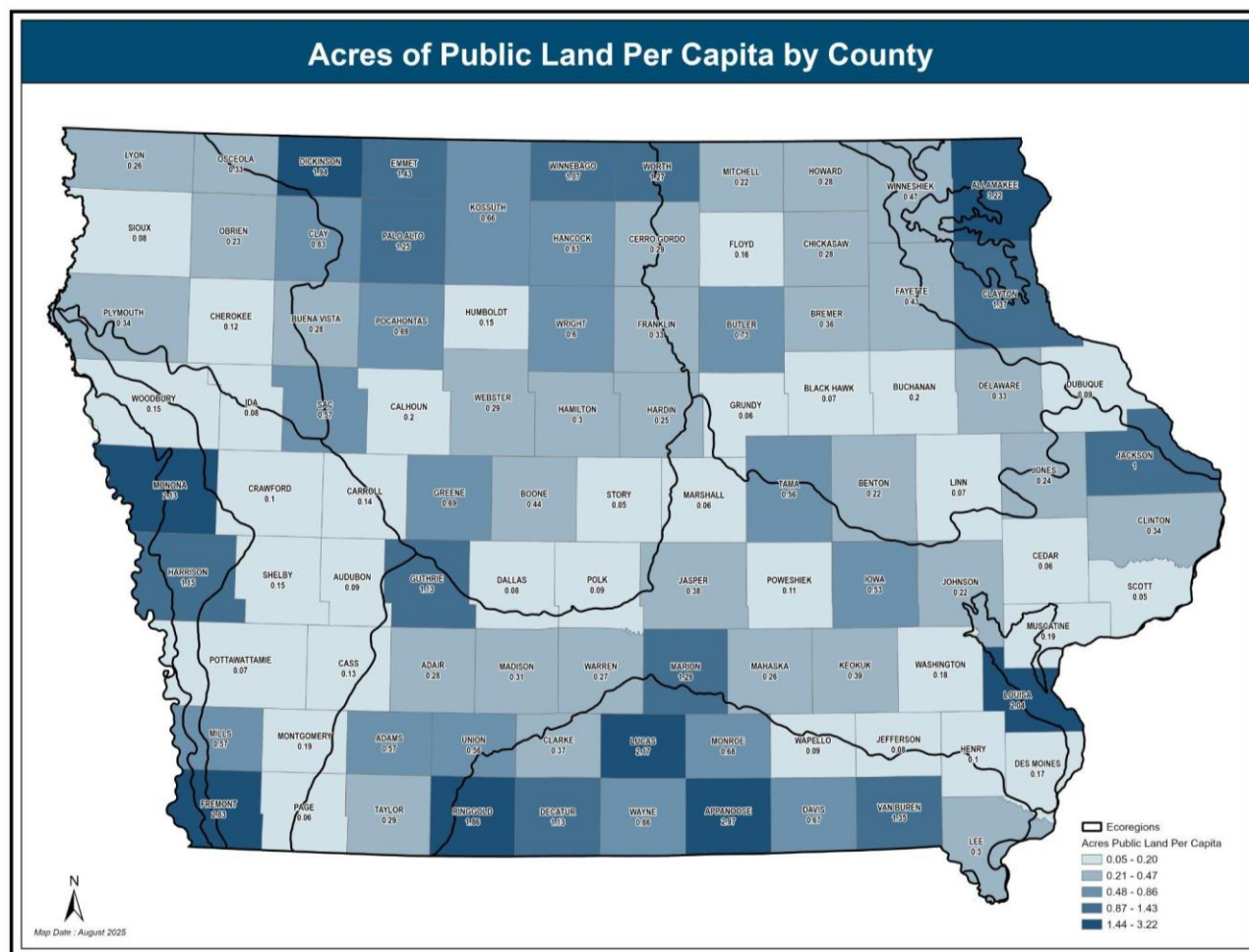
Priority: A broad and expanded base of support is needed to help ensure that wildlife and habitat management and protection efforts receive adequate attention and investment. A 2022 survey of lowans indicates high rates of participation in outdoor recreation, and even higher rates of interest in future participation. Wildlife-associated recreation plays a significant role, with over 1 million anglers, over 433,000 hunters, and nearly 842,000 people travelling to view wildlife. The survey also shows that birdwatching and wildlife photography are popular with lowans (Responsive Management 2022). Continued development and expansion of opportunities and resources for wildlife-associated recreation, combined with efforts to engage specific audiences will be critical.

Goal 2

Wildlife-associated recreation will be available to all lowans on public lands near their home.

Priority: In a culture where time for leisure activities is limited, new participants in wildlife -associated recreation will need to find public lands on which to recreate close to home. While all lowans deserve access to quality natural areas, the first priority should be given to acquiring and protecting public natural areas close to larger population centers. This will create an appreciation for wildlife-associated recreation among the greatest number of citizens in the early stages of the 25-year effort and generate support needed for completing the Plan. The current spatial arrangement of conservation lands relative to population centers are displayed below (Map 8-1). The distribution of existing public lands is shown in Map 8-23.

Map 8-1. Distribution of Iowa's public land in relation to county population size



Education Vision

Iowans will respect wildlife for its many values and they will advocate effectively for conservation of wildlife and wildlife habitats.

Goal 1

Iowans will understand the relationships of:

- Land use, and its impacts on wildlife diversity and abundance
- land use, and its impacts on quality of life for all citizens
- land use, and its impacts on Iowa's economic sectors related to wildlife recreation
- wildlife diversity & abundance, and its impacts on quality of life in Iowa
- wildlife diversity & abundance, and its impacts on Iowa's economy
- quality of life for all citizens, and its impacts on Iowa's economy
- Iowa's economic decisions and their impacts on wildlife-based contributions to quality of life for all citizens
- Iowa's economic decisions and their impacts on wildlife diversity & abundance

Priorities: The conservation actions proposed to implement this vision incorporate national standards proposed by the Association of Fish and Wildlife Agencies. The relationships among the health of Iowa's lands and waters and its human and wildlife communities are complex and dynamic. Therefore, it will be important to continue efforts to coordinate with other sectors (e.g., education, tourism, economic development, regional planning, and public health organizations) in the development of conservation education programs and messages.

Funding Vision

Stable, permanent funding will be dedicated to the management of wildlife at a level adequate to achieve the visions of this plan.

Goal 1

Government (Federal, State, and County) and private conservation spending will be increased so that the goals of this Plan are reached by 2030.

Goal 2

Funding will be dependable, secure, and appreciated as a powerful economic and social investment.

Priorities: Of the six vision statements, reaching the Funding Vision goal is the highest priority, as none of the other visions can be realized in anything near the 25-year time frame without increased funding. An estimate of the costs and benefits for implementing the IWAP is included in Chapter 10.

No single conservation organization or stakeholder group has the power to attain the necessary funding on their own. A broad effort, inclusive of all potential stakeholders will be necessary. A grass roots coalition of wildlife enthusiasts of all types - birdwatchers, bird feeders, hikers, back packers, hunters, anglers, photographers, etc. - is a start, but it should also include local government leaders whose communities stand to benefit from increased recreation revenues and improved quality of life. Only a broad-based coalition will have the strength necessary to obtain a sustainable, dedicated federal funding stream for all-wildlife conservation.

At the Federal level, Congress must act to supply basic funding to the states equivalent to the \$1.3 billion targeted in the Recovering America's Wildlife Act. Funding at the state level will be essential to obtain whatever level of non-Federal matching funds will be mandated by Congress.

Geographic Priorities

Map 8-2 through Map 8-24 represent a broad array of wildlife and biodiversity plans, programs and priority areas prepared by natural resource entities. Map 8-25 displays a combination of these priorities. If the areas displayed as priorities in Map 8-25 could be conserved or restored such that they functioned as healthy ecosystems with intact ecosystem functioning, then we might expect that the visions of this Plan had been achieved: Iowa would have

sustainable, connected networks of healthy, resilient, ecosystems to sustain viable wildlife populations and to provide accessible recreation opportunities and enjoyment for all.

The purpose of displaying geographic priorities is also more practical than simply depicting a grand vision of one potential scenario for Iowa's future. Map 8-25 and the maps that comprise it are used in a variety of ways to inform the design and delivery of conservation programs. Conservation organizations use the map to determine where to pursue conservation projects with partners and most effectively leverage their limited dollars. Granting entities use the map to delineate priority areas for wildlife conservation work. Transportation or utility development planners can use the map to help them identify areas of importance to wildlife to avoid disturbance, or areas that would be good candidates for mitigation in the event of disturbance to wildlife or habitat elsewhere.

Geographic Priority Layer Name	
Existing protected land complexes of 2,000 acres or larger	Map 8-2
Prairie Pothole Joint Venture Priority Wetland Complexes	Map 8-3
Landowner Incentive Program Site Priorities	Map 8-4
The Nature Conservancy's Priority Areas within Iowa	Map 8-5
Bird Conservation Areas	Map 8-6
Priority Amphibian and Reptile Conservation Areas	Map 8-7
Iowa Audubon's Important Bird Areas	Map 8-8
Designated & Proposed Critical Habitat for Federally Listed Species	Map 8-9
Ducks Unlimited Priority Areas	Map 8-10
Natural Resources Conservation Service Wetland Easements	Map 8-11
Watersheds with Coldwater Streams	Map 8-12
Priority Shallow Lakes	Map 8-13
Iowa Natural Heritage Foundation Priorities	Map 8-14
Lakes Restoration Program Priority Lakes Watersheds	Map 8-15
Habitat conservation priorities identified by Wildlife Bureau field staff	Map 8-16
Savanna Restoration Potential	Map 8-17
Forest Stewardship Potential	Map 8-18
Greater Prairie-chicken Predicted Habitat	Map 8-19
U.S. Army Corps of Engineers Sustainable Rivers Program	Map 8-20
Mapped Prairies	Map 8-21
Northern Tallgrass Prairie Focal Areas	Map 8-22
Existing Conservation and Recreation Lands	Map 8-23
Grassland Bird Conservation Priorities	Map 8-24
High Opportunity Areas for Cooperative Conservation Actions	Map 8-25

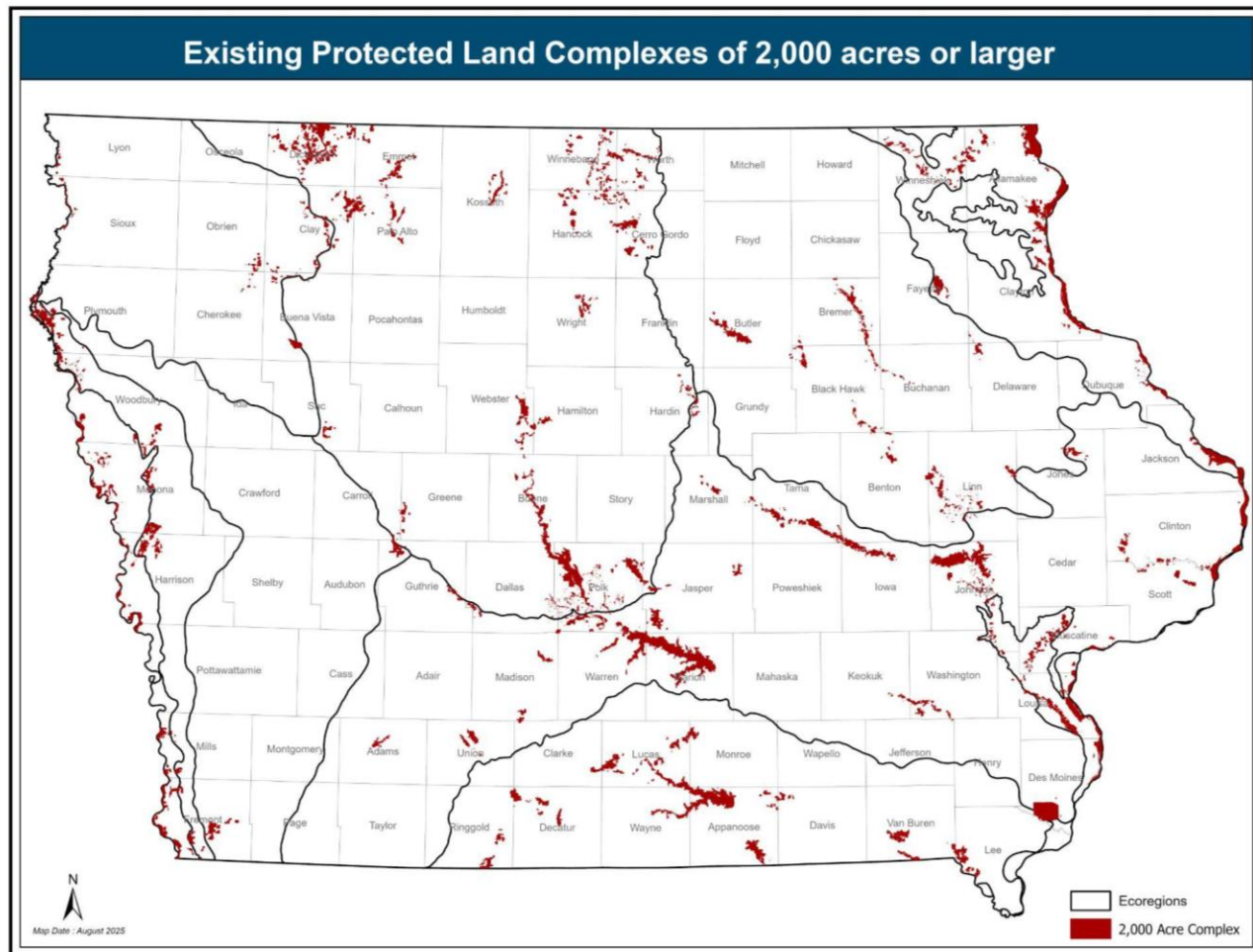
Process for Geographic Priority Map Updates or Changes

Because the IWAP is designed to serve as a living document that strategically guides conservation efforts across many sectors and entities, it is most useful when the information within the Plan is up to date. For this reason, occasional updates and/or corrections to layers that are presented below will likely be necessary prior to the next IWAP revision. For example, as additional Bird Conservation Areas are designated or shallow lake restoration priorities are updated, the associated map may be updated and corrected in the shapefiles that underlie Map 8-25. As such corrections or updates occur subsequent requests for the electronic shapefiles will contain the updated maps.

If, at a point prior to the next IWAP comprehensive review and revision, the Implementation Committee or its Working Groups decide that a full review of geographic priorities is warranted, then that review process will be coordinated by

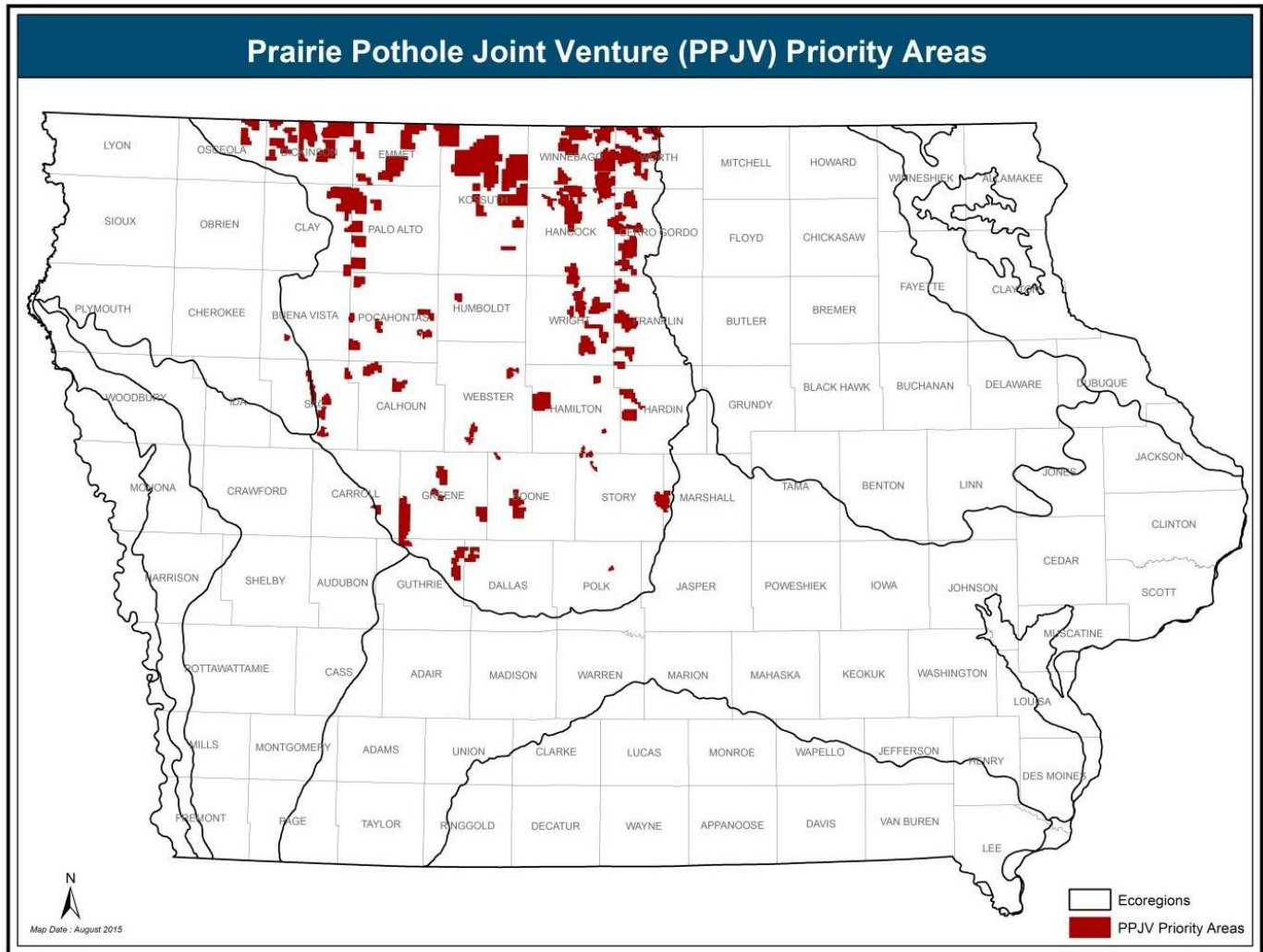
the Habitat Working Group, and will be submitted as a minor or major revision to the U.S. Fish and Wildlife Service for approval.

Map 8-2. Existing protected land complexes of 2,000 acres or larger



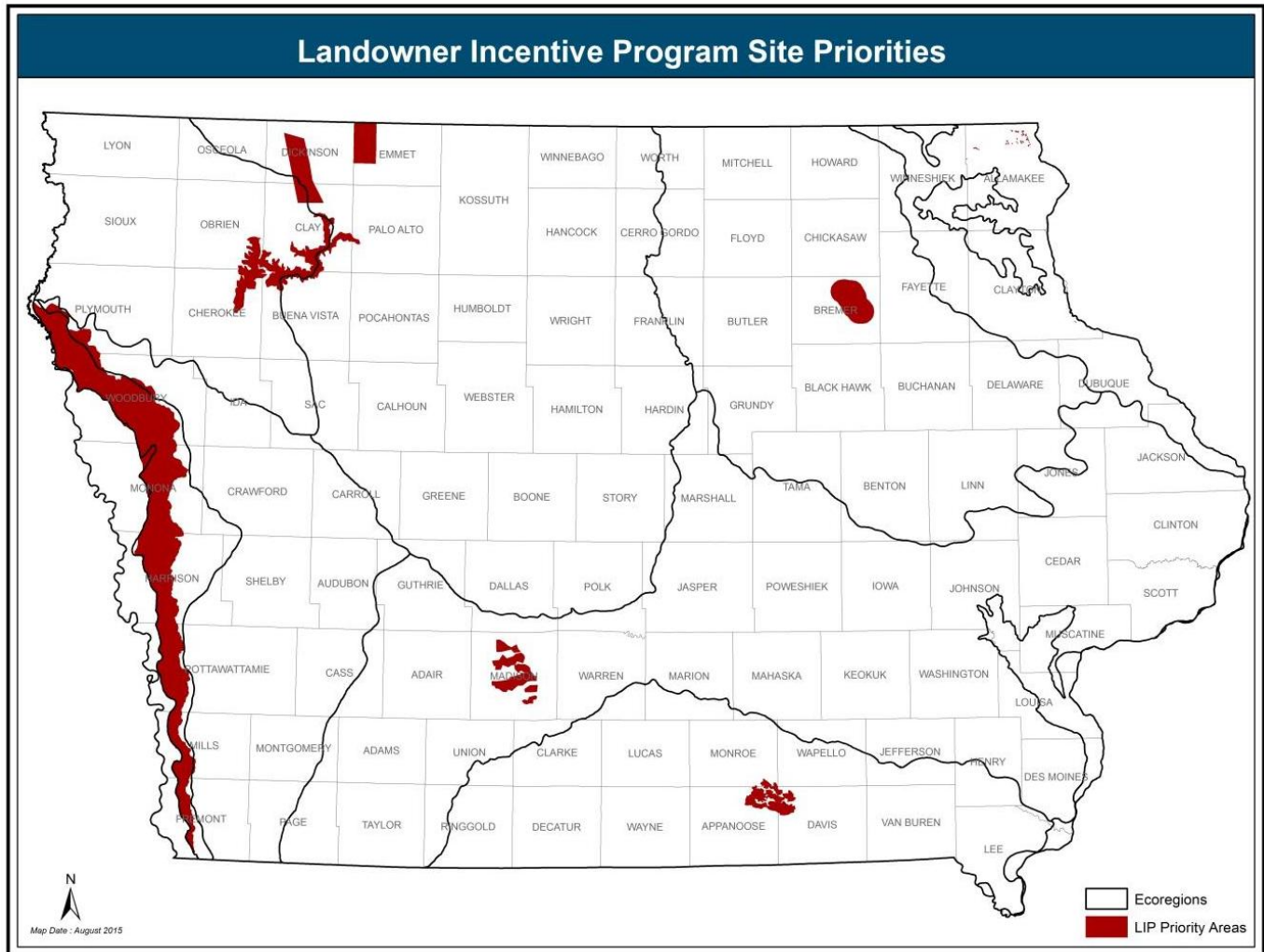
Map 8-3. Prairie Pothole Joint Venture Priority Wetland Complexes

The Prairie Pothole Joint Venture of the North American Waterfowl Management Plan is an effort by government agencies and conservation organizations to protect and restore waterfowl habitat within the Prairie Pothole Region of the United States and Canada. Existing and restorable wetland complexes within the Prairie Pothole Region of Iowa have been identified and are shown below. Although initially targeted at waterfowl species, emphasis within the Prairie Pothole joint Venture has been extended to nongame species as well. Research sponsored by DNR and Iowa State University has demonstrated that a variety of birds and other SGCN have successfully re-colonized these restored habitats.



