THE IOWA WILDLIFE ACTION PLAN

SECURING A FUTURE FOR FISH AND WILDLIFE

CHAPTER SIX

A VISION FOR IOWA'S WILDLIFE IN THE YEAR 2030

Few Iowans are aware that their state 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 them. Wetlands were drained and flocks of waterfowl numbering in the millions that nested here were diminished to a tiny 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 and game fish like brook trout, longear sunfish and grass pickerel disappeared. 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. Numbers of bobwhite quail and jackrabbits have plummeted, pheasants are in a half-century decline and songbirds of our forests and grasslands are declining rapidly. Nearly a third of Iowa's lakes, rivers and streams are considered imperiled waters.

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. Farm programs have placed hundreds of thousands of acres under temporary conservation practices on private land.

But after a half-century of conservation, one-third of all of Iowa's fish and wildlife are still considered in need of immediate conservation to stop their numbers from eventually dwindling into threatened or endangered status. A host of less-visible and specialized wildlife – songbirds, lizards and snakes, frogs and salamanders, fish, freshwater mussels and highly-fragile butterflies among others - is seriously threatened by the disappearance and degradation of their habitats.   Iowa has less than 2 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 social pressures. The pace of conservation efforts has not been able to keep up with the wholesale habitat destruction 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. The highest and best use of most of this landscape is in agricultural production. Nothing in this Plan suggests returning Iowa to its pre-settlement state on any but a small part 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 environments within a landscape dominated by agriculture.

A Vision for the Future

To establish a focus for future wildlife conservation activities, the Advisory Committee to the Iowa Wildlife Action Plan – a group of fish and wildlife professionals, educators, researchers, private conservation organizations, concerned citizens and representatives of the agricultural community - developed a vision for the status of Iowa's wildlife in 25 years. The vision statement has 6 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.

These *vision elements* and *conservation actions* are not specifically designed to be implemented by IDNR. They are designed to provide a broad framework of actions that can be undertaken by conservationists at all levels of government, by private conservation organizations and by private citizens. Extensive coordination will be necessary between these stakeholders to make the vision a reality.

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 Actions:

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

o Develop a balanced program of wildlife conservation by increasing the emphasis on species of greatest conservation need.

o Focus on protection, restoration, reconstruction, connection and enhancement of native plant communities and wildlife habitats.

o Restore viable wildlife populations to suitable habitats through informed relocation and reintroduction programs.

o Develop methods to identify and reduce economic and social conflicts between wildlife and citizens.

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 Actions:

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

° 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.
   — Develop a series of core habitat blocks in the range of 3,000 - 5,000 acres of permanently protected and managed habitat.
   — Evaluate existing permanently protected areas for potential expansion.
   — Work with legislators to implement *smart growth* efforts in these designated core areas.

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

° Provide technical guidance and supplemental cost share programs to private landowners to maximize the benefits to wildlife from Federal land conservation programs.

— 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.
— Expand IDNR's Private Lands Program efforts to meet the needs of SGCN outlined in this Plan.
— Provide for improved coordination of all Federal, state, county and non-governmental organizations private lands programs to efficiently deliver technical assistance to landowners.
— 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.
— Educate all natural resource agencies staff about the Plan.
— Create a central site for all resources of the Plan and make available to natural resource agencies and landowners.

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

Explanation:
Currently only 2% of Iowa's wildlife habitats are permanently protected – 600,000 acres by state, county, or Federal ownership and 57,000 acres on private land in permanent easements. To reach the goal of doubling the amount of permanently protected habitat by 2030, protection through acquisition or easements, restoration, reconstruction and enhancement of critical habitats must be accelerated by 24,000 acres annually. 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 Actions:

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

° 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.
— Provide coordination and implement activities that involve all in-state land management agencies (state, county and Federal) cross state lines and include the Missouri and Mississippi River systems.
— Coordinate all Federal, state, county and NGO's private lands programs to efficiently provide management plans to landowners.
— Implement a statewide private lands management coordination committee.
— Educate natural resource management staff on management needs of species of greatest conservation need.
— Develop standard elements for all public and private land management plans.
— Acquire tools and gather reference materials and make them easily accessible to all natural resource managers and landowners.
— 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.
— 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.
— Develop and implement a statewide strategy to eradicate invasive species.

° 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

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

° 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).

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

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

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.