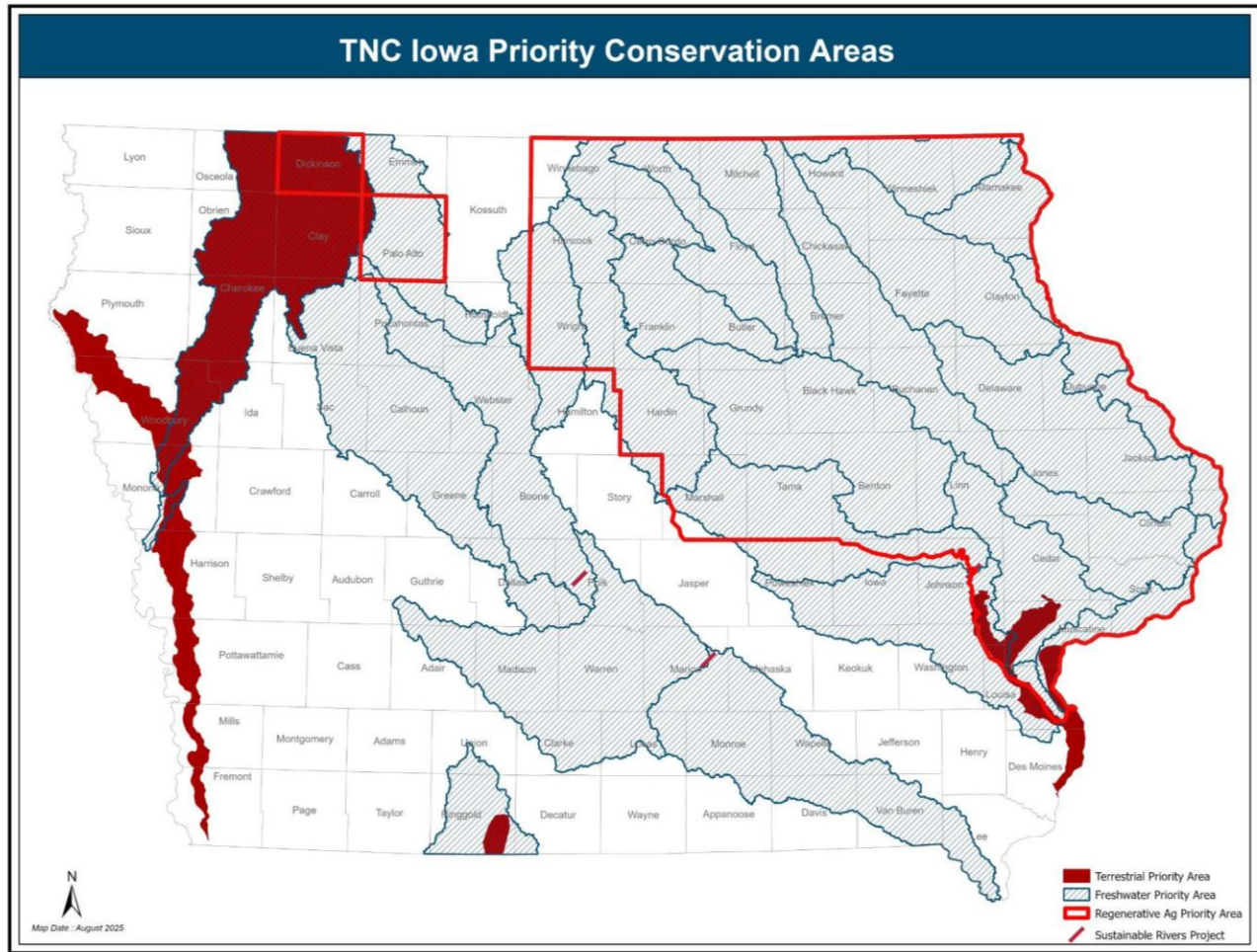
Map 8-4. Landowner Incentive Program Site Priorities

The Landowner Incentive Program (LIP) was designed to protect and restore habitat for state and federally listed endangered and threatened plant and animal species on private lands. The program provided financial incentives and educational materials to private landowners willing to participate in the program. Scientists knowledgeable about Iowa's Threatened and Endangered species established site priorities. The identified sites include known and potential habitats for endangered and threatened species. Although LIP was discontinued and program work was completed in Iowa in 2010, this map layer is considered important in determining current and future Wildlife Action Plan priorities, because habitat work in these areas would benefit listed species and those SGCN that utilize similar habitats. For this map, LIP priorities which are now encompassed by other priority layers (e.g., Topeka Shiner Critical Habitat, BCAs, ARCA) have been removed to reduce duplication.



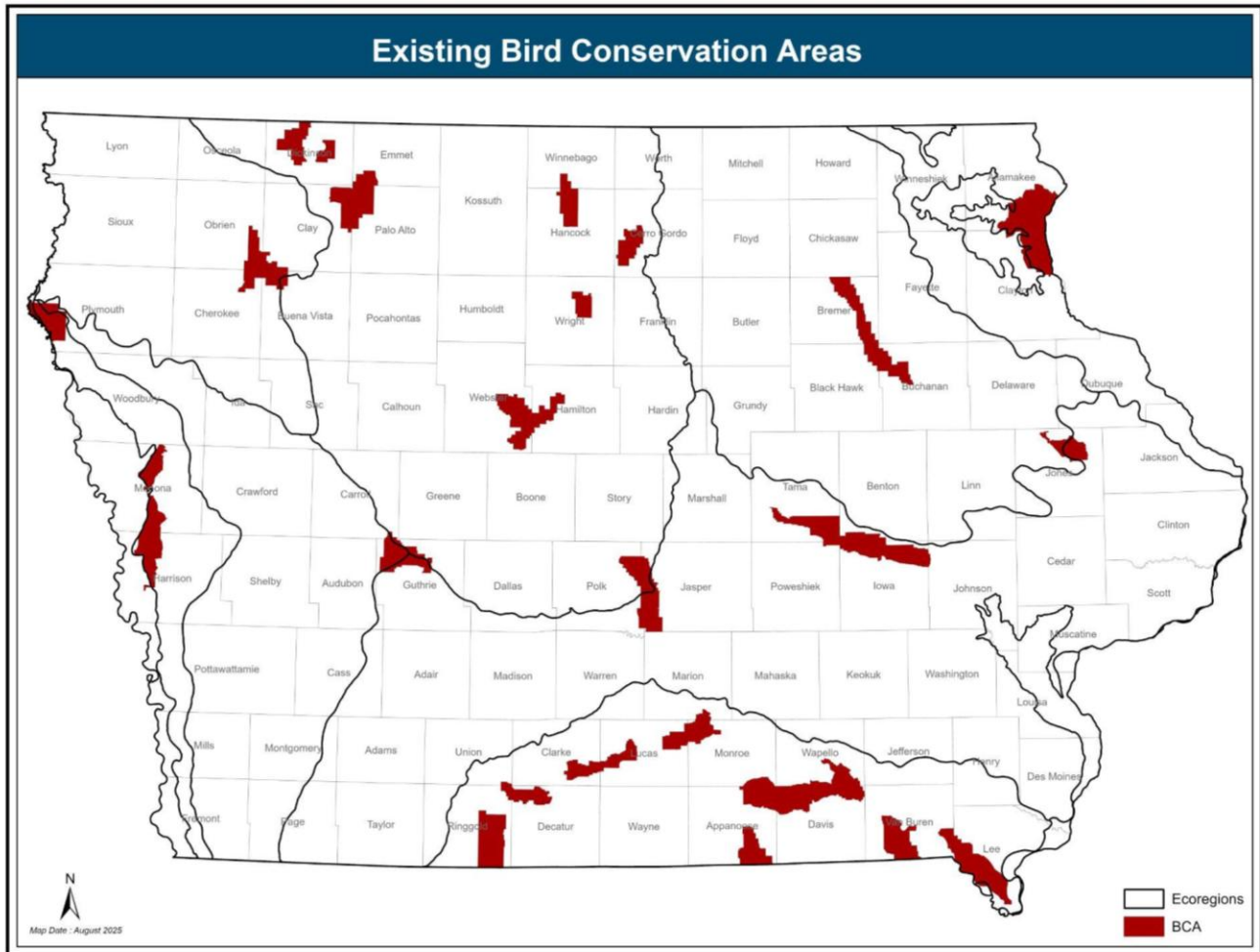
Map 8-5. The Nature Conservancy's Priority Areas within Iowa

This map reflects the terrestrial, freshwater, and regenerative agriculture priority areas of The Nature Conservancy.



Map 8-6. Bird Conservation Areas

Bird Conservation Areas have been designated by DNR as significant habitat complexes for birds generally following guidelines established by Partners in Flight. They are areas of 10,000 acres or more made up of a core area of permanently protected natural habitat surrounded by a matrix of public and private natural lands. This concept is backed by research that suggests viable bird populations require conservation efforts at a landscape-oriented level. While targeted specifically at birds, large tracts of natural habitat such as these have been identified throughout this Plan as providing significant habitat protection and restoration potential for SGCN.

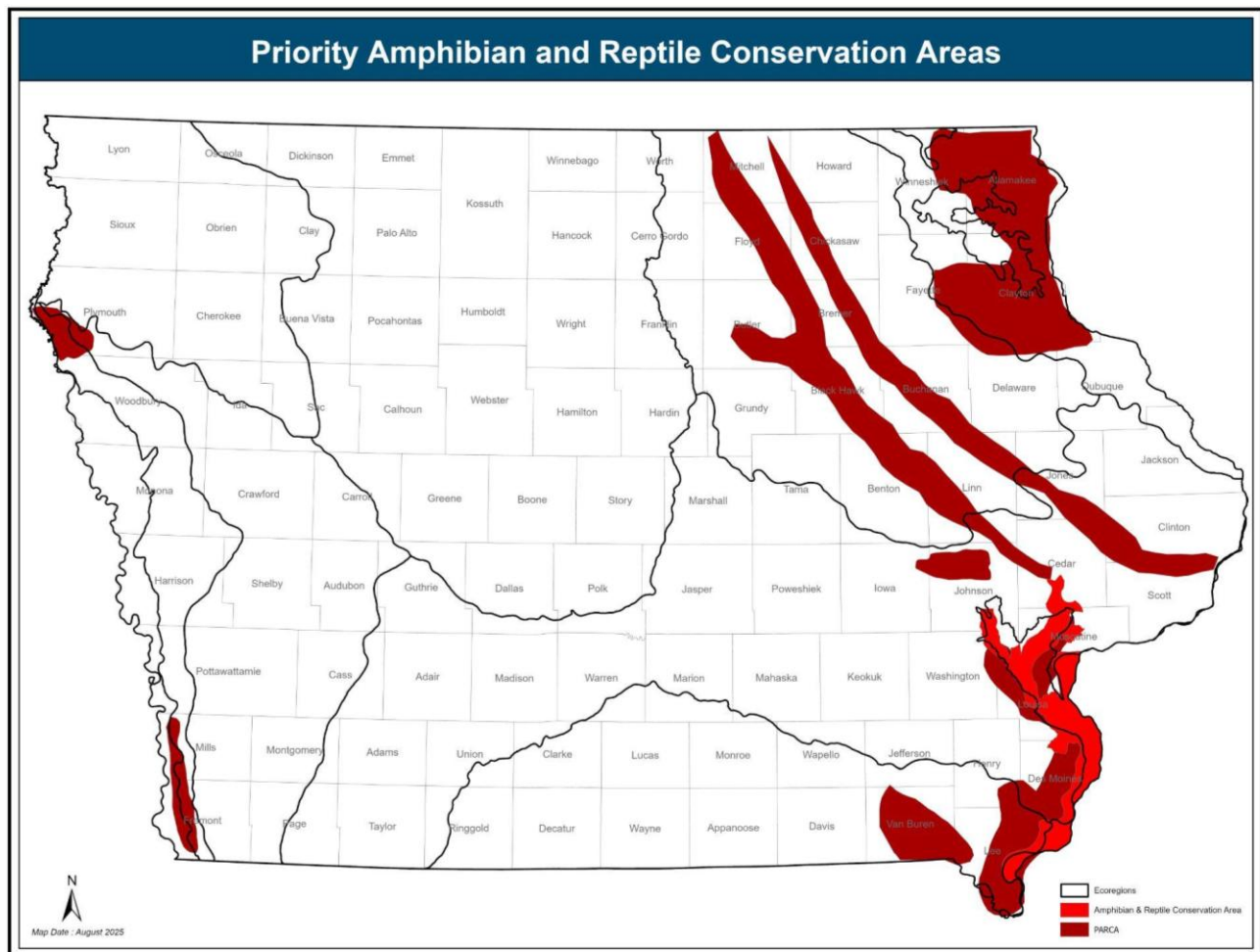


Map 8-7. Priority Amphibian and Reptile Conservation Areas

This map depicts priorities established to benefit reptiles and amphibians through two separate processes.

Priority Amphibian and Reptile Conservation Areas (PARCAs) are areas of high conservation value for amphibians and reptiles, collectively referred to as herpetofauna. Partners in Amphibian and Reptile Conservation (PARC) developed criteria to identify PARCAs and hosted state-level workshops with herpetologists across the nation to identify PARCAs to prioritize the most viable populations of rare reptiles and amphibians. Iowa's PARCAs were identified in 2017.

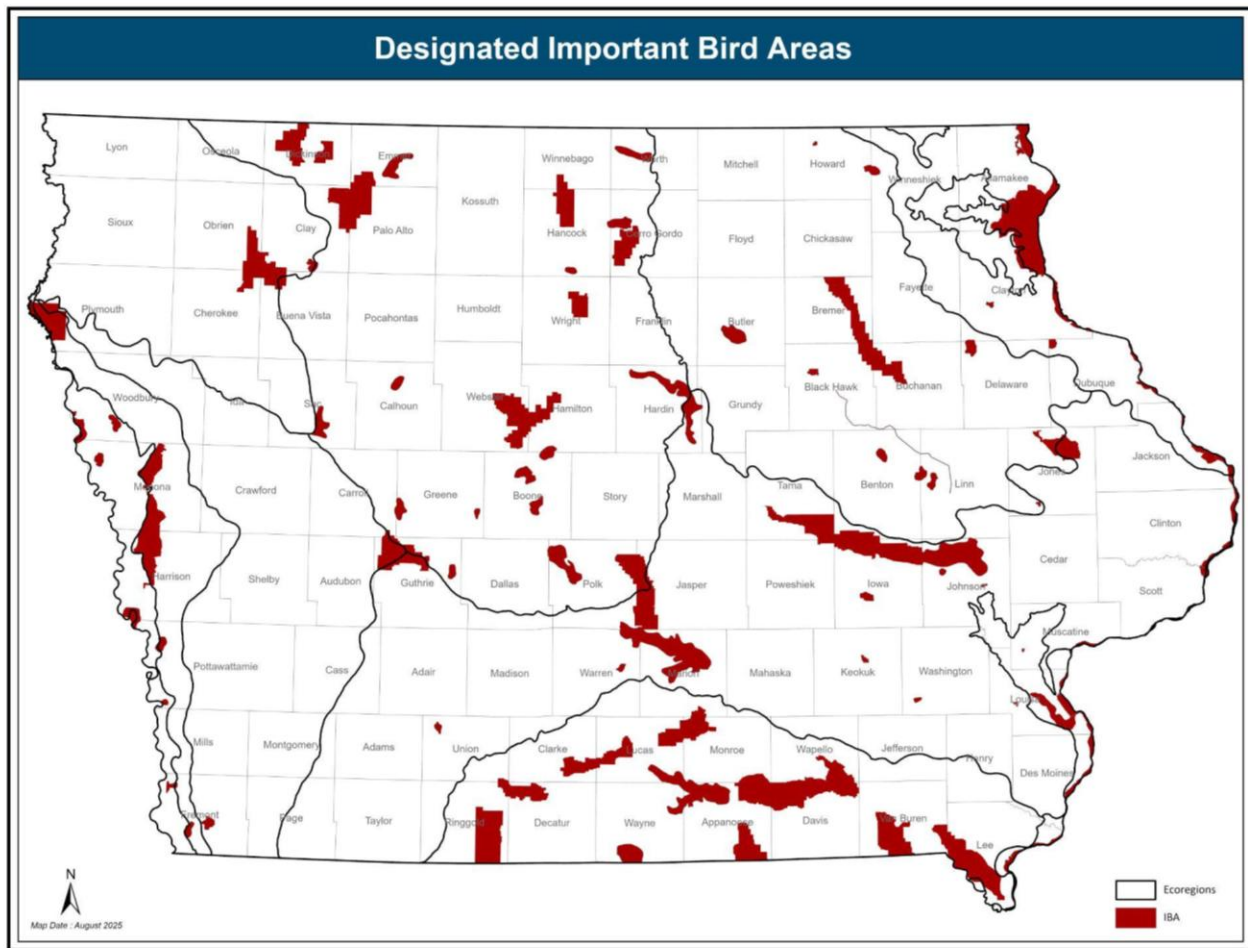
Iowa dedicated the nation's first-ever Amphibian and Reptile Conservation Area (ARCA) in 2007. The Southeast Iowa Amphibian and Reptile Conservation Area (ARCA) includes public and private lands in Iowa's Mississippi Alluvial Plain. Modeled on the Bird Conservation Area concept (Map 8-6) it spans approximately 470,000 acres. The area's diverse features - including riverbeds, grasslands, rock outcrops, streams, ponds and ephemeral wetlands - provide habitat for many species.



Map 8-8. Iowa Audubon's Important Bird Areas

Iowa Audubon's Important Bird Areas (IBA) Program is a citizen-led, science-based and data-driven bird conservation initiative. Phase I of this long-term effort is the identification, recognition and prioritization of habitats that support the most seriously declining species of birds. A State IBA Technical Committee evaluated all data received on a habitat-by-habitat basis, and then voted to confer IBA recognition when criteria were met. Habitats that meet criteria are considered to be the most essential habitats.

Phase 2 of the IBA Program is long-term monitoring of bird populations and habitat conditions, and organizing education programs at designated IBA sites where appropriate. Phase 3 is working with landowners and land managers to develop and implement long-term conservation plans to protect, restore, enhance and manage IBAs according to their environmental threats and conservation needs.

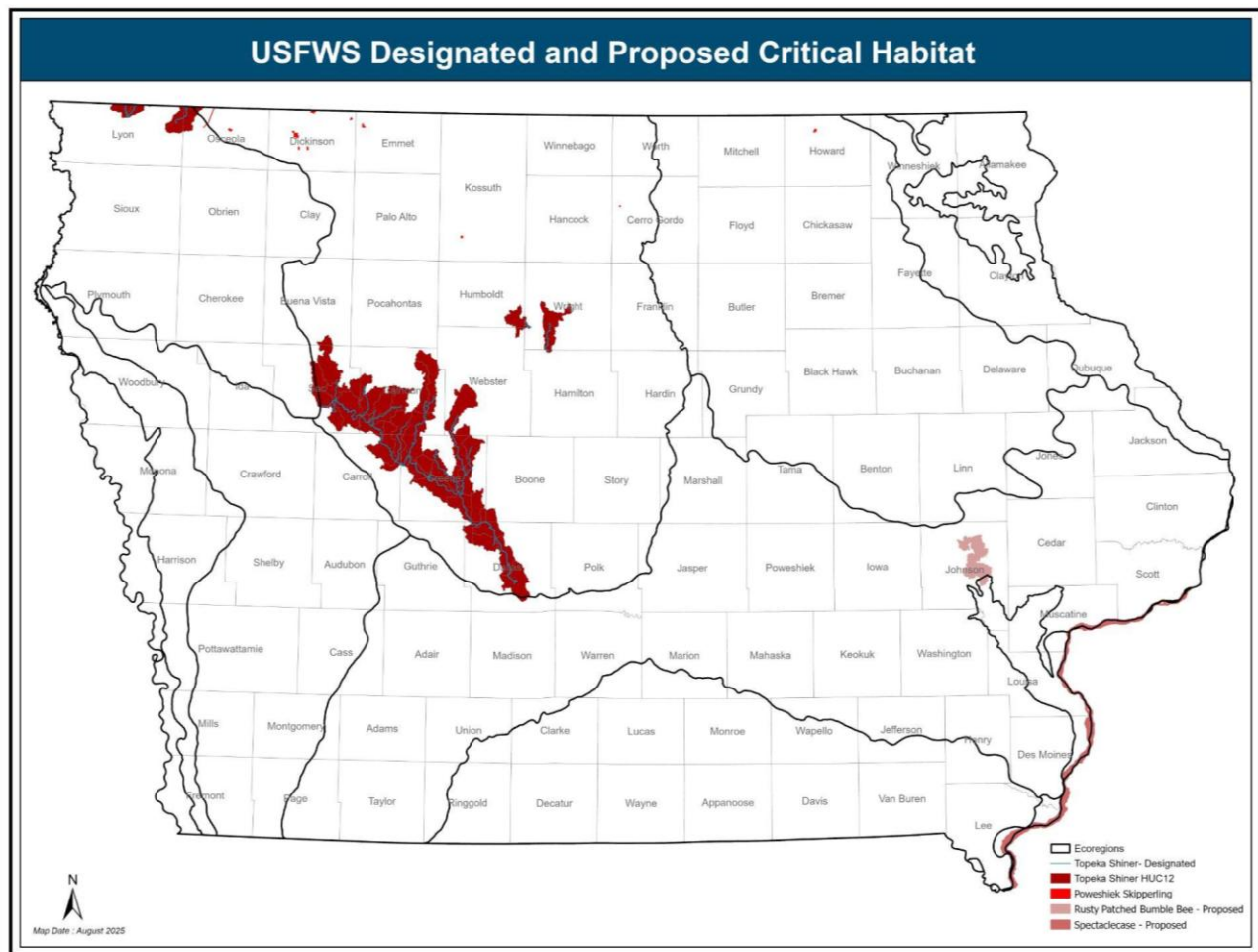


Map 8-9. Designated & Proposed Critical Habitat for Federally Listed Species

The Topeka Shiner, *Notropis topeka*, is a federally endangered species of minnow. This map shows designated critical habitat for Topeka Shiners in Iowa. The Poweshiek Skipperling (*Oarisma Poweshiek*) is a federally endangered species of butterfly. This map displays designated critical habitat for Poweshiek Skipperlings in Iowa. The Rusty Patched Bumble Bee is a federally endangered species. This map shows areas that have been proposed for designation as critical habitat for Rusty Patched Bumble Bees. The Spectaclecase is a federally endangered species of freshwater mussel. This map shows areas proposed for designation as critical habitat for the Spectaclecase.

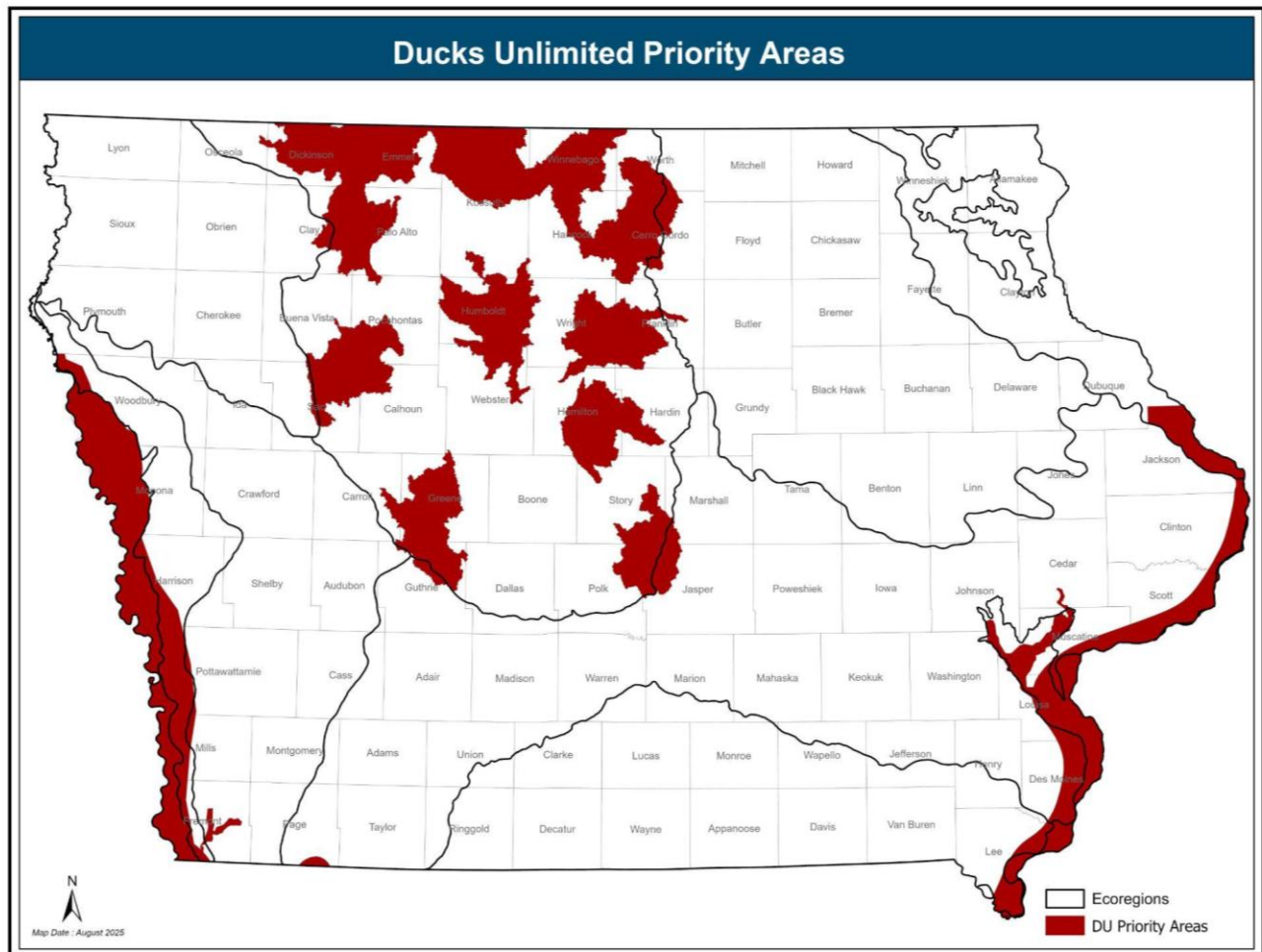
This habitat is essential for the conservation of these two species and may require special management and protection.

An area is designated as critical habitat through the federal regulatory process. The designation does not set up a preserve or refuge and has no specific regulatory impact on landowners' actions on lands that do not involve federal agency funds, authorization, or permits. Although this map displays critical habitat for only four species, it can be used to help set priorities for conservation actions in those parts of the state.



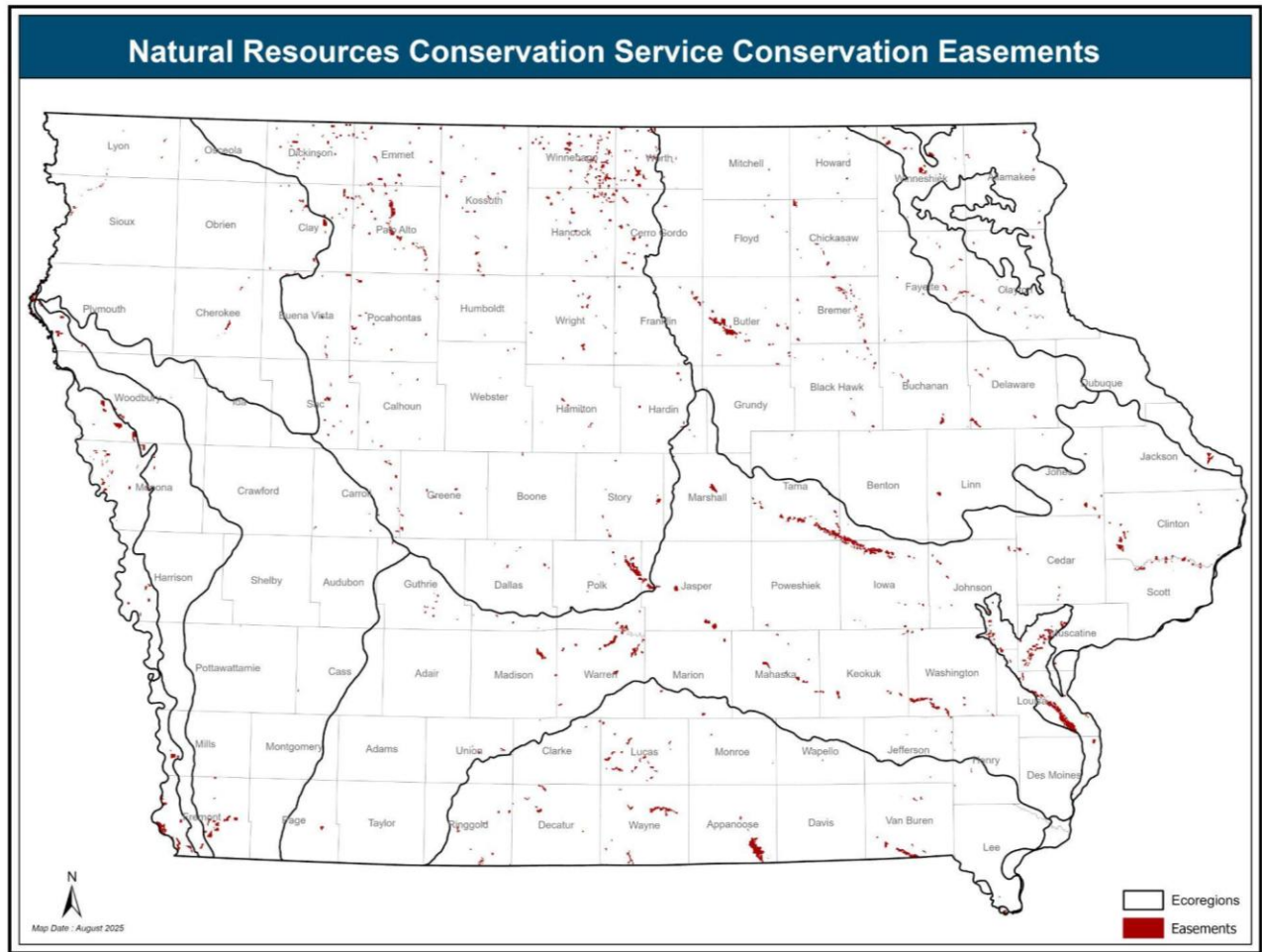
Map 8-10. Ducks Unlimited Priority Areas

Priority areas for Ducks Unlimited identify areas that are critical for migratory waterfowl, including both areas on Iowa's border rivers as well as areas in the Prairie Pothole region. Ducks Unlimited's Living Lakes Initiative Emphasis Areas represent an effort to provide high-quality feeding and resting areas for migratory birds as they cross the intensively farmed Des Moines Lobe. Research suggests migrating waterfowl can lose weight as they cross the Upper Midwest because of the lack of adequate food and consequently arrive on their Canadian breeding grounds in poor condition for nesting. This initiative works to provide 3,000 - 5,000-acre wetland complexes at less than 75-mile intervals so that birds can move at a more leisurely pace and maintain their body condition.



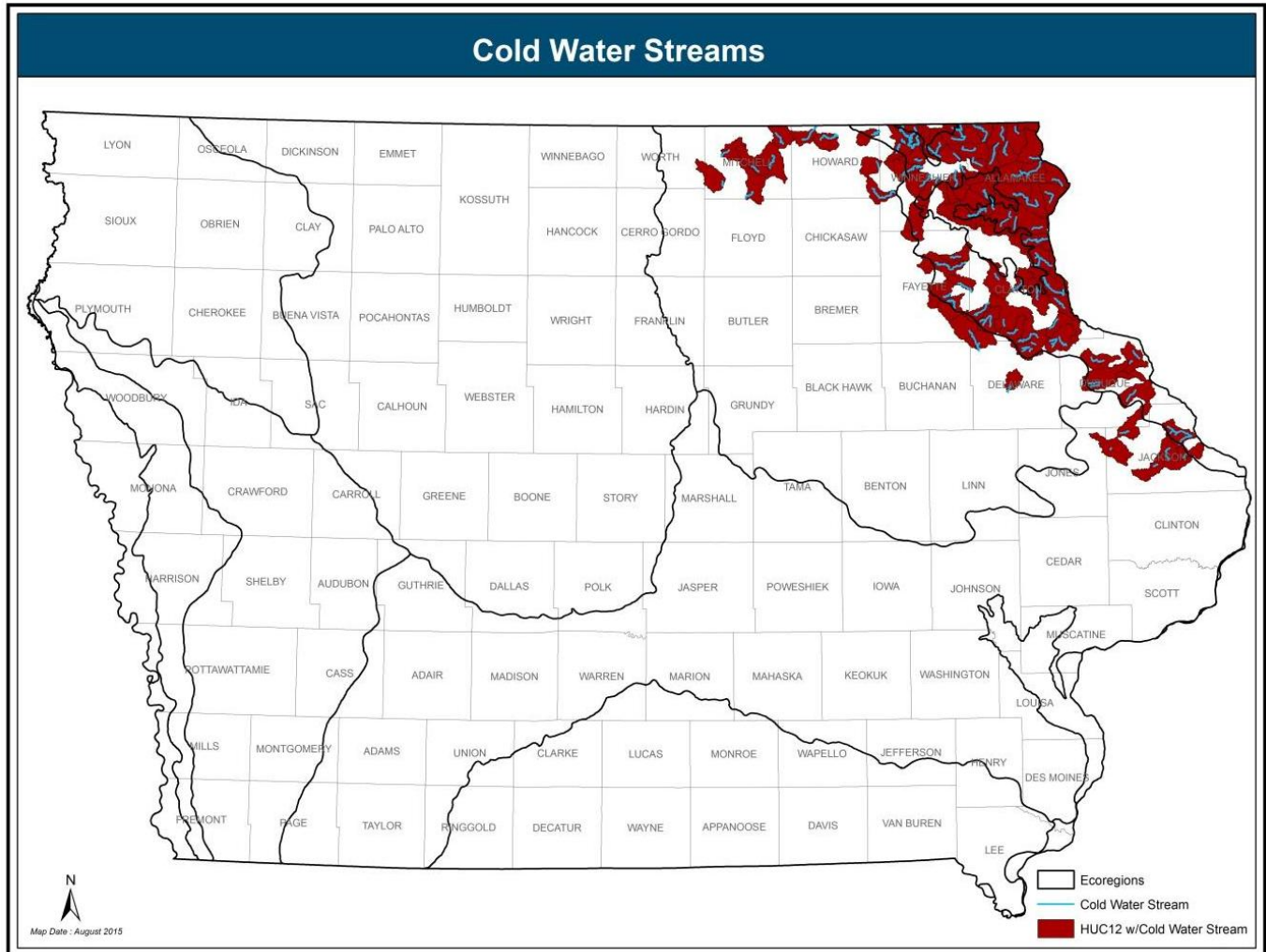
Map 8-11. Natural Resources Conservation Service Wetland Easements

The USDA Wetlands Reserve Easement (WRE, formerly called WRP), Emergency Wetlands Reserve Program (EWP), along with a few other wetlands restoration programs have helped slow the loss of wetlands in Iowa.



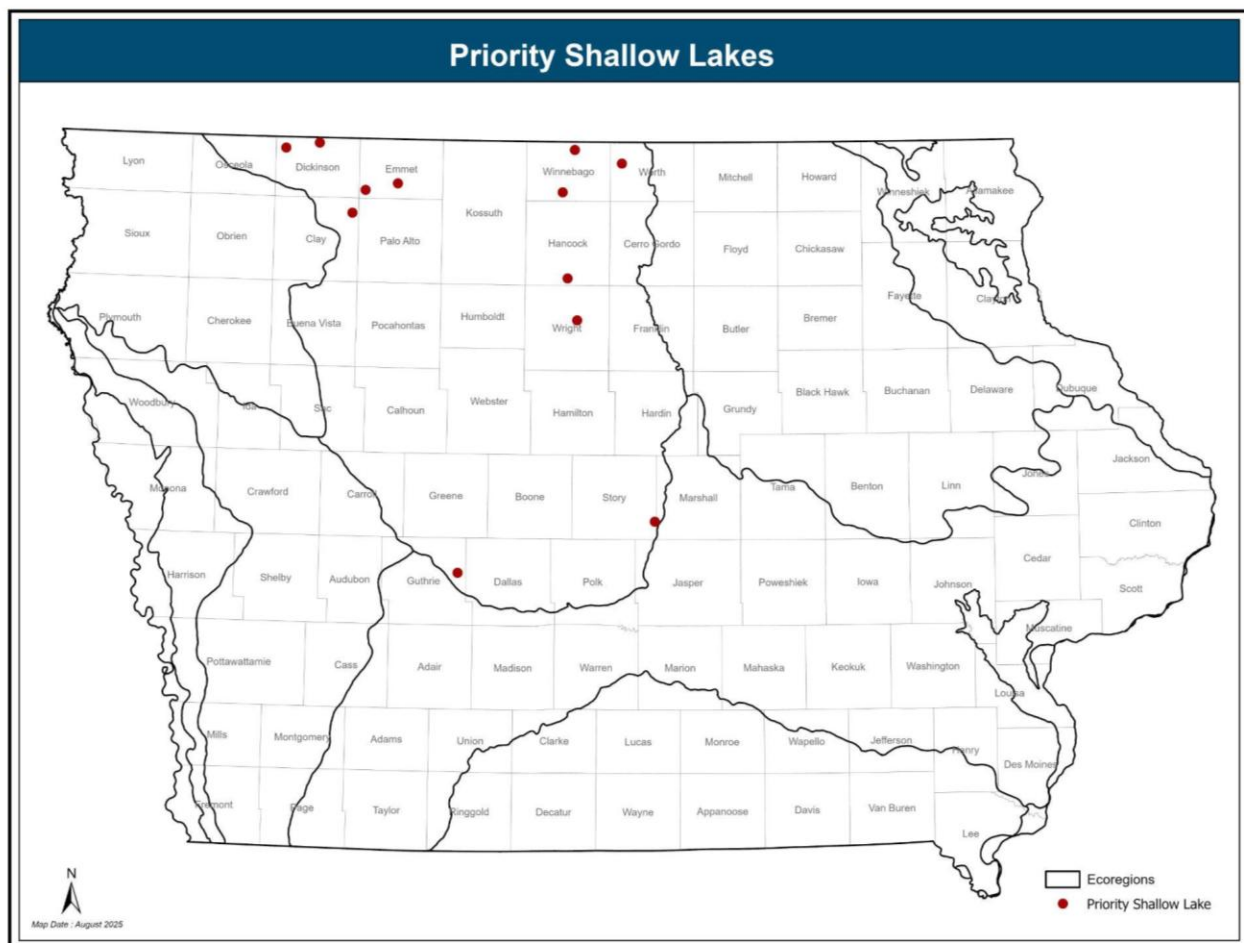
Map 8-12. Watersheds with Coldwater Streams

The Driftless Area covers over 16,000 square miles across Northeast Iowa, Southwest Wisconsin, Southeast Minnesota and Northwest Illinois. The area escaped coverage by glacial drifts which covered much of the upper Midwest during the latter part of the Pleistocene epoch. Due to its unique karst geology characterized by sinkholes, caves and springs, the Driftless Area supports a high concentration of spring-fed, regionally significant coldwater streams. Coldwater streams are flowing waters with maximum summer water temperatures that are typically below 22°C. This map displays Hydrologic Unit Code (HUC) 12 watershed containing coldwater streams.



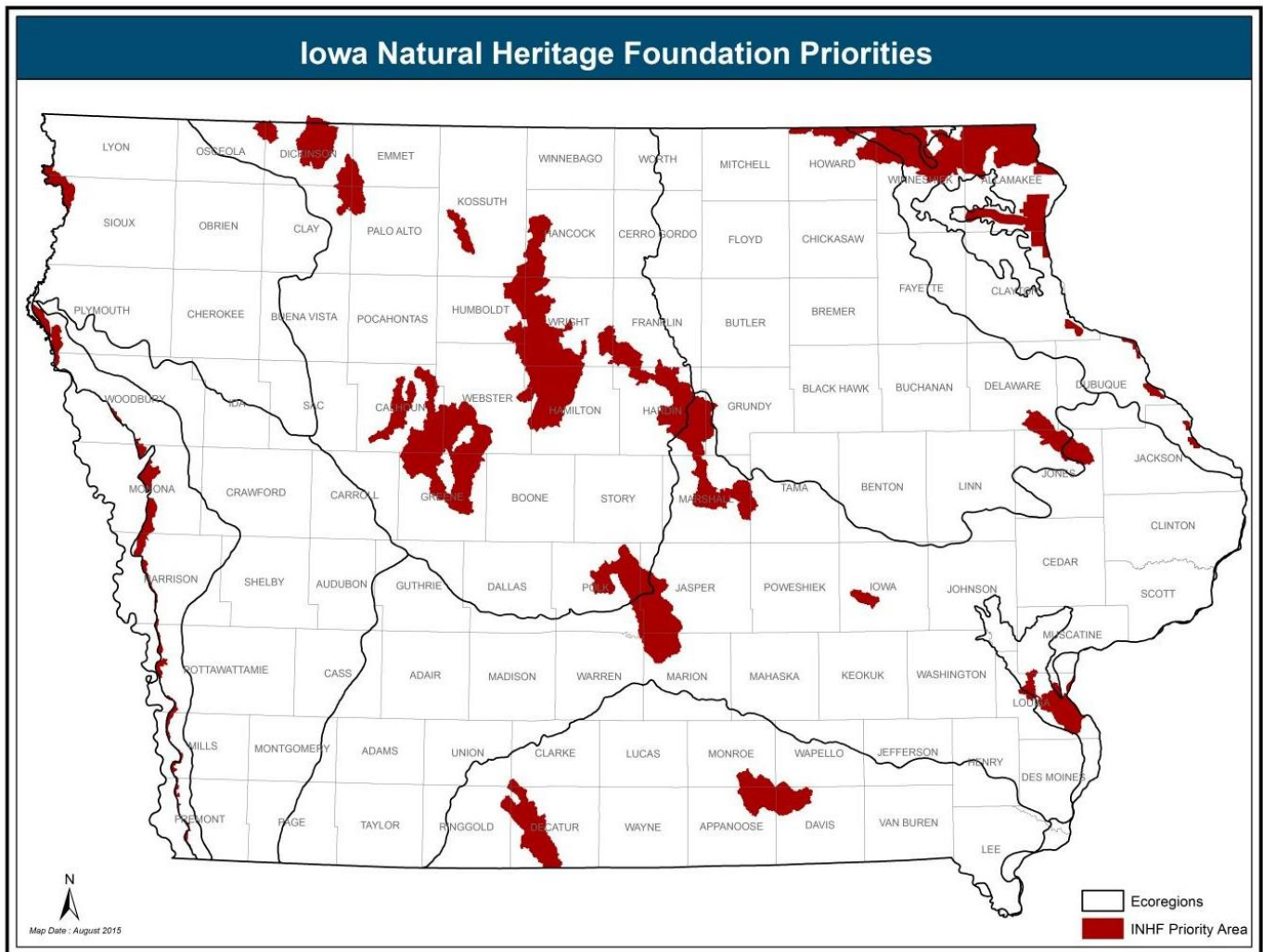
Map 8-13. Priority Shallow Lakes

Ducks Unlimited and the Iowa DNR's Wildlife and Fisheries Bureaus developed a prioritized list of shallow lakes to be renovated over the next ten years, which is updated periodically as restoration projects are completed. Natural lakes in Northwest Iowa are mainly characterized as shallow, windswept systems that exhibit poor water quality. Significant watershed changes and the introduction of common carp in the late 1800's have forever made management of these water bodies a challenge. The current focus of the Shallow Lake Restoration Program is on shallow lakes that support both fishing and wildlife benefits.



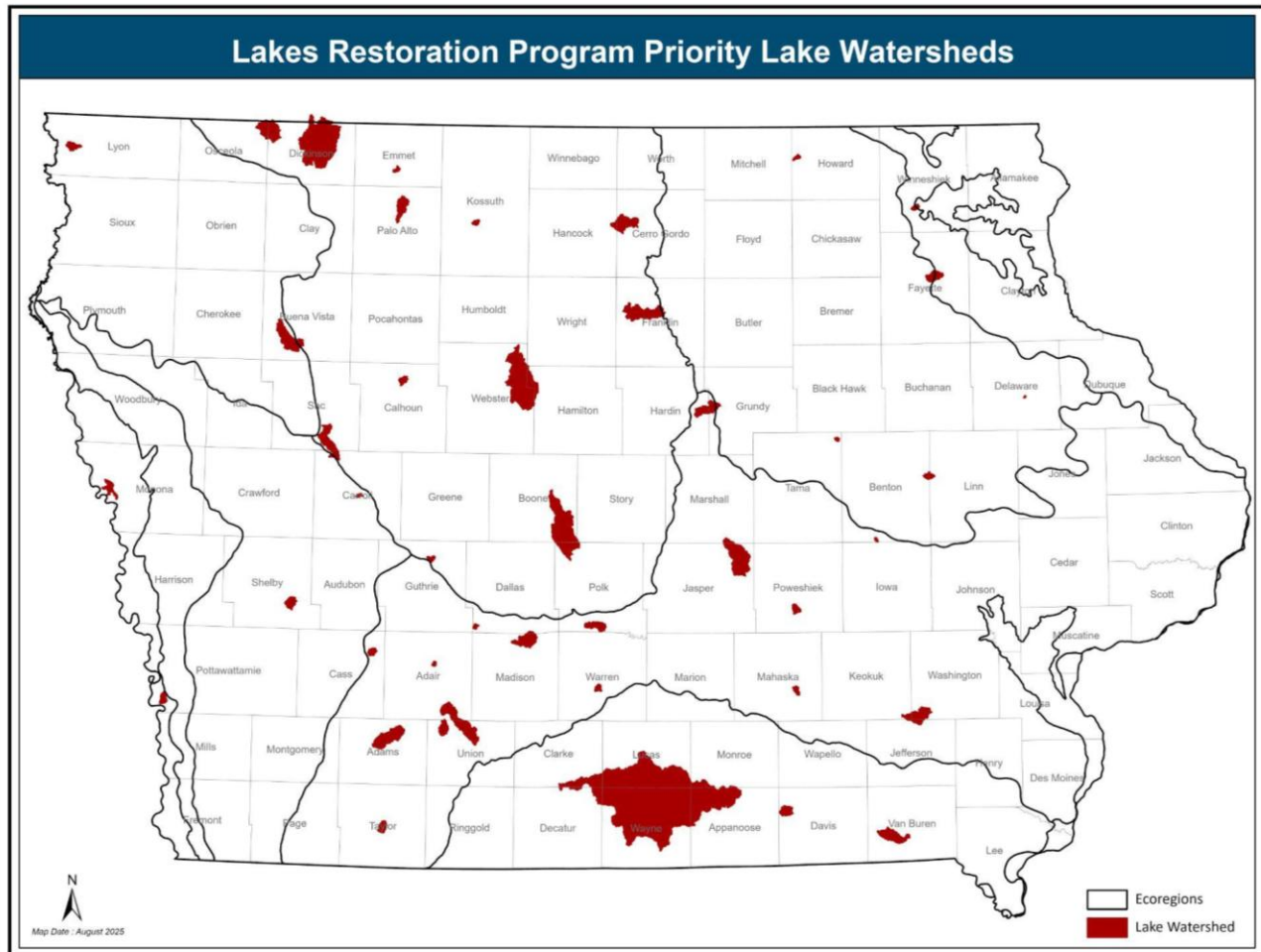
Map 8-14. Iowa Natural Heritage Foundation Priorities

The Iowa Natural Heritage Foundation (INHF) is an accredited land trust. INHF is a member-supported organization and its priorities include protecting priority lands, connecting natural landscapes and natural corridors, restoring natural areas, and engaging Iowans with Iowa's natural heritage.