Goal:
- 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;
- Increasing wildlife-associated recreation will improve public health.

Conservation Actions:
° Make sense of 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.
  — Gather information through the upcoming Statewide Comprehensive Outdoor Recreation Plan (SCORP) survey

° Expand training programs in wildlife-associated recreation skills to increase citizen participation and improve public health.
  — Work with the IDNR outdoor skills committee and associated partners to complete the development of outdoor skills modules,

  — Create a network of lending sites for recreation equipment to teach programs,

  — Provide training for interested teachers, youth leaders, and other educators through formal and non-formal venues.

° 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.

Explanation:
Currently 1.3 million Iowans participate in wildlife-associated recreation. 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 Vision for Wildlife Education

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

Goal: Iowans will understand the relationships between land use, wildlife diversity and abundance, the quality of life for all citizens, and the positive effects wildlife has on Iowa's economy.

Conservation Actions:
- ° 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.)

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

- ° Determine appropriate target audiences based on the overarching goals of this Plan.
    — Determine audience wants and needs through needs assessments
    — Develop appropriate informational materials and distribution venues
    — (Planned surveys include the 2005 needs assessment for SCORP).

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

- ° 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.

- ° 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.

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.

Goal:
- 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 Actions:
° 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.

° 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.

° 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.

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

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. Historically funding for wildlife programs in Iowa has come from hunters and anglers through license fees and excise taxes. All Iowans will receive tangible and intangible benefits when the IWAP is implemented. Presently, 25 percent of Iowans hunt or fish; another 25 percent enjoy wildlife viewing; and 74 percent say they enjoy seeing wildlife during other recreation activities. Wildlife-associated recreation generates $1.5 billion in economic activity annually in Iowa, equivalent to 16,000 jobs. Increasing wildlife habitat will reduce soil erosion, improve water quality, and reduce drinking water costs for all citizens. The costs for implementing the Plan should be borne by all citizens.

CHAPTER SEVEN

RESEARCH, SURVEY,
INVENTORY AND MONITORING

General Discussion

Identifying research and survey efforts needed to restore and enhance SGCN and their habitats is one of the required elements in the IWAP. Plans for monitoring SGCN, habitats, the effectiveness of proposed conservation actions and for adapting these actions to new information or changing conditions is also required. These elements are presented in this chapter.

Although discussed elsewhere in this document, this paragraph clarifies that Iowa understands the importance of monitoring and adaptive management. 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.

As discussed in this and other chapters, Iowa has identified, and will identify in the future, stresses to wildlife and actions that can be taken to alleviate those stresses. Performance measures for the actions have been outlined, and additional measures may be selected in the future as other stresses become apparent. Often, these measures are less obvious than the response of wildlife, but may be more oriented toward the opinions of the public or the success of education programs. However, all measures will be of utmost importance to the success of the IWAP. Following the adaptive management paradigm, should these measures indicate that an action is not working (whether the measure is the public perception of the importance of wildlife or the number of reproductively active small mouth salamander populations), then other actions will be evaluated until an appropriate response is found.

The lack of species-specific information on the abundance and distribution of SGCN was one of the greatest challenges faced in developing this Plan. In some cases species were added to the list simply because information was outdated or unavailable. In spite of the problems identifying fine scale habitats and qualitative differences, the amount and distribution of potential wildlife habitat is comparatively well known.

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.

Appendix 21 contains a partial list of individual wildlife monitoring, survey and inventory projects conducted in Iowa over the past 45 years. A summary is provided in Table 7-1. Many other research studies too numerous to list have provided information on the presence of individual species or groups of species.

Table 7-1. Summary of Wildlife Monitoring, Surveys and Inventories Conducted in Iowa: 1960-2005.

Taxonomic Class	Long Term Monitoring			Short Term Surveys & Inventories		
	Populations		Harvest	Populations		
	Game	Nongame	Game	Game	Nongame	Total
Birds	9	14	3 [1]	0	2	28
Mammals	1	2	2	2	24	31
Reptiles & Amphibians	0	2	0	0	7	9
Land Snails	0	0	0	0	1	1
Butterflies	0	0	0	0	?	0
Fish	1	4	1	13 [2]	2	21
Mussels	0	2	0	0	4	6
Damselflies & Dragonflies	0	0	0	0	2	2
Total	11	24	6	5	52	98

[1] Plus one harvest survey that includes 2 mammals and 5 birds

[2] Both game and nongame fish are surveyed.