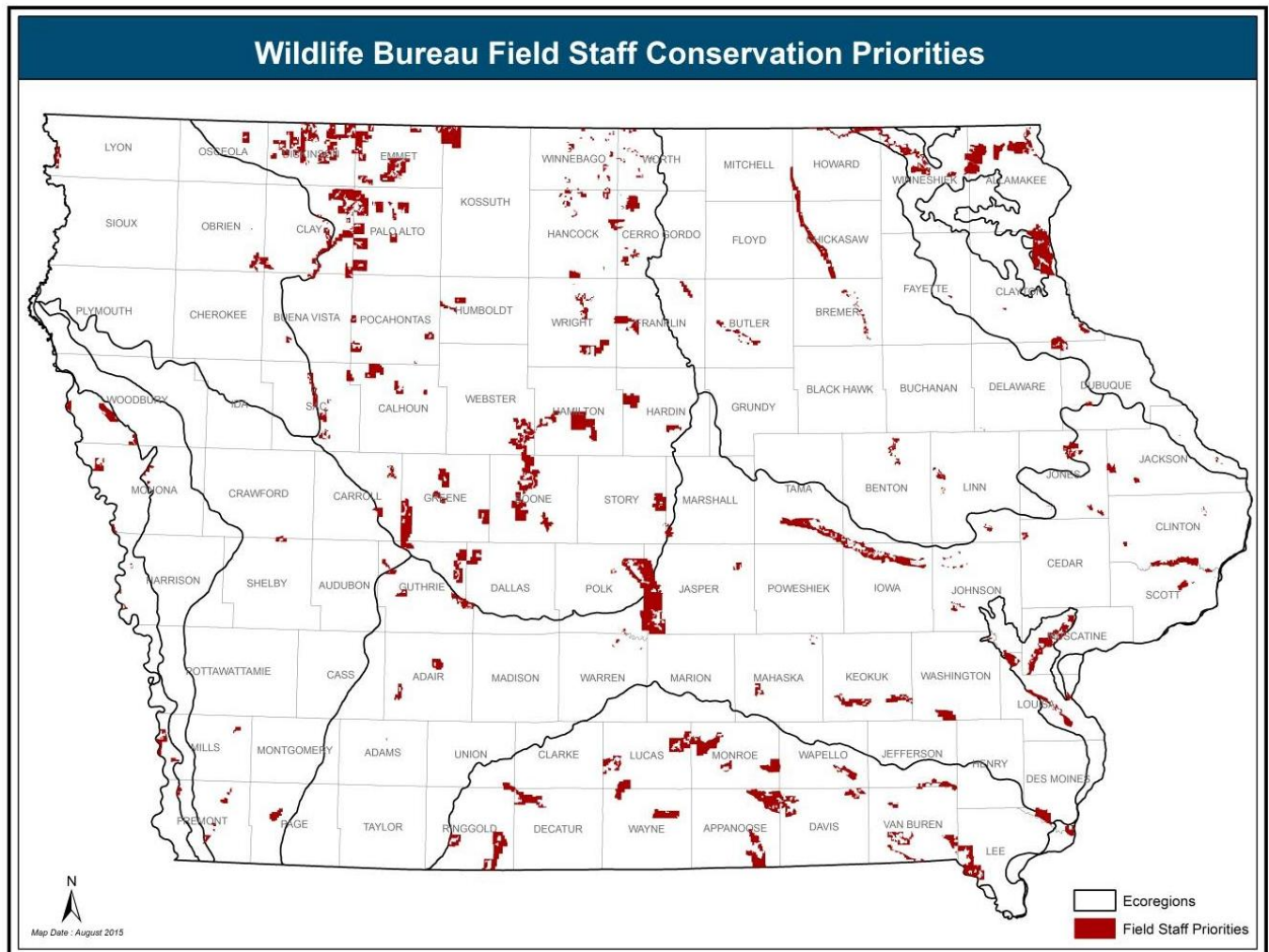
Map 8-15. Lakes Restoration Program Priority Lakes Watersheds

2006 was a milestone year of intensified focus on Iowa's lakes. This emphasis was encouraged by the 2006 Infrastructure Bill (HF2782), which provides additional funding and requires the DNR to use a science-based approach to achieving lake water quality improvements. 127 of Iowa's principal public lakes were initially ranked to develop a priority list of 35 lakes for lake restoration suitability based upon a number of socio-economic, water quality, and watershed factors. This ranking process has evolved and is still used to maintain a list of 35 lakes and 5 shallow lakes for consideration as potential lake restoration projects. As of 2025, 36 lakes have been restored and are in a maintenance phase. An additional 24 restoration projects are in progress, and 12 lakes are in a planning/evaluation phase.



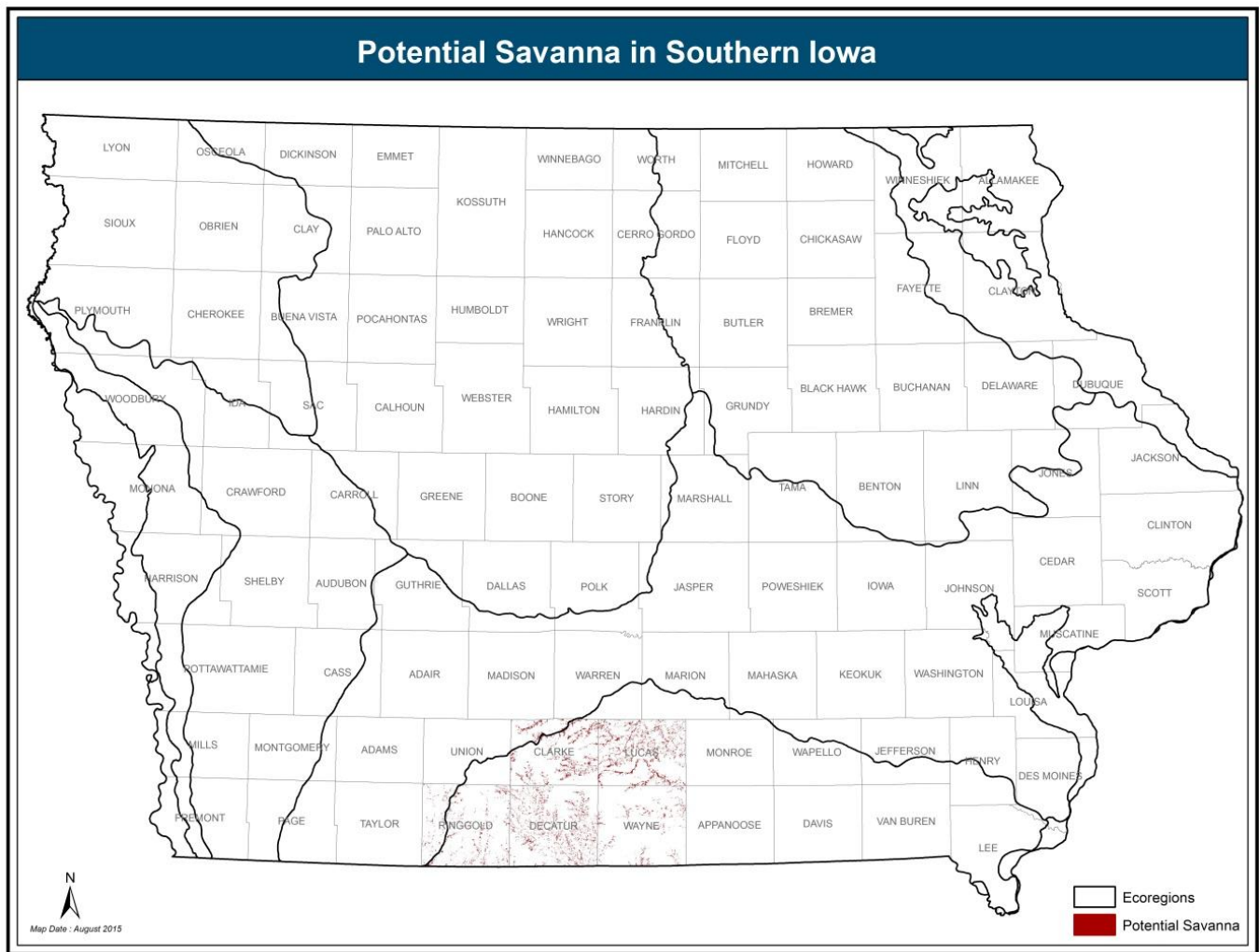
Map 8-16. Habitat conservation priorities identified by Wildlife Bureau field staff

When the importance of habitat conservation on a landscape scale became apparent, the DNR's Wildlife Bureau began to place an emphasis on the creation and maintenance of habitat complexes. This serves to provide core areas for wildlife to reproduce and maintain their populations and decreases the threats caused to populations by habitat fragmentation. With this in mind, in the mid-1990s the wildlife bureau field staff identified areas which serve as important habitat and are important to maintain as habitat, and also areas which would be most beneficial to wildlife populations if they could be restored to habitat through voluntary habitat improvement programs (such as Farm Bill conservation programs) or through easements, or acquisition from willing sellers. This is valuable information as it represents the potential habitat value assigned to individual areas by those who are intimately familiar with their local landscape.



Map 8-17. Savanna Restoration Potential

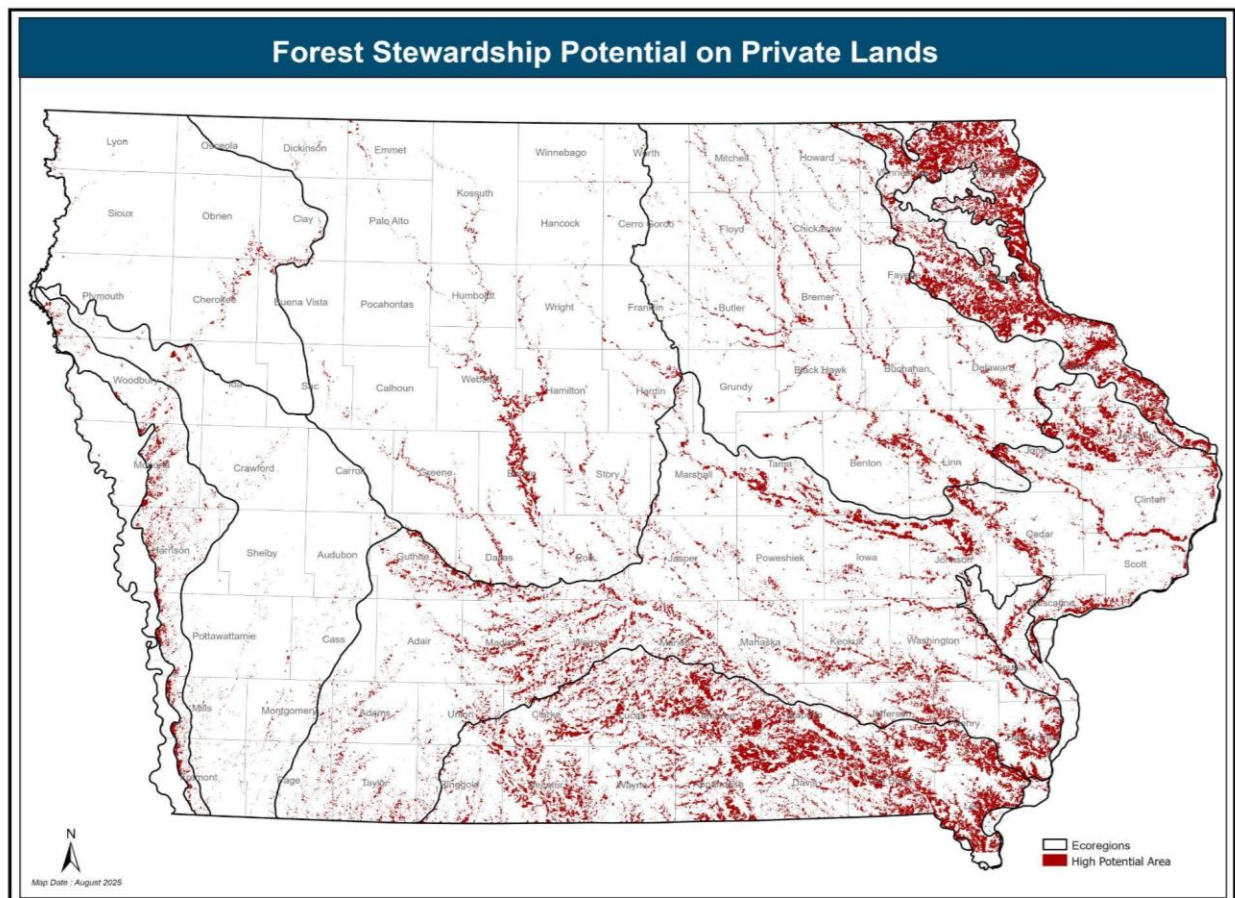
Savannah restoration potential was assessed within a five-county area in southern Iowa by the US Fish and Wildlife Service's Partners for Fish and Wildlife Program. The assessment was based upon soil type and current land cover type. This map is used by conservation partners in southern Iowa to prioritize savanna restoration work.



Map 8-18. Forest Stewardship Potential

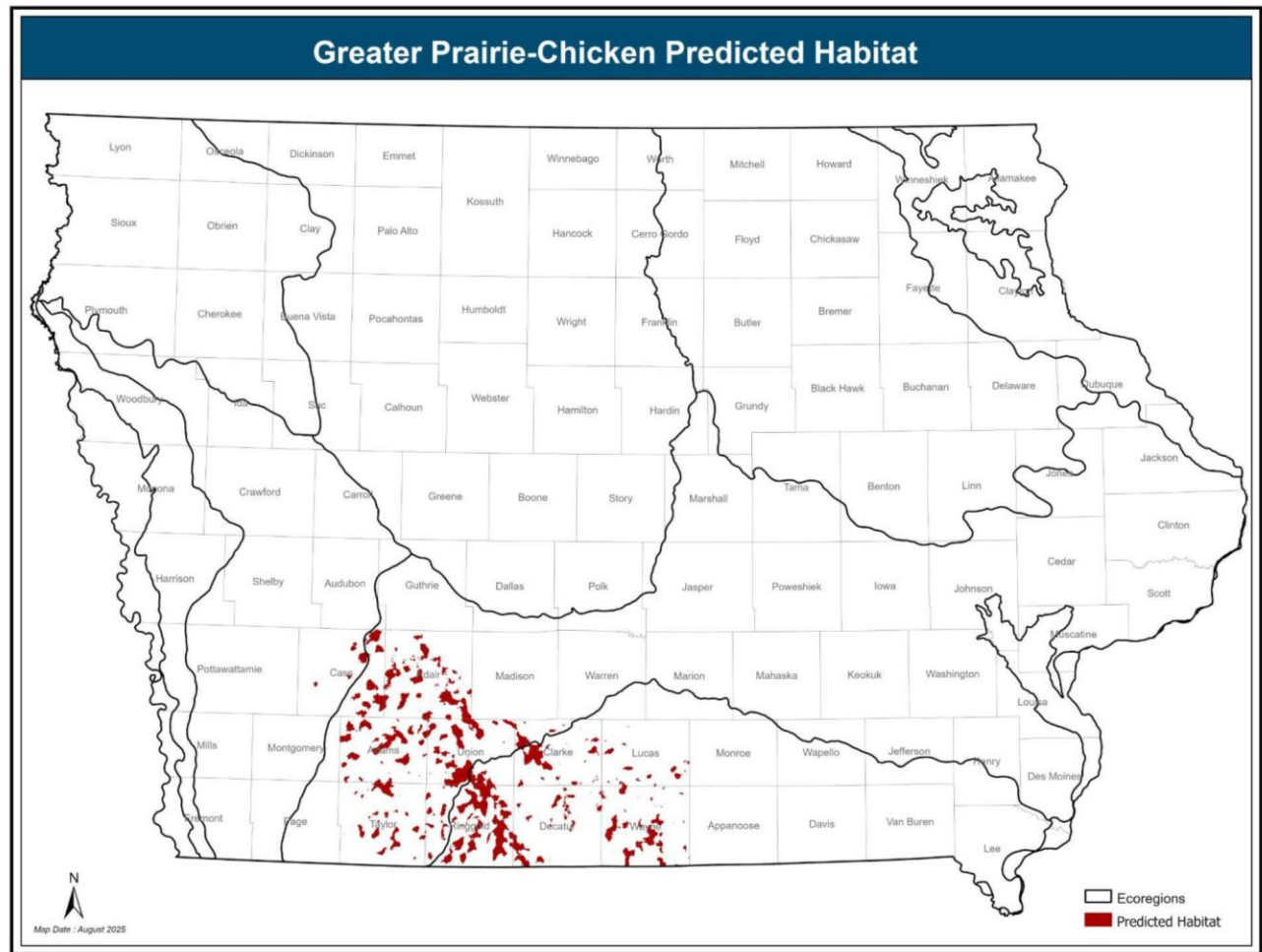
In accordance with U.S. Forest Service protocol, Iowa's Forest Stewardship Program (FSP) employs a geographically-based, landscape scale approach to prioritize the delivery of technical forestry assistance & education to Iowa's private woodland owners. Doing so helps ensure that on-the-ground forest management and reforestation activities are emphasized in areas where they will have the most impact in addressing critical state and national issues such as providing wildlife habitat, protecting watersheds, and supporting jobs and rural economies. In August 2020, Iowa developed an updated statewide GIS coverage of its Forest Stewardship Priority Lands in concert with the nationwide modernization of the Forest Stewardship Program. For more information, see the [Iowa Forest Action Plan](#).

Variables Included	Explanation
Private forested land	Excludes public landholdings, surface water bodies, large urbanized/developed areas
Water quality	Emphasis on lands located in or near riparian zones and forested wetlands, state-designated Protected Water Areas (PWAs), and priority watersheds such as Significant Publicly-Owned Lakes and impaired waterbodies
Forest Patch Size	Emphasis on consolidating large-scale, core forest habitat areas and inclusion of isolated patches greater than 10 acres in size
Wildlife	Emphasis on including forested lands of any size or location where occurrences of Threatened, Endangered, or SGCN are known to exist
Proximity to public lands	Emphasis on privately owned forests of any size that are in close proximity to publicly owned or protected conservation lands (State Parks, WMA's, county- or federally-owned conservation lands, etc.)
Active and engaged landowners	Ensuring that private forest landowners of any size or location who have enrolled in reforestation or forest management cost sharing programs, Tree Farm, or FSP are included in priority lands coverage



Map 8-19. Greater Prairie-chicken Predicted Habitat

A Greater-prairie Chicken habitat model (Vogel et al. 2016) was developed using the Iowa DNR 2009 high resolution land cover. Dan Kaminski updated the model using 2023 annual National Land Cover Database (NLCD) land cover to provide an estimate of current lek habitat. The updated model is used to identify areas of the most likely lek habitat and to prioritize survey efforts.

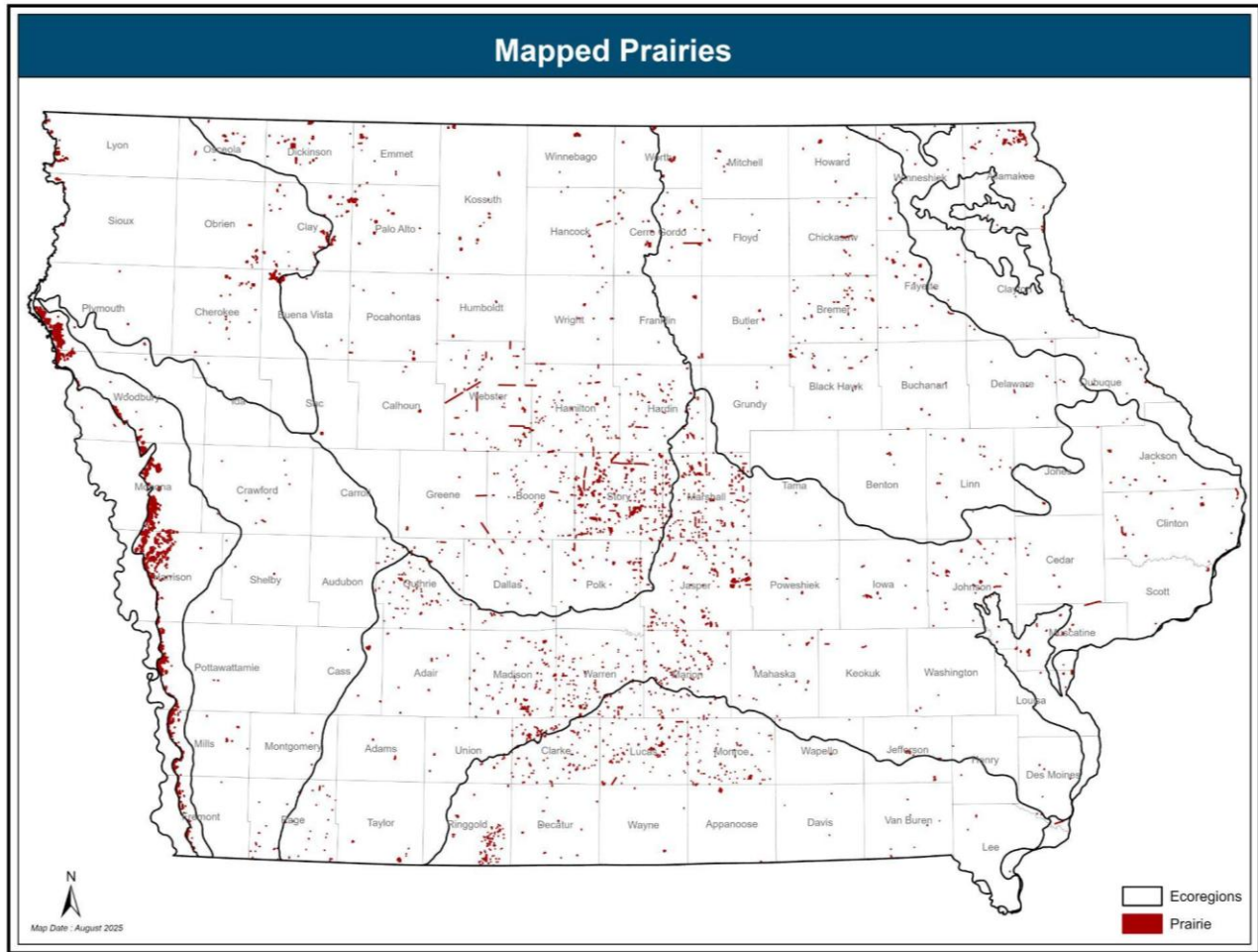


PLACEHOLDER FOR:
Map 8-20. U.S. Army Corps of Engineers Sustainable Rivers Program

We are working on obtaining an up-to-date map depicting the USACE Sustainable Rivers Program's priorities for Iowa.

Map 8-21. Mapped Prairies

The DNR maintains a map of Prairie that includes both remnant and restored prairies of varying quality. This map represents incidental information about occurrence of prairies (as opposed to showing results of a full inventory, which has not been undertaken for Iowa). Also, please note that the size of each prairie mapped is smaller than it appears on the map; these areas are depicted in a larger format to make it possible to view them at the scale of a statewide map.

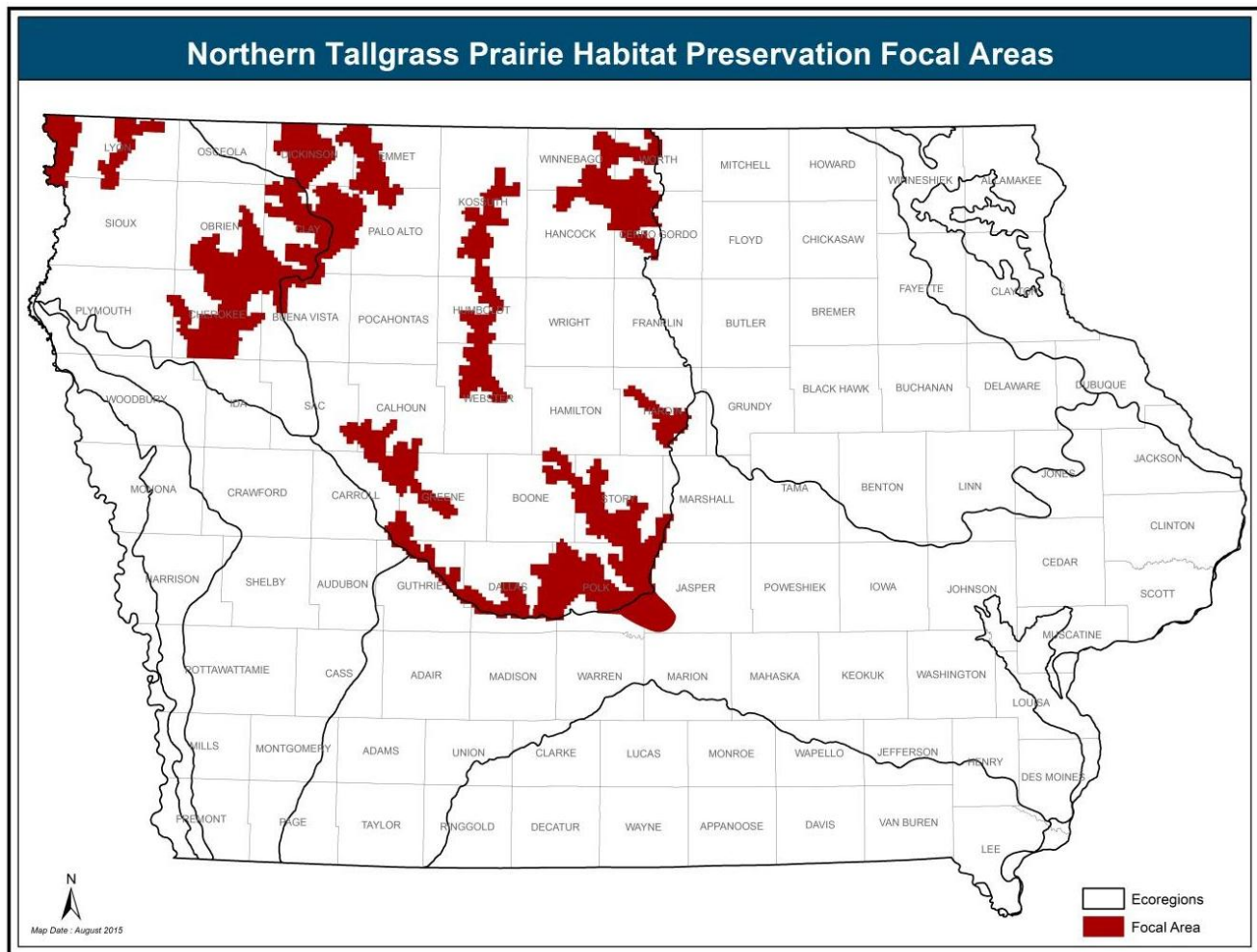


Map 8-22. Northern Tallgrass Prairie Focal Areas

In order to protect a portion of the remaining native tallgrass prairie in Iowa and Minnesota, in 2000 Congress established the Northern Tallgrass Prairie Habitat Preservation Area (HPA). About 300,000 - 320,000 acres of native tallgrass prairie remain with the HPA. The goal is to protect 77,000 acres, which equates to 0.3% of the historic tallgrass prairie land area, across the HPA. The HPA stretches across 37 counties in northwest Iowa and 49 counties in the western third of Minnesota. The U.S. Fish and Wildlife Service (USFWS) works with partners including private entities, land trusts and other non-governmental organizations, and government agencies to protect and restore tallgrass prairie tracts within the HPA. These parcels become part of the USFWS's Northern Tallgrass Prairie National Wildlife Refuge (NTGP NWR). Therefore, the NTGP NWR is different from a typical refuge, as it is made up of scattered prairie parcels which are protected through fee title acquisition or through easements.

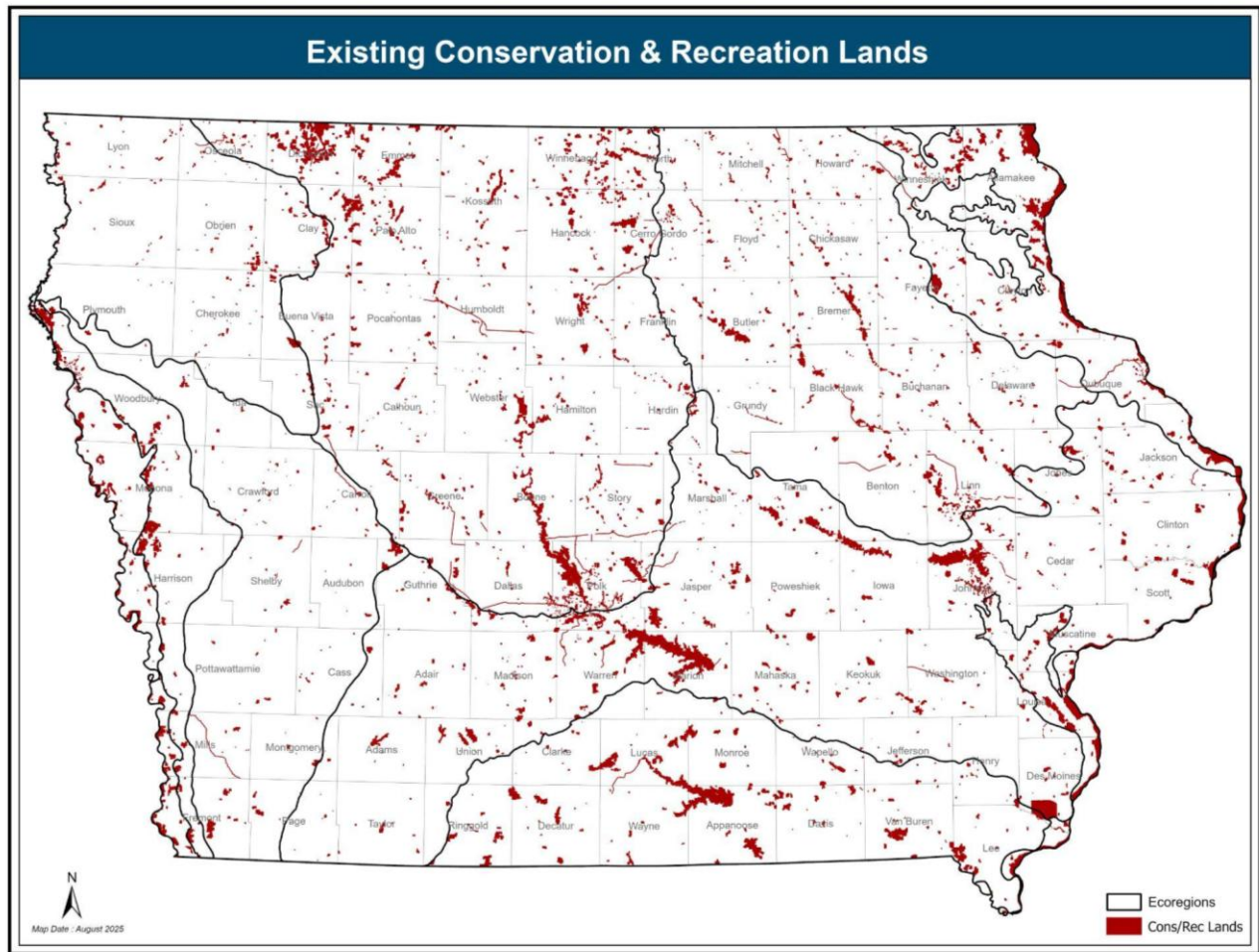
The Iowa Tallgrass Prairie Working Group developed a plan for tallgrass prairie conservation in Iowa in 2013. At that time, the Iowa portion of the NTGP NWR consisted of 352 acres of the total 5,255 acres within the Refuge. As part of the planning process, landscapes with the best potential for protection and restoration of native prairie were identified.

These focal landscapes are displayed below.



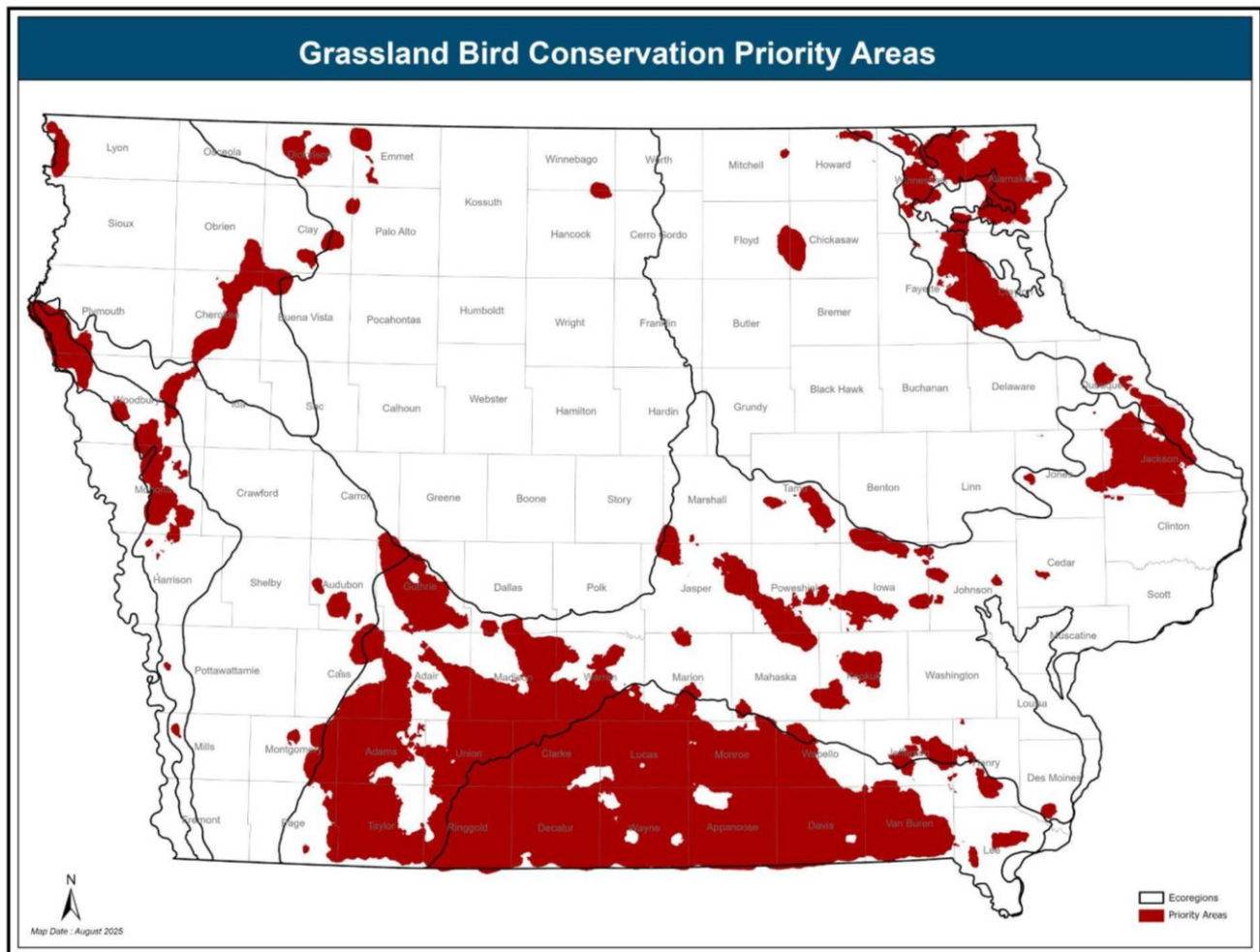
Map 8-23. Existing Conservation and Recreation Lands

This map shows the extent of areas that are utilized for conservation and recreation purposes. These lands are owned by a variety of entities including Federal agencies, Iowa DNR, and County Conservation Boards, and land trusts.



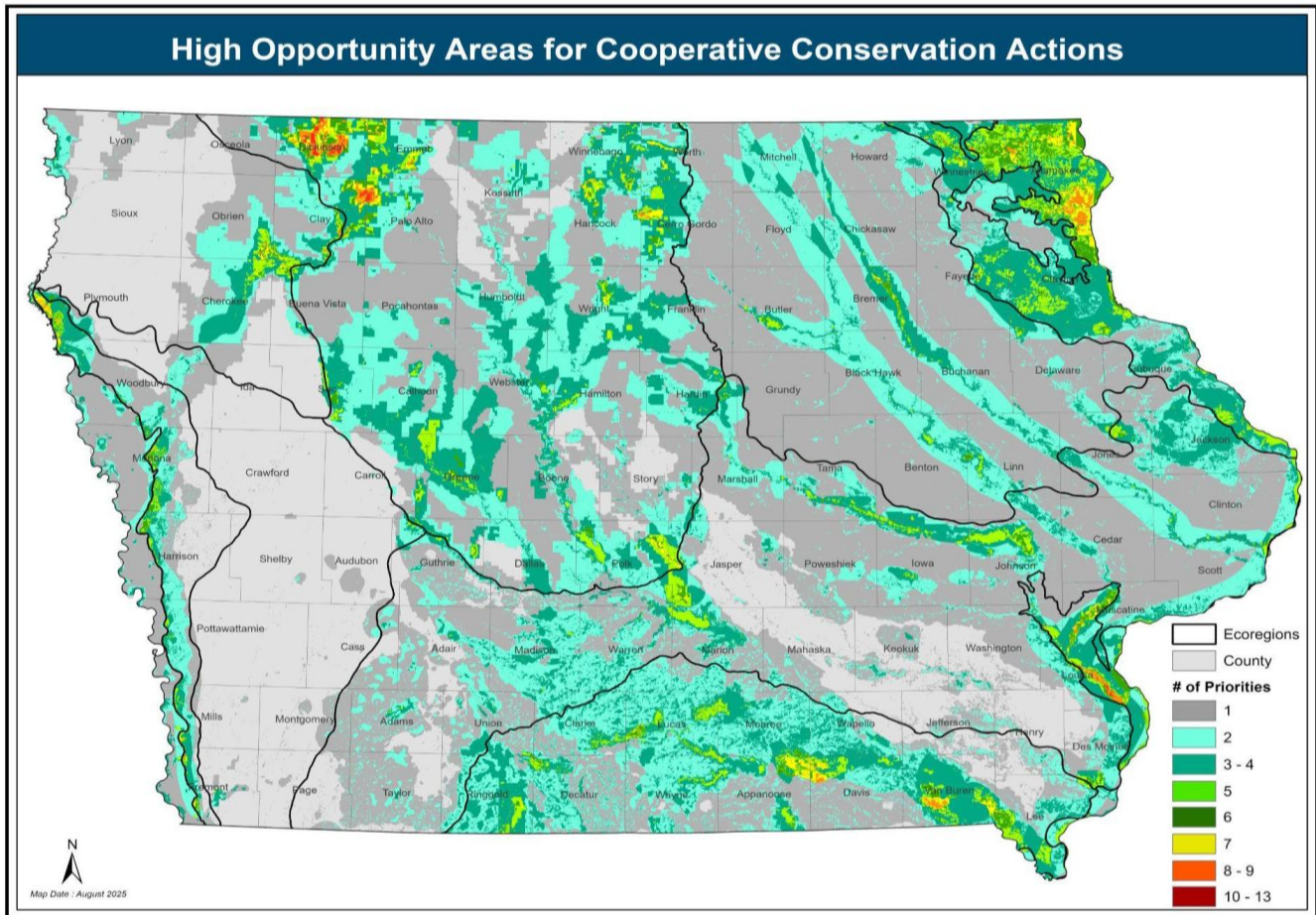
Map 8-24. Grassland Bird Conservation Priorities

Grassland birds are undergoing long-term, steep declines, as the North American grassland biome has been devastated by habitat loss and degradation. Grassland obligate species declines are the most serious. Conservation efforts are demonstrably effective, however. This layer results from an analysis of very persistent grassland, native grassland remnants that have been mapped on Wildlife Management Areas, and mapped prairies. These focal areas represent the best opportunities for conservation to benefit grassland birds.



Map 8-25. High Opportunity Areas for Cooperative Conservation Actions

Map 8-2 through Map 8-24 were combined to identify priority areas for conservation actions. The shaded areas on the map indicate areas identified as a priority for action by one or more of the plans referenced above. Darker shading indicates areas where progressively more of the plans have overlapping priorities and indicate where partnering to maximize the effect of resources should be possible.



Issue-Based Priorities: Overarching Approaches

Landscape Scale Conservation

Populations of fish and wildlife span political boundaries, as do the habitats and natural processes that support them. Therefore, effective conservation requires a landscape-scale approach. A landscape-centered approach requires collaboration across jurisdictions, in order to avoid duplication of efforts or counterproductive actions, as well as to be efficient and cost-effective. At a national level, the existence of State Wildlife Action Plans (SWAPs) is a helpful building block to effecting range-wide conservation for rare and declining species. In 2018, the Association of Fish and Wildlife Agencies (AFWA) adopted a resolution on landscape conservation and in 2020, the AFWA President's Task Force on Shared Science & Landscape Conservation Priorities pursued development of recommendations on how SWAPs can become even more effective at improving range-wide conservation of Species of Greatest Conservation Need by leading or contributing to regional and/or national landscape conservation priorities (AFWA 2021). These recommendations include the application of regional and shared approaches to plan development and implementation, increased consistency and alignment of SWAPs across jurisdictions, and inclusion of broad suites of partners during plan development and implementation. This effort led to the formation of [AFWA's Landscape Conservation Joint Task Force](#), to enhance coordination between State and Federal wildlife conservation agencies. With each new generation of SWAPs, we are collectively working to increase accessibility and relevancy of these plans to conservation partners.

Adaptive Resource Management

This Plan's third Vision (see Chapter 6) is this vision for wildlife management: Diverse wildlife communities will be developed on public and private lands and waters through the use of adaptive ecological management principles. Adaptive Resource Management is an overarching approach to implementing this plan. It is discussed in more detail in Chapter 7.

Human Dimensions of Fish & Wildlife Conservation

Fish and wildlife management requires an understanding of ecological context for conservation actions, which is gained through biological research. Similarly, a key to successful conservation outcomes is an understanding of the societal context of conservation action, gained through rigorous social science. Therefore, recognition of the human dimensions of conservation is another overarching approach to successful implementation of this plan. This scientific arena can challenge State Fish & Wildlife Agency capacity; typically, only a small number of social scientists, if any, are housed within such agencies, limiting the number of projects that can be handled internally. Thus, partnerships with universities are important to this aspect of conservation work.

Issue-Based Priorities: Emerging Approaches

Urban & Community Conservation

Data from the US 2020 Census show that the total population of the United States grew by 22,700,000 people between 2010 and 2022 representing an increase of 7.4% ([Census.gov](#) 2022). Four counties in Central Iowa (Dallas, Polk, Story, and Warren) grew between 10.0% and 50.7% in population during that time period. While these four counties represent 4.0% of the acres of Iowa, they account for 23.1% of the total population and all fall within the highest 2 growth categories delineated by the Census. Thus, this part of the State represents the vanguard of the challenge of adapting agency conservation and engagement efforts to meet the needs of a growing human population.

In Iowa, several organizations and partnerships promote urban conservation. To name a few, [Bird Friendly Iowa](#) which promotes bird habitat, connects people with birding, and offers city or county designations if the qualifications are met; and [Plant.Grow.Fly](#) which promotes backyard habitats for pollinators. In addition, several Iowa cities participate in the National Wildlife Federation's [Mayor's Monarch Pledge](#) meaning those cities have committed to create habitat for Monarchs and other pollinators as well as providing education on pollinators to their citizens. Iowa is also unique in our [County Conservation Board system \(CCB\)](#) which provides at least one staff person in each county in Iowa. Many CCBs have nature centers and all provide programming for county residents related to wildlife and natural resources.

Urban/suburban areas are well known to provide food and shelter to a variety of bird species, but residents of these areas are also broadening their efforts to attract pollinators and other wildlife by planting native plants, providing water, shelter (e.g. boxes for birds, bats, and bees, brush piles, leaf piles) or reducing the amount of mowing or raking they do

in their yards. Some insect SGCN have resource needs that can be provided in a smaller amount of space or habitat, meaning that cities could be already serving as refuges (Coman et al. 2022) making it possible to increase overall populations (e.g. Monarchs) within urban areas while raising awareness and importance of rare species. Another example of refugia, depending upon how they are managed, would be stormwater ponds. In urban settings, these can provide habitat for Northern Leopard Frogs and Gray Treefrogs to successfully breed, but if not managed properly (e.g. pollution, algae) then they can become sinks for those populations (Price et al. 2014).

Ames and Gilbert Iowa provide an example of private-public partnership at the community scale. These two cities are expanding towards each other. A new housing development was planned for an area northwest of the city of Ames (~2.5 miles) and west of Gilbert (~2 miles). It was determined that at least part of the area contained a xeric, remnant prairie. The developer decided to deed 90 acres of the new subdivision to Story CCB which has the staff and knowledge to maintain and expand the prairie. On this property, Story CCB has documented Black-billed Cuckoo (woodland species) and Grasshopper Sparrow (grassland species) during the breeding season, while iNaturalist also has records for Monarchs, all of which are SGCN in Iowa. Story CCB understands the need to work closely with the residents of the subdivision in order to maintain the habitat. Meetings will need to be held to discuss prescribed fire, invasive species, potential impacts of lawn chemicals, etc. In addition to the human concerns, Story CCB will be trying to balance the needs of the various SGCN.

Pollinator Conservation

In Iowa, the primary pollinators are insects: bees, butterflies, wasps, flies, and beetles. Due to limited capacity, only a subset of these groups are evaluated in this Plan for SGCN status, but pollinator conservation is an important issue for the health of Iowa's natural communities as well as society overall. An estimated 85% of plants use animal pollination (as opposed to self-pollination, or wind or water-based pollination). And crucially for humans, approximately $\frac{2}{3}$ of crops rely on pollination. Unfortunately, many pollinators are declining. For example, over $\frac{1}{4}$ of North America's Bumble Bee species have exhibited significant declines, even formerly common species. Learn more about pollinator declines and conservation from the Xerces Society for Invertebrate Conservation's [Pollinator Conservation Program](#) website.