Virtually all monitoring programs have focused on game species, T & E species, common bird surveys (e.g., Breeding Bird Survey), and evaluations of wildlife restorations. (Recall that game animals make up only 15% of the species considered in this Plan). Birds, mammals, and fish have been studied far more than the other taxonomic classes, but most mammal work has been short term inventories.

Because of the funding available, IDNR researchers have historically worked most on game animals and fish, although that is changing (Appendix 21). Without the career–long dedication of Dr. James Dinsmore (ISU-nongame birds), Dr. John Bowles (Central College-small mammals), Dr. James Christiansen (Drake University-reptiles and amphibians) (all now retired) and their students relatively little would be known about these taxa. Recent work on butterflies and odonates is discussed in Chapter 3.

In spite of this recent change in emphasis, little information is available on the distribution and status of amphibians, small and meso-mammals, snails, butterflies, odonates, freshwater mussels, reptiles, non-game fish and many nongame birds. Iowa GAP is the most recent project to attempt to determine the statewide distribution of terrestrial wildlife. Iowa GAP produced distribution maps for 288 vertebrate species based on habitat modeling. These are habitat distribution maps, however, and are not based on current survey or inventory work. Many of the surveys listed in Appendix 21 were used by Iowa GAP to determine habitat preferences. Given the highly fragmented nature of Iowa's remnant wildlife habitat, the inability of current GIS technology to identify habitats at a fine scale or to identify qualitative habitat differences, these maps serve best as a starting point for future research rather than the providing the answers sought by the Steering Committee and Working Groups in preparing this Plan.

It should be recognized that in order to meet IWAP submission deadlines, as prescribed by Congress and the National Advisory Acceptance Team, there was insufficient time to fully develop and test the necessary monitoring programs and protocols. Therefore, the *beta* procedures described herein must be considered subject to change or revision as a monitoring system is adapted to Iowa's unique requirements.

What Needs to Happen?

The State of Iowa is in need of surveys and monitoring programs that focus on the biodiversity of the state.

New Survey Needs

The Steering Committee and the Monitoring Working Group sub-committee agreed that the first priority for monitoring and research is to inventory Iowa's permanently protected wildlife habitats and a sample of habitat on private lands within the state. Virtually all wildlife specialists involved in developing this Plan expressed the need for expanded inventories, surveys, and monitoring of SGCN to guide habitat and population conservation actions. The Working Groups developed specific survey needs to fill immediate knowledge gaps (Table 7-2). These can serve as a priority list of potential survey projects until more extensive monitoring can begin.

Long Term Monitoring

Tracking accomplishments of the IWAP so that political and financial support can be maintained over the 25-year implementation period is a first-order priority of the Plan. Discrete accomplishments such as funding attained, education programs initiated and presented, site-specific recreational opportunities developed, citizen participation, habitats protected, information learned from survey and research studies, etc. must be tracked and made constantly available for scrutiny by all stakeholders.   A database will be developed by IDNR's Wildlife Diversity Program and made available through the Internet for stakeholder review and use.

Future performance measure development: It should be understood that the stresses and actions described in this plan will most likely change over time. Although future stresses and responses cannot be predicted at this time, information gained from the current monitoring of both wildlife populations and conservation actions can serve as a fount of knowledge for future issues. When new stresses or actions arise, they will be addressed in a manner that is in accordance with this plan and the approach and steps outlined herein.

But 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 to track the status of Iowa's wildlife resources. Tables 14.1 through 14.9 in Appendix 14 list each primary habitat associated with each SGCN.

Iowa's Species of Greatest Conservation Need almost always are linked to critical habitats, which frequently are localized, degraded, highly fragmented or disconnected from similar habitats and under increasing pressure from numerous human-related threats. Figures 7.4, 7.5 and 7.6 (see the end of this chapter) offer readily recognizable examples of some terrestrial and aquatic habitats, associated SGCN, habitat stresses, suggested actions to address those stresses, possible inventory and monitoring needs and a list of suggested partners to undertake necessary tasks.

Who Needs to be Involved?