The issue of pollinator decline has garnered increased attention in recent years, with the federal listing of the Rusty Patched Bumble Bee and the decline of the monarch butterfly capturing many people's interest. Pollinator conservation efforts have largely focused on providing habitat that includes pollinator-friendly plants, including spaces ranging from farmland to natural areas to urban environments. Natural resource land managers also focus on avoiding or modifying management activities that may harm rare pollinator species.

One Health

One Health is considered a collaborative approach that recognizes the interconnectedness of the health of humans, domestic and wild animals, and the ecosystems/landscapes they inhabit. The One Health framework, which is the intersection of human health, animal health, and environmental health, can be especially useful for thinking about the health of SGCN as it considers connections with humans, domestic animals, and ecosystems including habitat, invasive species, and community dynamics. The One Health paradigm can be pathogen-driven or can be used as a framework for conservation.

In a pathogen-driven framework, disease-causing agents/toxicants that impact wildlife health may also threaten human or domestic animal health and vice versa. It is especially important to understand the distribution and risks related to zoonotic pathogens, highlighting the importance of understanding wildlife disease to protect human, domestic animals, and wildlife health.

As a framework for conservation, One Health can be practiced in terms of system resilience. Anthropogenic changes to the landscape, including invasive species and exclusion of important disturbance regimes, affect wildlife populations. Biodiversity, healthy habitats free of toxicants, and intact ecological systems will by design help protect the health of wildlife populations. Healthy ecosystems provide a variety of ecosystem services for humans, agriculture, recreation and wildlife. Wildlife management actions designed around the conservation of entire ecosystems are critical to protecting the health of, and supporting resilient, wildlife populations.

For SGCN, management efforts focused on the community and ecosystem characteristics and the maintenance of biodiversity and intact disturbance regimes will promote wildlife health and resilient populations.

Full Life Cycle Conservation

Management of natural resources requires working beyond state borders on a regular basis. Iowa's ecoregions extend past our boundaries and most SGCN have ranges beyond the borders of the state, requiring partnerships with neighboring states to accomplish needed actions to achieve shared conservation goals. Watersheds and flyways often encompass all or parts of multiple states and require complex coordination among many partners and jurisdictions to improve conditions, regulate harvest, and provide needed habitat. Recovery of declining species that have large ranges requires coordination with partners and agencies with interest and jurisdiction throughout the species' range, including internationally.

Full Life-cycle Conservation is an effort to protect and maintain migratory species habitat during all periods of life throughout their annual cycles (i.e. breeding, nonbreeding, and migration). Full life-cycle conservation of migratory species is one area of Iowa's commitment to cross-border conservation and is imperative to the improvement and long-term sustainability of Iowa's natural communities and species. Neotropical migrant birds, waterfowl, and monarch butterflies are key examples of species whose populations rely on conservation partnerships beyond Iowa's borders. To prevent migratory species from becoming endangered, and recover those already endangered, we must understand and address the totality of threats facing the species throughout their full life-cycle and Iowa's role in supporting their populations. This is particularly important for neotropical migratory birds.

Bird declines and urgency: In light of recent research that quantified a net loss of 2.9 billion birds in the last 50 years, and a 28% decline of migratory species over that time (Rosenberg et al. 2019), we cannot afford to ignore the threats that many migratory birds face across their full life-cycle ranges.

Why full life-cycle conservation is important

1. 69% percent of the birds found in Iowa are neotropical migratory birds and spend up to eight months of the year beyond the borders of the U.S., some traveling thousands of miles each way.
2. Millions of migratory birds that breed across Canada and the U.S. rely on a relatively small geography within Mexico, Central America, South America, and the Caribbean (called the Neotropics) during migration and the nonbreeding season, making habitat conservation in these regions extremely important for whole populations of species.
3. Threats to these vital Neotropical landscapes, ecosystems, and the birds that use them vary by country and region but include deforestation, commodity agriculture (palm oil), illegal logging, contaminants, and insufficient enforcement on protected areas, among others.

Intense poverty across this region of the world adds to the dire need for support from international partners that have a shared interest in the protection and conservation of shared avifauna. Conservation efforts on international migratory stop-over sites and the nonbreeding grounds work to curb these threats through acquisition and protection of lands used as migratory pathways and nonbreeding sites; education of landowners on regenerative agricultural and ranching practices including shade-grown coffee farming; the creation and maintenance of native tree nurseries and reforestation efforts; and other actions.

The Cerulean Warbler for example, is an Iowa SGCN and neotropical migrant that relies on a limited range during the nonbreeding season. This species has been declining across the North American breeding range, and full life-cycle conservation efforts to conserve habitat and reduce threats to the species in the nonbreeding range are critical to stabilizing populations (Figure 8-1).

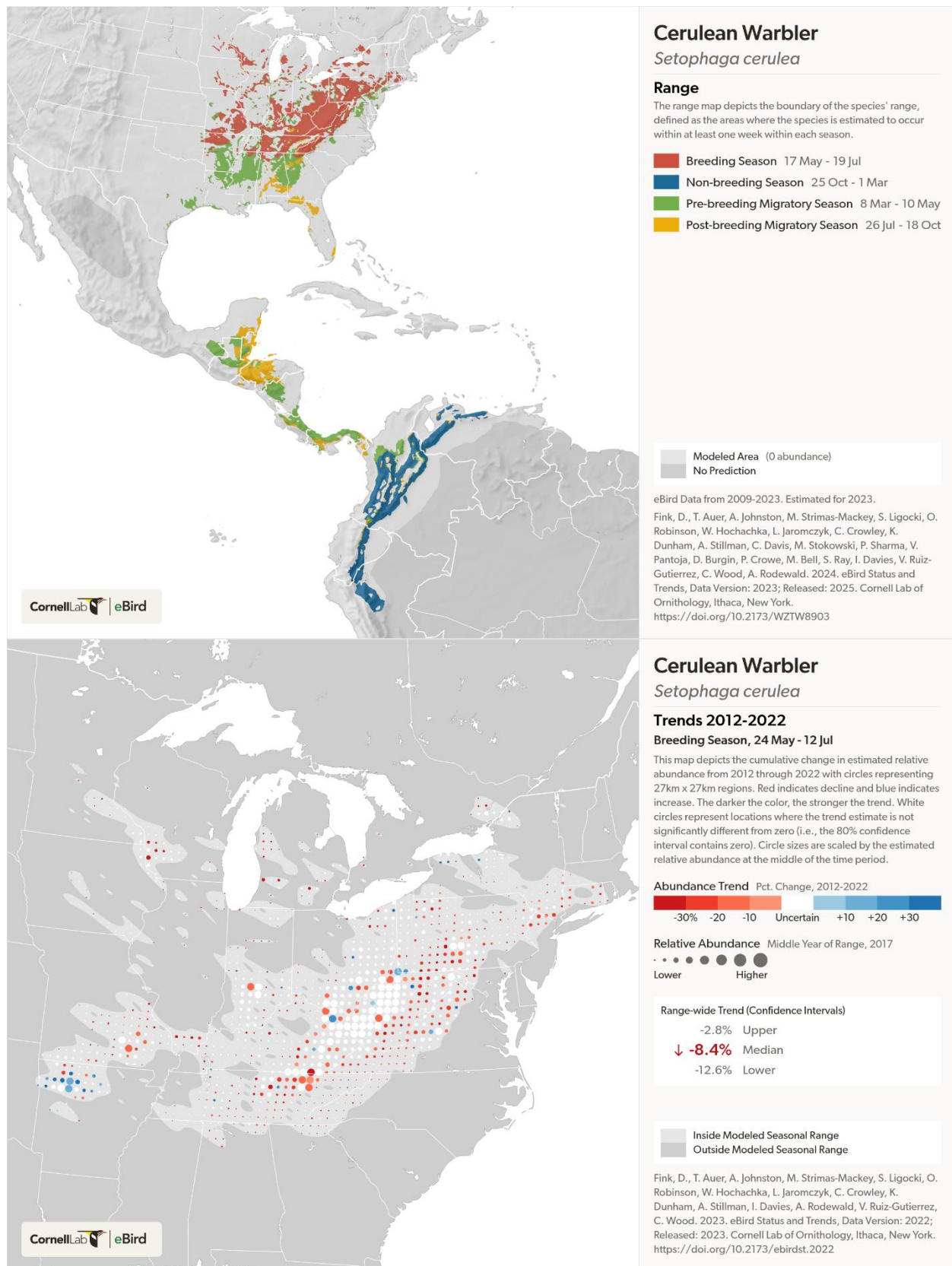


Figure 8-1. The full life-cycle range of the Cerulean Warbler and the breeding population trend map for the species, from Cornell Lab of Ornithology, based on eBird data.

Southern Wings

- The Association of Fish and Wildlife Agencies' (AFWA) created Southern Wings in 2009. Southern Wings facilitates state fish and wildlife agency participation in the conservation of priority migratory birds across their full life-cycle. The latest tracking data, stopover habitat information, and research is used to guide Southern Wings conservation projects. Since 2009, 41 states have contributed over \$4.2 million to conservation efforts on stop-over sites and wintering grounds in Mexico, Central America, South America, and the Caribbean.
- Strategic actions vary by project and species but include slowing or reversing continued deforestation through reforestation efforts and implementation of regenerative agroforestry systems with local landowners; securing protection of core migratory bird habitat through protected area creation and management; improving or reestablishing shade-grown coffee practices that maintain or create migratory-bird foraging habitat; working with local communities to build sustainable conservation capacity and ownership; among others.

Southern Wings full life-cycle conservation efforts in Mexico, Central and South America support over 150 species of Neotropical migrants that migrate through or overwinter in these rich habitats, including Iowa SGCN.

The following stewardship maps, created by the Cornell Lab of Ornithology, show the migratory connections between Iowa and the rest of the hemisphere. Stewardship Connections show the relative strength of connection between Iowa and the rest of the hemisphere for 34 priority species. Uniqueness of Stewardship Connections depict how uniquely-connected Iowa is to the rest of hemisphere relative to all other states for 34 priority species. These maps can help prioritize international conservation efforts to support Iowa's birds.

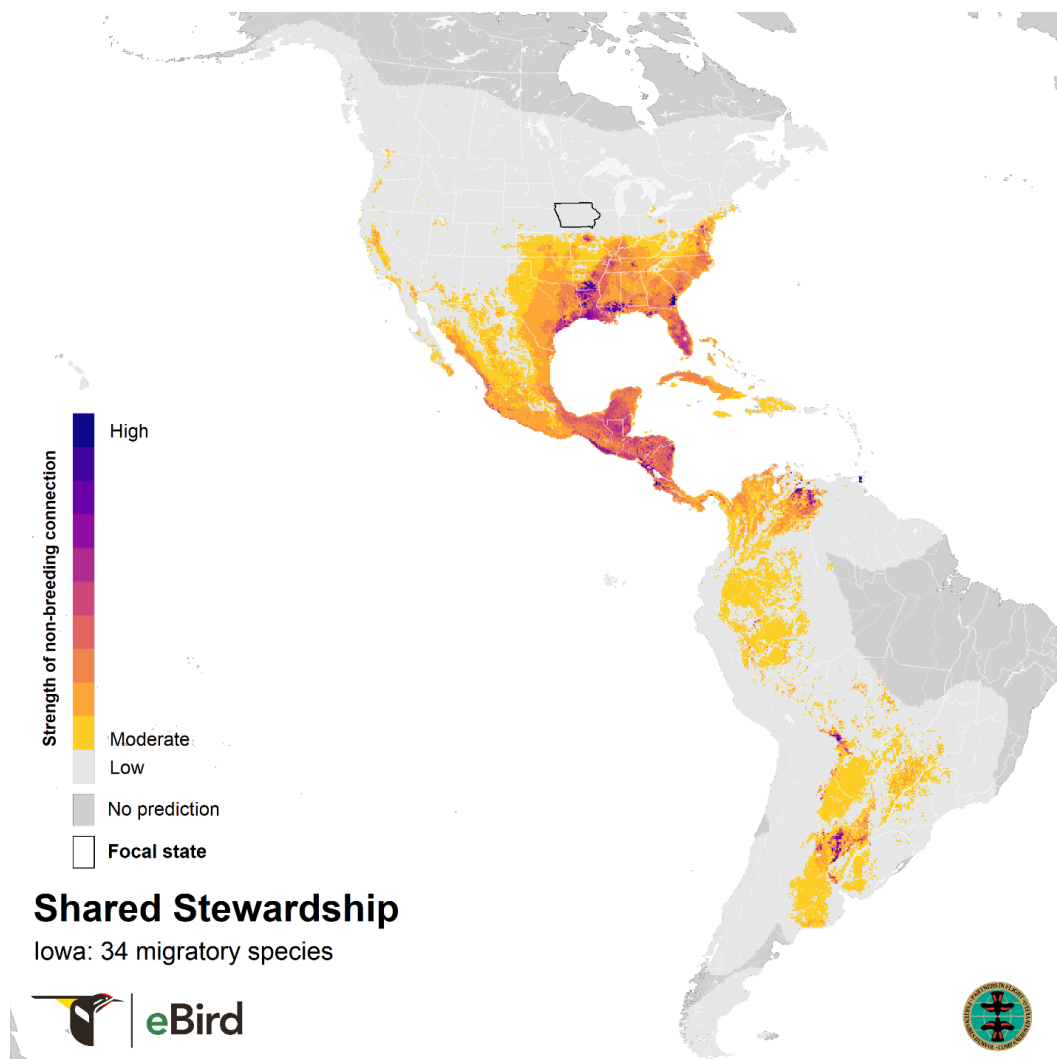


Figure 8-2. Iowa migratory bird Stewardship Connections map created by the Cornell Lab of Ornithology, based on 34 priority breeding species in Iowa.

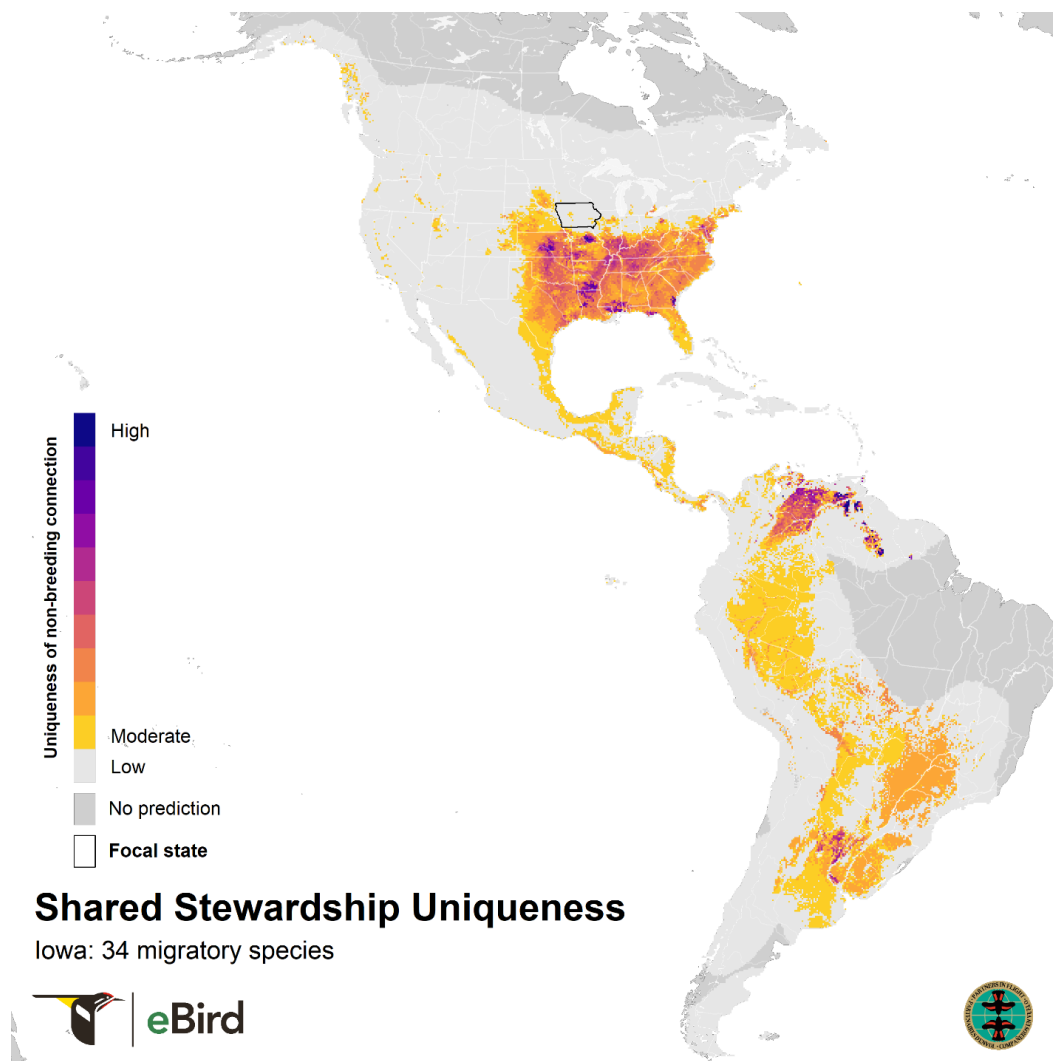


Figure 8-3. Iowa migratory bird Stewardship Uniqueness map created by the Cornell Lab of Ornithology, based on 34 priority breeding species in Iowa.

Table 8-2. 34 priority breeding bird species included in stewardship maps, listed alphabetically by common name.

Species Common Name	% of Global Breeding Population in Iowa	Species Common Name	% of Global Breeding Population in Iowa
Baltimore Oriole	8.1	Eastern Wood-Pewee	3.5
Bell's Vireo	1.1	Field Sparrow	5.1
Bobolink	5.6	Grasshopper Sparrow	2.1
Brown Thrasher	3.9	Gray Catbird	7.7
Brown-headed Cowbird	2.3	Great Blue Heron	1.7
Chipping Sparrow	1.2	Great Crested Flycatcher	2.5
Cliff Swallow	2.4	Henslow's Sparrow	17.6
Common Grackle	3.2	Indigo Bunting	3.2
Common Yellowthroat	4.2	Killdeer	2.8
Dickcissel	11	Northern Rough-winged Swallow	1.4
Eastern Kingbird	3.4	Orchard Oriole	3
Eastern Meadowlark	4.5	Red-winged Blackbird	4
Eastern Phoebe	1.7	Rose-breasted Grosbeak	7.2
Eastern Towhee	1.7	Sedge Wren	5.3

Species Common Name	% of Global Breeding Population in Iowa	Species Common Name	% of Global Breeding Population in Iowa
Upland Sandpiper	2.1	Wood Duck	5.2
Warbling Vireo	1.7	Yellow-billed Cuckoo	1.7
Willow Flycatcher	4.3	Yellow-throated Vireo	2

References Cited in Chapter Eight

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Chapter Nine

Plan Review, Coordination, and Implementation

Required Element #6: Description of procedures to review the plan at intervals not to exceed ten years;

Required Element #7: Plans for coordinating the development, implementation, review, and revision of the plan with federal, state, and local conservation agencies and Indian Tribes that manage significant areas of land or water within the State, or administer programs that significantly affect the conservation of species or their habitats.

Wildlife Action Plan Review and Revision

Comprehensive review/revision is required at least every ten years. In addition, more frequent and/or less comprehensive revisions can be conducted at any time. Too-frequent revision cycles can stress the capacity of the Implementation Committee and its working groups, but changing conditions may necessitate updates to the Plan at points between required ten-year revisions. Between 2005 and 2025, this Plan underwent one major revision (2012), and two comprehensive reviews (2015 and 2025). The meaning of these terms is explained below:

Comprehensive Reviews

- Required ten years from date of last approved comprehensive review,
- States must demonstrate evidence that the entire plan, including all Eight Required Elements, was assessed by the State Fish & Wildlife Agency, stakeholders, and the public,
- Any decision not to revise certain sections should be based on a review and resulting agreement that the section(s) remain current and relevant to the revised sections.

Major Modifications

- May occur at any time and does not re-set the ten-year timeline,
- No requirement for review of entire plan or all Eight Required Elements,
- States must demonstrate evidence of coordination among relevant agencies during the revision, and that the revised portion(s) of the Plan was reviewed by the public.

2025 Comprehensive Review and Revision Process

Work on the 2025 comprehensive review began in the spring of 2024, when DNR notified the USFWS of its intent to review and revise the IWAP. A contractor was hired to help coordinate the various committee meetings that are necessary to update a plan of this magnitude.

This revision used the same process and criteria for determining the list of SGCN that was used for the 2015 revision. The taxonomic subcommittees of the Wildlife Working Group assessed the conservation status of all native, extant species (see Chapter 3). This process was lengthy, requiring 2-5 meetings for each subcommittee, and could not have been accomplished without the dedication and hard work of individuals and organizations volunteering their time and expertise. The process was beneficial in ensuring that the same suite of criteria was applied to each species within each taxonomic group, as well as identifying which specific factors were associated with inclusion of a species on the list of SGCN.

Compiling the resulting information and updating the maps and text was handled by DNR for the most part, with input provided by conservation partners outside the agency on a frequent basis.

Coordination

Coordination during Development of Original Version of IWAP

No single entity - government conservation agency, private conservation organization or research institution - can implement all conservation actions in this Plan even if full funding is achieved. To access all the energy, expertise and enthusiasm needed, an IWAP Implementation Committee with representatives from several organizations was formed. Consultation was held with numerous government and private conservation organizations in the development of the

IWAP - directly through their participation in the planning or review process or indirectly through review of wildlife conservation plans they had developed that included Iowa's SGCN. Participants in the Advisory Group are listed in Appendix 2.

Guidance on Plan content and preparation was received from the USFWS, the Association of Fish and Wildlife Agencies, and the National Advisory Acceptance Team (NAAT). National Plan coordination meetings were attended by Iowa DNR staff in 2003 (Mesa, AZ and Madison, WI). The One Year Out conference held in Nebraska in 2004 was especially helpful. An interstate coordination meeting between representatives from Iowa, Missouri and Kansas was held early in the planning process to help identify interstate implementation efforts. A Plan status meeting with USFWS staff in February of 2005 and an early review of a Plan draft by USFWS also helped focus development of the final Plan.

Coordination during Plan Implementation and Comprehensive Review and Revision

The purpose of the Implementation Committee is to coordinate to the extent possible the many actions of government agencies at all levels that impact wildlife and its habitats in Iowa. A list of those agencies that have had input into Plan development or are engaged in Plan implementation is provided below in the "Interagency Cooperation" section. The Implementation Committee is not intended to add another layer of bureaucracy or usurp the statutory authority, budget authority, or mission of any agency or NGO that seeks to improve the status of Iowa's wildlife. Cooperation with the IWAP is and should remain completely voluntary.

As the Plan is now twenty years old, much of the process of implementation has become institutionalized and meetings of the committees and work groups have become less critical. The conservation community is used to accessing the shapefiles for the geographic priorities described in Chapter 8, and use the lists of SGCN and their habitat preferences when making conservation plans or applying for grants. Alignment with IWAP priorities has been added as criteria in a number of state grant programs, as well as with some USDA conservation programs. The monitoring protocols used by the Multiple Species Inventory and Monitoring (MSIM) program described in Chapter 7 have been adopted by other land managers (e.g., US Army Corps of Engineers, US Fish & Wildlife Service, counties). The IWAP committees that meet the most frequently are the taxonomic subcommittees, because they provide quality control reviews of MSIM data and they typically have other agenda items that need discussion on a periodic basis. These subcommittees include representatives from a broad set of land management organizations as well as academics.

Interagency Cooperation

Cooperation between agencies and organizations that manage public conservation lands in Iowa is essential to the successful implementation of the IWAP. Federal, State, and local agencies which manage significant conservation land and water areas within Iowa include Iowa Department of Natural Resources (DNR), Iowa County Conservation Boards (CCBs), US Army Corps of Engineers (USACOE), and US Fish Wildlife Service (USFWS). All have working relationships at both the state and local levels.

Many of the recommended conservation actions must be carried out on private land. The US Department of Agriculture (USDA) provides funding and technical assistance to landowners for land conservation projects through its Natural Resource Conservation Service (NRCS) and Farm Services Agency (FSA). Farm conservation programs and projects in Iowa are often delivered through partnerships involving agencies such as USDA, DNR, Iowa Department of Agriculture and Land Stewardship (IDALS), as well as non-profit organizations such as Pheasants Forever, Wildlife Management Institute, and Conservation Districts of Iowa. DNR has permanent positions on Iowa's USDA State Technical Committee and subcommittees that provide input into wildlife-friendly programs like WRE, CRP, and EQIP. Some DNR Private Lands Wildlife Biologists and District Foresters are co-located in NRCS offices to promote close interaction between the DNR, USDA staff and private landowners. All of these avenues should continue to be utilized to promote the concepts and management recommendations identified in this Plan.

Iowa has four US Army Corps of Engineers Reservoirs in the state. These reservoirs not only hold back flood waters but also comprise thousands of acres of habitat including lake, upland and wetlands. Both the DNR wildlife and fisheries staff work with the USACOE to manage not only the water habitat for fish but also through long term agreements to develop the habitat in the upper limits of the reservoirs for wildlife.

Iowa's eastern and western borders are defined by major river systems. DNR fisheries and wildlife staff are heavily involved with cooperative projects that involve the border rivers - Upper Mississippi River Conservation Committee (UMRCC), Mississippi Interstate Cooperative Resource Association (MICRA), Fish and Wildlife Interagency Committee, Upper Mississippi River National Wildlife and Fish Refuge and Port Louisa National Wildlife Refuge Comprehensive Conservation Plans (CCP), Upper Mississippi River Restoration Program (UMRR): including Upper Mississippi River Restoration Coordinating Committee (UMRR-CC), Long Term Monitoring (UMRR-LTRM), Habitat Rehabilitation and Enhancement Projects (UMRR-HREP), and Analysis team. Water Level Management Task Force, and Mississippi River Mussel Coordination Team.

DNR fisheries personnel are involved with the Missouri River Natural Resources Committee (MRNRC), the MRNRC Fish Technical Committee, Missouri River Mitigation Committee, Master Manual Review Committee, MICRA, MICRA Paddlefish/Sturgeon Recovery Work Group, USFWS Fish Passage Grants, and USACE Missouri River Recovery Program. They also coordinate fisheries issues with the eight MRB states to develop Missouri River recovery and ecosystem restoration plans.

Iowa DNR fisheries research personnel coordinate shallow lakes management investigations with Minnesota DNR and Wisconsin DNR. Iowa DNR fisheries culture personnel work with drug (fish disease) issues with many state and federal agencies. Iowa DNR is represented on the Topeka Shiner recovery team. Fisheries biologists with Topeka Shiner populations in their management areas in Iowa work with the USFWS on critical habitat and habitat restoration on private land.

Aquatic nuisance species (ANS) issues are addressed by Iowa DNR fisheries personnel with support from several partnerships including the ANS Task Force, AFWA Invasive Species Committee, Mississippi River Basin Panel on ANS, Missouri River ANS Work Group, Midwest Invasive Plant Network, and Upper Mississippi River Asian Carp Coordination Team.

DNR staff members also serve on a number of national and regional committees, which provide opportunities for review of plan activities and integration of conservation actions in other wildlife programs:

- Association of Fish and Wildlife Agencies and associated Committees
- Flyway Councils
 - The Mississippi Flyway Council
 - Mississippi Flyway Council Technical Section
 - Mississippi Flyway Council Nongame Technical Section
- Joint Ventures
 - Prairie Pothole Joint Venture Technical Committee and Board,
 - The Upper Mississippi River and Great Lakes Joint Venture Board,
- Midwest Landscape Initiative
 - Steering Committee, Technical Committee, and Work Groups
- Midwest Association of Fish and Wildlife Agencies (MAFWA) Technical Working Committees
 - Midwest Deer and Turkey Study Group
 - Midwest Furbearer Group
 - Midwest Private Lands Working Group
 - Midwest Public Lands Working Group
 - Midwest Pheasant Study Group
 - Midwest Wildlife and Fish Health Committee
 - Midwest Climate Change Technical Committee
 - Midwest Wildlife Diversity Technical Committee
 - Midwest Human Dimensions & Social Science Technical Committee
 - MAFWA Hunter & Angler Recruitment & Retention Committee
- Upper Mississippi River Conservation Committee

Chapter Ten

The Costs and Benefits of Sustaining Iowa's Natural Resources

Background

The costs of reaching the goals outlined in this Plan exceed the historic levels of conservation funding in Iowa. Hunters and anglers have funded most wildlife conservation. National and state trends indicate that the number of participants in hunting and fishing is declining. To reach the goals established in this Plan a broader spectrum of Iowans must invest in conservation. Supporting the Wildlife Action Plan will benefit the health of wildlife and people. Investing in cost-effective conservation will safeguard Iowa's natural resources for the generations to follow.

Annual Costs

The annual cost to bring the amount of permanently protected acres to 4% of Iowa by 2030 is estimated to be \$397 million (Table 10-1). At the current pace for land protection, this value is \$103,808,300 annually and will take Iowa a little more than 19 years to complete. Costs to implement the habitat management, research and surveys and other activities needed to implement the Plan are listed in Table 10-2. Combining habitat protection, habitat management, survey and research costs brings the total funding needed for implementation of this Plan to approximately \$165 million per year. The annual funding shortfall for implementation of this Plan is about \$127 million (Table 10-3).

Tracking Progress toward the Land Protection Goal

Land protection is a combination of land purchases and conservation easement purchases. Iowa DNR buys land *only* from willing sellers, and *only* at or below appraised value. Conservation easements can last for any number of years, depending on the easement program. For example, some Farm Bill conservation programs such the Wetland Reserve Easements Program (WRE), provide funding only for permanent easements. Iowa currently has 193,529 acres enrolled in USDA easement programs (about 40% of which are now also in public ownership).

When this Plan was first developed in 2005 it was estimated that approximately 604,000 acres were publicly-owned, and that approximately 650,000 acres of Iowa were permanently protected for conservation purposes. While the DNR maintained a GIS database of conservation and recreation lands, all entities protecting land were not uniformly able to submit their data on land protection efforts on a regular schedule. Having the Plan in place highlighted the importance of compiling this information across organizations. In the intervening decades, Iowa has improved its estimates through a combination of technological advances and increased coordination among conservation entities.

In 2015, the number of publicly-owned conservation acres was estimated to be 895,000. After private WRP and EWP easements were added, then the estimated number of permanently protected acres became 1,002,655. In addition, we estimated ~32,000 acres of private conservation easements, for a total of 1,034,655 protected acres.

As of 2025, there are 961,310 acres in public ownership (2.67% of Iowa). There are an additional 212,686 (193,529 USDA + 19,157 Conservation/Recreation acres) of known easements, resulting in a total of 1,173,996 protected acres, which represents 3.26% of Iowa.

Rate of Land Protection

In the past decade, approximately 139,341 acres of land in Iowa have been permanently protected through a combination of fee-title purchase and easements. This figure likely reflects improved reporting from cities and counties of land already in their possession prior to 2014, but if we assume that is not the case and that all gains in acres have been through acquisition or permanent easements, approximately 13,934 acres are protected annually.

Challenges to attainment of the original habitat goal remain considerable. The *original* goal to achieve permanent protection of 4% of Iowa's acres in 25 years would have required a rate of 31,600 acres protected per year. The rate between 2005-2014 was more modest: approximately 8,350 acres/year (both easements and acquisition). Between 2015 and 2024, the pace of land protection was approximately 13,934 acres/year (both acquisition and easements). The

remaining habitat needed to double the 2005 amount of land permanently protected in Iowa to 1,440,000 acres (4% of Iowa) would require a rate of land protection of ~53,333 acres/year between 2026 and 2030. That rate is about 3.8 times the current pace of land protection in Iowa. At the current rate of 13,934 acres protected per year, it will take 19.1 years to protect the remaining 266,664 acres needed, meaning that the habitat goal is more achievable by 2055 than 2030.

The cost per acre of land has influenced the amount of land protection that can be accomplished with a limited budget. The average cost/acre of land protected between 2005 and 2014 was just under \$2000, and the trend over that period was that the cost of land protection roughly doubled. In 2005, farmland values in Iowa averaged \$2900/acre. In 2014, average farmland values were closer to \$8000/acre (CARD, 2015). Between 2015 and 2024 these values changed such that the average cost/acre of land protected was \$8,886/acre. In 2015, the average acre cost \$7,633 but by 2024, this had risen to \$11,467 per acre (Chandio 2024). Low quality farmland was valued at \$7,450 per acre (Chandio 2024). Average cost-per-acre estimates aren't directly applicable to the types of lands acquired for conservation purposes, as public conservation land in Iowa is marginal for agricultural uses, with an average Corn Suitability Rating (CSR) of 32.1. The cost of farmland is presented here to illustrate the demand for land in Iowa as well as the variability of that demand over relatively short periods of time, all of which influence the cost of land protection.

Table 10-1. Cost to Double the Amount of Permanently Protected Conservation Land in Iowa

Habitat Protection Needs	Acres and Dollar Amounts
Acres in Iowa	36,000,000
Acres Protected Goal (4% of Iowa)	1,440,000
Current Acres Permanently Protected 2025 (3.26% of Iowa) (Public Ownership + Private Wetland Easements)	1,173,996
Additional Acres Needed	266,644
Cost/acre (2024) for marginal (low quality) land	\$7,450
Total Cost	\$1,986,646,800
Cost/Year (5 years, if attempting to reach goal by 2030)	\$397,329,360
Cost/Year using current annual land protection rate (13,934 acres per year)	\$103,808,300

Existing Sources of Funds

(estimated based on mean contributions to land protection over past 10 years)

Dedicated Funds	
Iowa Habitat Stamp	\$1,200,000
Iowa Migratory Bird Stamp	\$50,000
REAP License Plate Fund	\$270,000
Sub-total	\$1,520,000

Appropriated Funds (subject to debate or use for other purposes)

Federal NAWCA	\$900,000
Federal Farm Bill Conservation Easement Programs	\$9,500,000
Federal SWG	\$50,000
US FWS Land & Water Conservation Fund	\$65,000
Wildlife & Sport Fish Restoration (Pittman-Robertson)	\$3,000,000
REAP Public-Private	\$325,000
REAP Open Spaces	\$6500,000
Sub-total	\$14,490,000

Habitat Protection Needs	Acres and Dollar Amounts
Non-State and Federal Donations	
CCB's (using Habitat Stamp, REAP and 25% match)	\$4,700,000
INHF/PF/DU/NWTF/TNC & Individual Landowners	\$2,100,000
Sub-total	\$6,800,000
Available Per Year	\$22,810,000
Annual Shortfall to reach land goal in 2030	\$374,519,360
Annual Shortfall at current land protection pace	\$80,998,300

Table 10-2. Cost to manage public lands, provide technical assistance to private landowners, and conduct research & monitoring needed for wildlife population management, in accordance with this Plan's goals.

Wildlife Habitat Management & Science	Dollar Amounts
Public Land Management	\$48,800,000
Private Lands Assistance	\$9,525,000
Education	\$2,050,000
Recreation	\$2,050,000
Science & Monitoring	\$6,800,000
Total Annual Needs	\$61,225,000
Existing Funds	
Public Land Management	\$11,8000,000
Private Lands Assistance	\$1,150,000
Science & Monitoring	\$2,040,000
Total Available	\$14,990,000
Annual Shortfall	\$46,235,000

Table 10-3. Estimated funding needs for full implementation of Plan.

Combined Annual Costs	Dollar Amounts
Needs – Land Protection at current pace	\$103,808,300
Needs – Habitat Management & Science	\$61,225,000
Annual Needs Combined	\$165,033,300
Funds Available – Land Protection	\$22,810,000
Funds Available – Habitat Management & Science	\$14,990,000
Annual Funds Available Combined	\$37,800,000
Annual Shortfall – Land Protection at current pace	\$80,998,300
Annual Shortfall – Habitat Management & Science	\$46,235,000
New Funds Needed Annually:	
Total	\$127,233,300

Funding for Wildlife Action Plan Implementation

State & Tribal Wildlife Grant Program

At the national level, the sole funding source with the stated purpose of conserving SGCN and their habitats is the State & Tribal Wildlife Grant Program. Congress created the State Wildlife Grant (SWG) Program in 2000 and the Tribal Wildlife Grant (TWG) Program in 2001 to provide critical funding to state, territorial, commonwealth, District of Columbia (D.C.), and tribal fish and wildlife agencies to conserve at-risk fish and wildlife. These programs are administered by the U.S. Fish and Wildlife Service's Office of Conservation Investment. These programs filled a significant void in conservation funding for conservation reliant wildlife species and spurred new partnerships (U.S. Fish & Wildlife Service 2020). However, this funding is subject to the annual appropriations process in Congress. Funding appropriated to the STWG Program has varied over time (Figure 10-1).

In order to be eligible for SWG funding, State Agencies must have an approved State Wildlife Action Plan (SWAP). The funds are required to be used only to:

- Meet the needs of species of greatest conservation need or their habitats through activities that are identified in a State's Plan, as approved by the U.S. Fish & Wildlife Service Director, such as research, surveys, species and habitat management, and monitoring;
- Update, revise, or modify a State's Plan; or
- Address emerging issues affecting wildlife or their habitats that are not identified in a State's Plan. An emerging issue is a critical problem that needs attention or an unexpected and recently recognized opportunity that a State wants to address with Program funds.

The funds are divided among the states using a formula based partially on each state's land area and partially based on each state's population. Iowa's annual allocation is, on average, 1.23% of the full allocation for all states & territories.

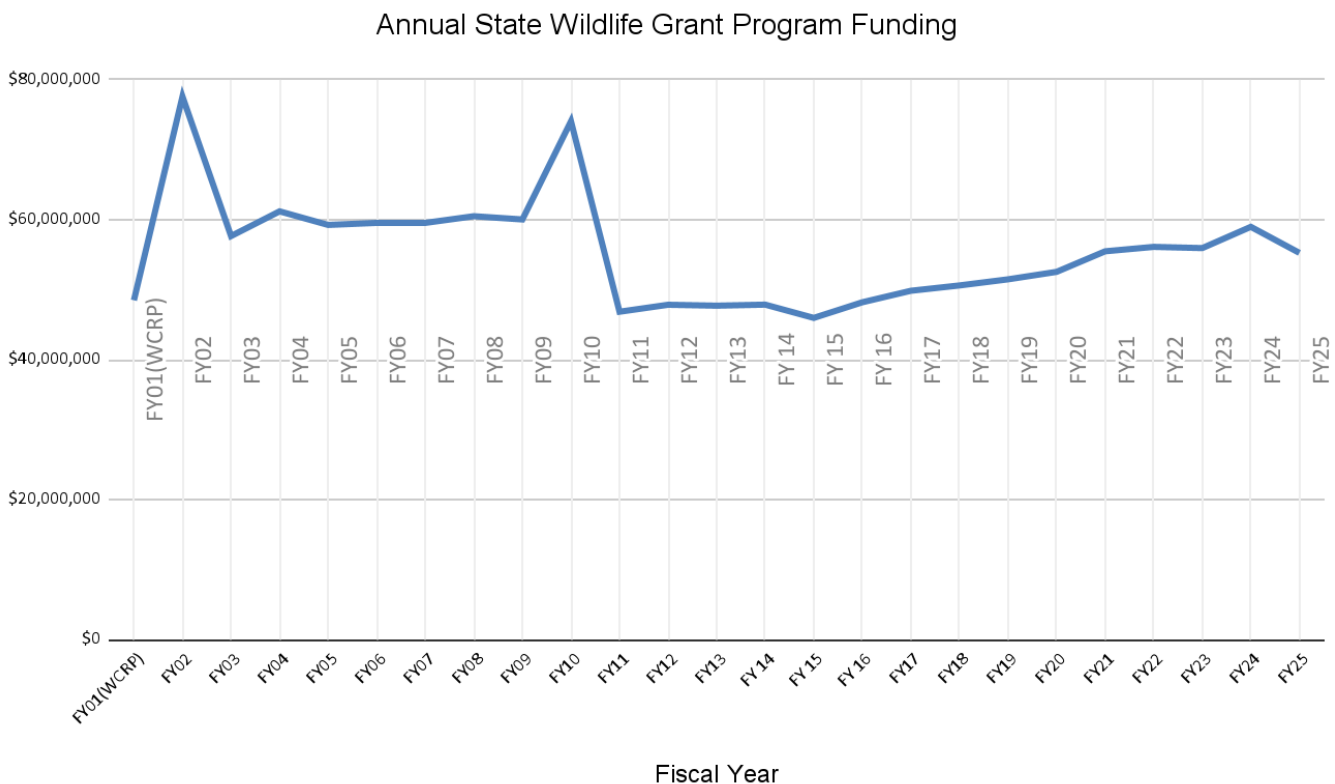


Figure 10-1. Annual State Wildlife Grant apportionments to States and Territories each fiscal year since program initiation. Amounts displayed reflect the amount available for States & Territories after deducting Tribal Grants, administration costs, and allocation to the competitive sub-program.

States are required to provide match (match requirements vary depending on the type of project being funded), and therefore SWG funds are leveraged to bring state and local funding to conservation efforts. This program has allowed Iowa to carry out a wide range of projects, including the Multiple Species Inventory & Monitoring Program discussed in

Chapter 7, habitat management on public and private land, and much needed research on the conservation needs of rare species. Chapter 11 describes a few of these projects in more detail.

Other Funding Sources

While STWG is the only program that is specifically intended to address the needs outlined in SWAPs, there are some other funding sources at the national, state, and local levels that also play a role in Plan implementation. The conservation community in Iowa continually seeks to leverage existing resources to attract additional resources to the implementation effort. Some examples of other funding sources that have been used to address the goals of this Plan include:

Federal Funding:

- [Cooperative Endangered Species Conservation Fund](#) (CESCF, also referred to as “Section 6” funding) grants. This is funding from the U.S. Fish & Wildlife Service available to State Fish & Wildlife Agencies for the benefit of species listed as Threatened or Endangered. Authorized by Section 6 of the Endangered Species Act, and partly funded through the Land and Water Conservation Fund, CESCF grants support the implementation of state and territorial programs that address the needs of federally listed and at-risk species.
- [North American Waterfowl Conservation Act \(NAWCA\) grants](#). This program is designed to benefit migratory birds that rely on wetlands by protecting, restoring and/or enhancing the nation’s wetlands and associated upland habitats.
- Wildlife Restoration and Sportfish Restoration Programs. These programs are administered to States by the USFWS Office of Conservation Investment. Funding comes from excise taxes on the sale of hunting and fishing gear, and is allocated based on formulas that include the number of license buyers in the state.

State Funding:

- [Resource Enhancement and Protection \(REAP\)](#) program. This is a State of Iowa program that invests in the state’s natural and cultural resources. REAP has a broad array of individual programs for which funding is allocated through a formula, after the legislature sets the total amount for the year. Some aspects of REAP funding can be used to implement the actions outlined in this plan. This funding source also allows Iowa to leverage federal funding for Plan implementation
- [Fish & Wildlife Trust Fund](#). This program uses money generated primarily from hunting, fishing, and trapping license fees as well as habitat stamp fees, donations from the Chickadee Tax Checkoff, and boat registration fees. It is protected by the Iowa Constitution from diversion for other purposes aside from regulation, research, management, education, and habitat protection of Iowa’s fish & wildlife resources. This fund, along with the Wildlife Restoration program described above, provides the foundation of funding upon which Iowa’s Wildlife Management Areas are protected and managed. These funding sources were originally initiated by hunters and anglers to protect and manage fish and game, and the habitat that supports them, as well as to provide places for outdoor recreation. These programs have also benefited a wide array of fish, wildlife and plants in Iowa, as well as areas for Iowans to appreciate nature.

County Funding:

- Iowa is fortunate to have a system of [County Conservation Boards \(CCBs\)](#). Across Iowa, CCBs own and/or manage almost 200,000 acres of parks, natural areas, preserves and trails. CCBs also take a lead role in [Iowa’s Integrated Roadside Vegetation Management](#) (IRVM) and programs for natural resource education and recreation.

Non-Profit Funding:

- Non-profit organizations that support wildlife conservation or land and water protection are critical to Plan Implementation. These organizations often contribute non-federal funds which can leverage federal grants. They also contribute in a multitude of other ways (e.g., raising public awareness of and engagement in conservation, volunteering time and supplies, providing information and expertise). Conservation in Iowa is nearly always conducted because of partnerships. Please see Appendix 20 for webpage links to partner organizations that contribute to Plan implementation.

Iowa is fortunate to have a community of conservationists full of dedicated and talented individuals, who engage from a variety of perspectives, whether they are wildlife, forestry, or fisheries professionals, ‘amateur’ wildlife enthusiasts who frequently embody vast expertise and deep understanding of certain taxa, or educators, researchers, and academicians. They may also represent non-profit conservation or scientific organizations, educational institutions, state, local, or federal governmental agencies, or may simply be volunteering their time to support community science or conservation initiatives. This community is inspirational in its boundless energy, commitment, and creativity.

Benefits of Sustaining Biodiversity in Iowa

Economic Benefits

Outdoor recreation is a significant economic driver in Iowa as demonstrated by several key metrics. According to the Bureau of Economic Analysis (BEA), in 2023, the outdoor recreation economy contributed \$5.3 billion to the nation’s Gross Domestic Product (GDP), and Iowa was ranked 36th nationally with a 2.1% share. This sector’s economic impact extends beyond direct spending, encompassing a wide range of goods and services.

The outdoor recreation economy includes:

- Direct spending: User expenditures on equipment, gear, travel, food, lodging, and entrance fees.
- Industry and recreational services: Contributions like salaries, wages, and transportation.

In 2023, Iowa’s outdoor recreation sector was responsible for 46,000 jobs and \$2.19 billion in wages, according to BEA data.

Iowa’s parks and recreational activities are major contributors to the state’s economy. In 2024, despite the closure of three campgrounds for the entire season, Iowa State Parks recorded an impressive 13,714,545 visits. County Parks, a unique feature of Iowa’s recreational landscape, are estimated to receive a comparable number of visits. The population of Iowa was approximately 3,210,000 in 2024.

Data compiled by Headwaters Economics from the 2023 BEA report highlights the economic power of these activities:

- RVing, tent camping, and hiking: These activities alone contribute \$456.8 million to Iowa’s GDP.
- Hunting and fishing: These activities contributed at least \$115.8 million to Iowa’s GDP and in 2024, Iowa sales totaled 587,390 licenses.
- While BEA data does not specifically track wildlife watching, national trends indicate that these enthusiasts contribute significantly to the economy through travel, equipment purchases, and backyard bird feeding activities.

Other work shows similar contributions. In Iowa, fishing for sport supports 5,880 jobs, generates \$859 million in economic activity, and produces \$55 million in state and local tax income (Scuderi et al. 2024a). Hunting and target shooting supports 7,740 jobs, generates \$977 million in economic activities, and produces \$72 million in state and local tax income (Scuderi et al. 2024b, c). Although estimates were not available for wildlife watching in Iowa, national results indicate that wildlife watchers spend \$2,188 per person on their hobby, and that the sport is growing while hunting and fishing activities decline (USFWS 2023).

Regardless of whether the analysis focuses specifically on the economic contributions of fish and wildlife or outdoor recreation more broadly, the conclusion is clear: conservation is a solid investment for Iowa. The data consistently show that protecting and managing the state’s natural resources has a direct and positive impact on its economy, creating jobs and generating substantial revenue.

Other Benefits

Nature provides many benefits and services to people (clean air, clean water, food, crop pollination, medicine, aesthetics, relaxation, recreation, etc.), some of which cannot easily be translated into monetary values. Below are some examples of the types of benefits provided by natural communities in Iowa:

Wetlands

- Groundwater recharge
- Flood attenuation
- Hunting opportunities
- Aesthetics
- Nutrient removal (clean water)
- Habitat for diverse plant and animal communities
- Reduction in flashiness of hydrologic system

Box 10-1

“Someday we may need this prairie flora, not only to look at but to rebuild the wasting soil of prairie farms. Many species may then be missing. We have our ears in the right place, but we do not yet recognize the small cogs and wheels.”

Forests

- Habitat for diverse plant and animal communities
- Recreation (e.g., hiking, camping, hunting)
- Aesthetics
- Generation of wood products
- Carbon storage
- Air quality

Grasslands

- Soil quality
- Water quality
- Carbon storage
- Aesthetics
- Habitat for diverse plant and animal communities
- Recreational opportunities

These benefits are sometimes referred to as “ecosystem services.” The values of ecosystem services have not regularly been captured in monetary terms, but frameworks are being developed (Brander et al. 2024). For example, there is now an [Ecosystem Valuation Database](#). Hopefully, future analyses of the return on investment for conservation expenditures will continue to incorporate more ecosystem services in order to more accurately capture the costs and benefits of conservation investments.

To learn more about priorities for outdoor recreation in Iowa, please visit the [Iowa Statewide Comprehensive Outdoor Plan](#).

Conclusion

Iowans value natural resources. A 2022 survey of Iowans found that Iowans view outdoor recreation as providing the following personal benefits (Responsive Management, 2022):

- A sense of peace, relaxation or stress relief (95%)
- Positive family activities (92%)
- Mental or emotional health (92%)
- Health & fitness (93%)
- Healthy childhood development (86%)
- The healing power of the outdoors (85%)
- Adventure or challenging activities (75%)

A 2018 survey asked Iowans for their views on how fish and wildlife management is currently funded at the state level, and how management should be funded in the future (Dietsch et al. 2018). The survey respondents included representatives of the hunting and angling communities as well as non-hunters / anglers. The survey question was asked on a 7-point scale ranging from entirely funded by hunting and fishing license fees (license fees) to equally funded by license fees and public tax funds (public taxes) to entirely funded by public taxes. Perceptions of current funding and preferences for future funding were similar, with 79% of respondents indicating that a mix of license fees and public taxes do, and should continue to, fund fish and wildlife conservation. The results of this survey indicate that a majority

of Iowans, regardless of hunting or fishing participation, support a balance of funding sources for fish and wildlife conservation.

Iowa citizens are strongly in favor of investments in conservation. In a 2013 bipartisan, statewide survey of voters, 97% of respondents agreed (76% strongly agreed) with the following statement (FM3 and POS, 2013):

“We need to ensure that our children and grandchildren can enjoy Iowa’s land, water, wildlife and natural beauty the same way we do.”

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Chapter Eleven

Implementation Highlights

Introduction

The Wildlife Action Plan (Plan) serves as a guide for conservation efforts seeking to improve Iowa's ecosystems and the status of wildlife populations across the state. Many agencies, organizations, and private individuals in Iowa are dedicated to the goal of conserving wildlife, an effort that consistently requires cooperation among many stakeholders. This chapter highlights a small portion of the work being done in Iowa to ensure people will continue to enjoy Iowa's wildlife and their ecosystems for years to come. Chapter 6 outlines the larger vision for wildlife conservation in Iowa and the conservation actions required to achieve that vision. This chapter features efforts in Iowa that have applied that vision from words on a page to real actions that benefit wildlife.

Implementing the IWAP through Cooperative Natural Resources Management

Vision #1: Iowa will have viable wildlife populations by the year 2030

Conserving viable wildlife populations requires keeping common species common and increasing populations of Species of Greatest Conservation Need to self-sustaining levels. Information about the distribution and abundance of wildlife populations is crucial to these efforts so managers can focus their work on target species and ecosystems and understand the impact of their work. The Multiple Species Inventory and Monitoring Program and the Volunteer Wildlife Monitoring Program have arisen as tools to understand the distribution and status of wildlife throughout Iowa. When combined with long-standing survey methods for game species, the collective body of monitoring efforts allows managers to target help for populations that are in decline through specific habitat management and protection actions, as well as reintroduction of species, where appropriate.

The Multiple Species Inventory and Monitoring Program



MSIM Aquatic Surveys

The largest effort directed towards increasing knowledge about the status of Iowa's non-game wildlife is the Multiple Species Inventory and Monitoring (MSIM) program. Seasonal field technicians are employed each year through a partnership between Iowa State University and the Iowa Department of Natural Resources to survey for fish, mussels, crayfish, amphibians, reptiles, dragonflies, damselflies, birds, butterflies, and mammals, and to conduct habitat assessments across the state (see Chapter 7 for a more detailed description of the program). The MSIM program data collection was launched in 2006, has produced 20 years of data through 2025, and continues to inform wildlife experts on the status of Iowa's wildlife populations. This information helps ensure that conservation management is appropriate and effective. A few exciting records from the MSIM program have been the documentation of the extremely rare Olympia

marble butterfly in 2014, the first state records of stream cruiser and spring time darter in 2012, and in 2024 the first documentation of the starhead topminnow in more than 85 years.

Citizen Science: The Volunteer Wildlife Monitoring Program

Iowans contribute directly to wildlife monitoring through the Volunteer Wildlife Monitoring Program. This program makes it possible to track a larger number of species than the Iowa Department of Natural Resources would be able to keep up with on its own, and is a meaningful way for Iowans to learn about and contribute to wildlife conservation. The DNR partners with citizens to help monitor frogs and toads, nesting bald eagles, peregrine falcons, ospreys, and bats.



Volunteer Wildlife Monitoring Program Training

Bolstering Iowa's Wildlife Populations through Relocation and Reintroduction

"Wildlife conservation programs have returned adaptable wildlife like deer and wild turkey to our forests, Canada geese and trumpeter swans to our wetlands, bald eagles and peregrine falcons to our skies, and river otters to our streams." - IWAP Chapter 6



Nesting Trumpeter Swans - Photo by Jayden Jech

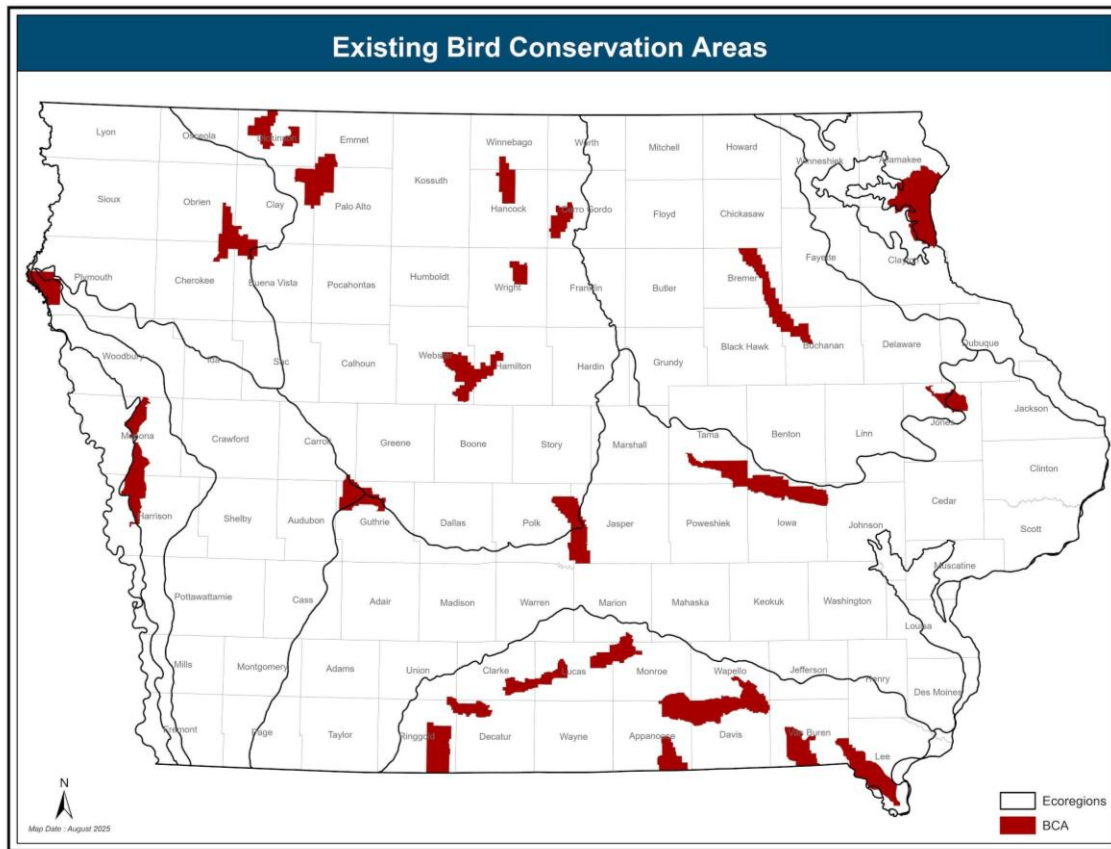
Efforts to restore wildlife populations through relocation and reintroduction have been going on in the state since the early 1900s. They began with game species and eventually expanded to non-game species as well. Since the 1990s, wildlife biologists at the Iowa DNR have partnered with other agencies, organizations, and motivated citizens to reintroduce or translocate trumpeter swans, greater prairie chickens, peregrine falcons, osprey, barn owls, Higgins eye pearly mussels, and pallid sturgeon. Some of these reintroductions were highly successful, such as the ever-growing and thriving population of breeding trumpeter swans seen around Iowa. The program has been so successful, in fact, that this Plan downlisted the once-extirpated swan to no longer be a species of conservation need in Iowa: a true conservation success story.

Vision #2: Provide healthy ecosystems that incorporate diverse, native habitats capable of sustaining viable wildlife populations.

The second vision of the Plan requires permanently protecting, restoring, and reconstructing habitat across the state. This goal could not be achieved without cooperation between natural resource agencies and non-government organizations to identify important habitat types, landscapes, and travel corridors in all regions of the state. Work has already been done to identify high opportunity areas for conservation actions. These areas are determined based on combined data from various conservation entities across the state on the regions that contain key habitat for wildlife. Prioritizing conservation efforts in those areas is important for providing essential ecosystems for wildlife. This information is also useful for providing private land owners with technical guidance on how to benefit wildlife on their land, which is especially important in Iowa, where the majority of the land is privately owned.

Iowa's Bird Conservation Areas

The Bird Conservation Area (BCA) program was established in 2001 by the Wildlife Diversity Program of the Department of Natural Resources as part of the North American Bird Conservation Initiative (NABCI). NABCI is a broad collective of national and international bird conservation efforts directed towards reducing the serious declines in North American avian species that have been observed over the last three decades. Although the BCA program was established before the Plan was written, it has been an exemplary mode of Plan implementation, serving to achieve multiple Plan goals.



There are no legal regulations that come with the establishment of a BCA. Rather, these places serve to encourage and focus protection in areas where birds and other wildlife are most likely to benefit. The BCA model is based on research suggesting that viable bird populations require habitat spread across a large landscape. Under this model, a BCA must be at least 10,000 acres in size, with a minimum area of 2,000 acres at the core being permanently protected. In addition to the core area, blocks of habitat greater than 40 acres need to be scattered throughout the complex. A portion of these blocks are on public land that is managed for bird habitat. Private pastures, easements, prairie remnants, and land that is idle, or land enrolled in a Conservation Reserve Program (CRP) can also help meet the habitat requirements within the BCA.

NABCI designated three bird conservation regions in Iowa: Eastern Tallgrass Prairie, Prairie Potholes, and Prairie-Hardwood Transition. Iowa now has at least one Bird Conservation Area in each of the three regions that serve to conserve woodland, savanna, wetland, and grassland habitats. Seven BCAs have been strategically positioned to extend up to a state border in order to encourage partnership with other states.

Stream restoration for freshwater mussels

Water quality is the focus of many conservation efforts in Iowa. People and wildlife, in Iowa and beyond, stand to benefit from the positive outcomes of programs and projects being implemented across the state that seek to improve water quality. Aquatic species are particularly vulnerable to poor water quality, and Iowa's declining mussel populations are one indicator of the need to implement practices that



Stream restoration project

improve Iowa's aquatic ecosystems. One example of work being done to improve water quality and aquatic ecosystems is a restoration project conducted from 2016 to 2021 through a cooperation among a private landowner, four county conservation boards, and the Iowa DNR in Clay, Dickinson, Lyon and Osceola counties. This project sought to benefit mussels using three different approaches. One approach was to create low areas along stream and river banks where floodwater can spread out and slow down, which helps reduce erosion and allows sediment to settle out of the water. Another was to place boulders in streams, which creates riffles that increase oxygen in the water, create space where mussels and their fish hosts can be protected during strong flows, and increase access to food. The third strategy was to add native prairie buffers along streams and rivers, which reduces erosion and nutrient run-off that negatively impact water quality. This project directly improved more than 50 acres of aquatic habitat for mussels and also included mussel releases and population monitoring.

Enhancing and expanding native prairies for butterflies

Iowa was once primarily covered in an abundant, diverse prairie. Restoring and reconstructing prairie ecosystems in Iowa benefits many different wildlife species and creates excellent opportunities for people to enjoy the beauty of Iowa's natural resources. Much of Iowa's wildlife specifically depends on prairie ecosystems to survive. Two examples of this are the monarch and the regal fritillary. Restoring prairie ecosystems in Iowa that benefit these two species requires ensuring that the milkweeds that monarch larvae eat and the violets that regal fritillary larvae eat are present among the many other prairie plants. In addition to plants for larvae, the adult butterflies need certain plants for nectar. There are many ongoing efforts to restore ecosystems that support pollinators in Iowa. One large-scale project that was done from 2017 to 2021 focused on improving existing prairies by removing trees, shrubs, and invasive plants and implementing prescribed fire to prevent the return of woody species. The project also focused on restoring and reconstructing additional prairies with a high diversity of native broad-leaved flowering plants, especially those that monarchs and regal fritillaries need. This project leveraged the Iowa DNR Prairie Resource Unit to grow birdfoot violets to be planted in the prairies. This project helped improve more than 5,900 acres of existing prairie, and 109 new acres of prairie were planted on public land. Private landowners are essential for the success of habitat restoration and management efforts. This project included one-on-one meetings with landowners in the focus area, and financial assistance was leveraged to support interested landowners who wanted to manage prairies on their properties. Over 350 acres of private land across 11 different properties were improved to support monarchs and regal fritillaries for this project.



Regal fritillary

Putting Iowa SGCN on the map

A collaboration between Iowa State University and the Iowa DNR used MSIM data and modern, sophisticated statistical procedures to create species distribution maps for more than 100 species of conservation concern across the state. As explored in Box 7.1 in Chapter 7, these maps can be combined to highlight hotspots of biological diversity across the state or leveraged by local land managers to understand species likely to benefit from conservation actions.

Vision #3: Develop diverse wildlife communities through science-based adaptive ecological management.

Sustaining the diversity of wildlife within the state requires managing a variety of native ecosystems. Prairie once covered over 80% of Iowa's landscape. Trees, shrubs, and wetlands were interspersed within the expanse of grassland, creating a wide variety of habitat that supported a huge diversity of wildlife. Now, less than 0.1% of this native prairie habitat remains and managers are working to recreate prairie ecosystems through a variety of restoration techniques. Land managers strive to create habitat diversity and connectivity across the state in order to provide high quality habitat and winter cover for many different species. This improves the survival and reproduction of species of conservation concern and helps increase local populations of wildlife. The management plans implemented across the state use methods that have been successful in the past to support healthy wildlife populations and also incorporate innovative approaches to solve ecological problems in a variety of ways.

Restoring native ecosystems is only one component of wildlife management. With much of the landscape being used for agriculture, it can be difficult for species to find areas that fit their specific needs. For instance, reptiles require places to hibernate through the winter and areas to bask during cool periods in order to regulate their body temperature. The Grand River Unit in southern Iowa repurposed a large pile of unused riprap at the headquarters in order to construct a snake hibernaculum and basking area. A long trench was dug and the riprap was placed in the trench. It was then covered with soil, leaving rock exposed to the south for the entrance and basking area. The snakes crawl in through the spaces in the rocks and make their way underground where they will be protected from freezing in the winter. A similar structure was built for snakes at McCoy Wildlife Management Area in Boone County Iowa and a turtle hibernaculum was created there as well. These structures were created based on designs provided by the Natural Resources Conservation Service which employs engineers to create a wide variety of designs for conservation efforts.

Another important component of land management is invasive species control. Invasive species tend to spread aggressively and take over an area. When this happens, they choke out native plants, reducing species diversity and making ecosystems less suitable for wildlife. Invasive plant species are often removed from an area through chemical sprays or mechanical approaches which include pulling plants by hand and mowing. These approaches have varying levels of effectiveness depending on the hardness of the plants and the persistence of treatments.

Vision #4: More Iowans will participate in wildlife-associated recreation, and all Iowans will have access to publicly owned recreation areas to enjoy wildlife in its many forms.

Iowa continues to expand wildlife-associated recreation opportunities through land protection, programming, and maintaining public access to public land. Chapter 10 discusses the gains in public land holdings over the past 10 years. One example of a new public area is the Heritage Hills Wildlife Management Area (WMA), which started out as a 700-acre WMA in Warren County in 2019. About an hour drive from downtown Des Moines, this WMA has expanded to several units that span about 2,300 gently rolling acres in Warren, Clarke, and Madison counties. The managers emphasize restoration of remnant prairie, combatting encroachment of cedar trees into grassland areas, and controlling invasive species.

In an effort to provide useful information and resources for bird watchers, DNR consulted with a focus group to find out what the needs of the birdwatching community are. Having received guidance from that group that the existing DNR resources weren't all that useful and that the best place for DNR to focus its efforts is with beginning bird watchers, the Department compiled resources for novice bird watchers into a landing page that addresses the gaps identified by the focus group.

- [DNR Birding](#) webpage

Vision #5: Iowans will respect wildlife for its many values and they will advocate effectively for conservation of wildlife and wildlife habitats.

Providing opportunities for people to experience wildlife firsthand is one of the best ways to pique their interest in outdoor recreation and appreciate the benefits of having healthy and diverse wildlife populations. Getting people involved in outdoor activities also contributes to the state's economy and increases public health. Iowa has over 450 state-managed wildlife areas and numerous county wildlife areas, state forests, and other public areas across the state that are open to the public for hunting, wildlife viewing, and other outdoor recreation activities. The DNR website offers user-friendly, interactive maps of these areas to help people find public areas near their home or favorite vacation spot in the state. The many conservation efforts ongoing on private land also provide people with opportunities to enjoy Iowa's wildlife and native ecosystems right in their own backyard.

- [DNR Public Hunting Atlas](#) webpage
- [DNR Private Landowner Assistance](#) webpage

Vision #6: Stable, permanent funding dedicated to wildlife management at a level adequate to achieve plan goals

Chapter 6 states that in order to achieve this vision, there will need to be a marketing campaign to convince citizens, conservation professionals, activists, leaders, and lawmakers of the need to fund the plan. Although funding has never been dedicated to wildlife conservation at a level adequate to achieve plan goals, partnerships between agencies have

made many projects possible that could not be completed by any entity on its own. Two state based funding sources in Iowa for non-game wildlife are the income tax Chickadee Checkoff and natural resources license plates. At the national level, a few collaborative efforts including the Alliance for America's Fish and Wildlife and Recovering America's Wildlife Act (RAWA) have spotlighted the need for a solution to the problem of inadequate wildlife diversity funding.

The Chickadee Checkoff

The Chickadee Checkoff provides Iowans the opportunity to donate money directly to the Wildlife Diversity Program when they fill out their Iowa 1040 tax form. Although the Chickadee Checkoff was enacted in 1981, long before the publication of the Plan, the money that has been raised through this means has been used to benefit non-game wildlife and has contributed to Plan implementation since the Plan was formed. All of the money donated through the Chickadee Checkoff goes to the Wildlife Diversity Program and helps fund projects that help achieve Plan goals, such as wildlife research, monitoring and restoration, educational events about wildlife, and public land acquisition and management. Over the years, donations to the Chickadee Checkoff have declined. Efforts have been made to spread awareness about the existence of this important funding source for Iowa's non-game wildlife, including the design and distribution of Chickadee Checkoff posters. As an increasing number of people have turned to tax preparation services, the importance of tax preparers' awareness of this option on the tax form has increased. Therefore, members of the Wildlife Diversity Program of the Iowa Department of Natural Resources bring the posters to tax schools where tax preparers are trained, and discuss the importance of the Chickadee Checkoff with those attending the trainings. Postcards are also mailed to those who have donated in previous years, to thank them for their past donations and remind them about the Chickadee Checkoff as the next tax season approaches.



Natural Resources License Plates

Iowans can contribute to wildlife conservation in the state by purchasing one of several natural resources license plates. All of the proceeds from the initial purchase of the plate and the annual renewal fee provide funding for natural resources in Iowa. A portion of the funding is dedicated to the Iowa DNR Wildlife Diversity Program, which focuses on conserving nongame species. They leverage funding from license plates to conserve and restore native ecosystems, monitor threatened and endangered species, and provide public education on the diversity of wildlife that depend on Iowa's ecosystems. Funding from license plates also supports the Resource Enhancement and Protection (REAP) program, which supports county conservation boards, soil and water improvement, city parks and open spaces, preservation of cultural resources, conservation education programs, and other efforts that benefit Iowa's wildlife.

Conclusion

Iowa hosts thousands of vertebrate and invertebrate species in need of conservation and worthy of celebrating for the rich beauty and diversity they bring to our lives. Continuing to develop a diverse base of native ecosystems and movement corridors for wildlife is essential for the preservation of Iowa's wildlife populations. Maintaining Iowa's rich natural resource legacy also creates a wide variety of enjoyable recreational opportunities for Iowans and visitors alike, thereby improving public health and contributing to the state's economy. This chapter highlights just a few of the many projects that are being conducted across the state to preserve and restore Iowa's natural resources as well as provide opportunities for people to enjoy them. As implementation of the Iowa Wildlife Action Plan continues, more benefits will be seen across the state for wildlife as well as for the people who enjoy outdoor recreation and who value wildlife and wild spaces.