If funding becomes available, a standardized, statewide wildlife survey will be implemented to provide a basic inventory of wildlife species and to serve as the initial data collection in a long term monitoring design. This program would incorporate permanent sampling sites situated on public (federal, state, and county owned) as well as private lands. Private land sampling should focus on short term protected conservation lands (CRP, WRP, FWP, TNC, INHF etc.) The IDNR should have primary responsibility for coordinating this statewide survey and monitoring program, with assistance as needed from other partners (USFWS, Iowa County Conservation Boards, ICFWRU, NGO's, etc.) This design will be based loosely on the US Forest Service's "Multiple Species Inventory and Monitoring Guide".

We intend to establish the permanent sampling locations on public and private lands. By stratifying the plot locations based upon habitat classifications, we will be able to monitor multiple SGCN associated with each habitat type. Ideally, we envision a system under which other cooperators are involved in the monitoring, perhaps on their lands. For example, the IDNR could provide training on the methods and species identification as well as providing assistance with the establishment of the permanent sampling plot (GIS, ground-truthing, etc.). The cooperators (USFWS, ICCBs, NGO's), then would ensure that the protocols were carried out by their employees or well-trained volunteers. This may mean that various NGO's, state or federal parks, and private landowner programs would need to purchase some equipment (Trail master cameras, Sherman traps, minnow traps, etc.) in addition to the time used by their staff and/or volunteers.

How Will Monitoring of SGCN and Their Habitats be Accomplished?

Iowa's WAP has defined 19 habitats and 296 SGCN. The majority of these SGCN were designated as such due to the lack of information concerning their distribution and status. Therefore, Iowa has decided to follow the template established by the US Forest Service for their Multiple Species Inventory and Monitoring Program (Manley et al. 2004). In following this design, Iowa will be randomly choosing permanent sampling locations stratified by the 19 habitat classes. Within each location, field techniques will be used to document the occurrence of all taxonomic groups of animals on the SGCN list. We expect this to be a more cost efficient approach for inventory and monitoring as compared to designing and sampling locations for individual species for 3 reasons. The first reason is that, by randomly choosing areas (instead of going to known locations), we hope to increase the number of known locations for many species. The second reason is that, also due to the randomization of site selection, we should be able to use the trends in the proportion of area occupied as a surrogate for the trend in population size (MacKenzie et al. 2003 *and* 2005). A third benefit to following the multiple species design is that we will be acquiring information on all species encountered, not just a handful of indicator species. In addition to the data collected on the animal species, habitat data will also be collected at each site. This habitat data will be in addition to that assembled by the IDNR Geographic Information Systems Section (see Objective 1). All animal and habitat protocols are currently in different stages of peer review.

Table 7-2. Short Term Survey Needs for SGCN

SGCN	Project	Lead Agency	Cost	
Fish Mississippi River	Inventory of Channel border Fish	IDNR	$150,000	
	Grass pickerel inventory & re-establishment in deltas	IDNR	$60,000	
Missouri River	New survey of River Channel	IDNR, FWS	$180,000	
Turkey River	Crystal darter inventory and habitat preference	IDNR	$50,000	
Rivers General	Asian Carp River & Stream Surveys - Track Movements	IDNR	$80,000	
Streams General	Surveys for SGCN - Fish passage and habitat	IDNR	$250,000	
	Identify extent of cold water streams	IDNR	$80,000	**Fish**
	Increase range of brook trout, slimy sculpin and mottled sculpin	IDNR	$60,000	**$910,000**
Mussels	Statewide mussel survey at 10-year intervals	IDNR	$10,000	
	Document mussel beds in Mississippi River	IDNR,FWS	$50,000	**Mussels**
	Time frame and causes of mussel mortality in Des Moines River	IDNR	$40,000	**$100,000**
Amphibians & Reptiles	Survey for T & E species	IDNR	$10,000	**Amphibians**
	Repeat survey of southern Loess Hills	IDNR	$100,000	**& Reptiles**
	Mudpuppies in Mississippi and Upper Iowa Rivers	IDNR	$100,000	**$210,000**
Birds	Repeat Breeding Bird Atlas to Look for Trends	IDNR, FWS	$250,000	
	Inventory and Monitoring on Important Bird Areas	IDNR Audubon	$150,000	**Birds**
	Inventory and Monitoring on BCAs	IDNR, Audubon	$200,000	**$600,000**
Mammals	Statewide survey for bats	IDNR		**$100,000**
Dragonfly and Damselfly	Statewide survey	IDNR		**$150,000**
Crayfish	Statewide Survey	IDNR		**$150,000**
	Total Short Term Survey Needs			**$2,220,000**

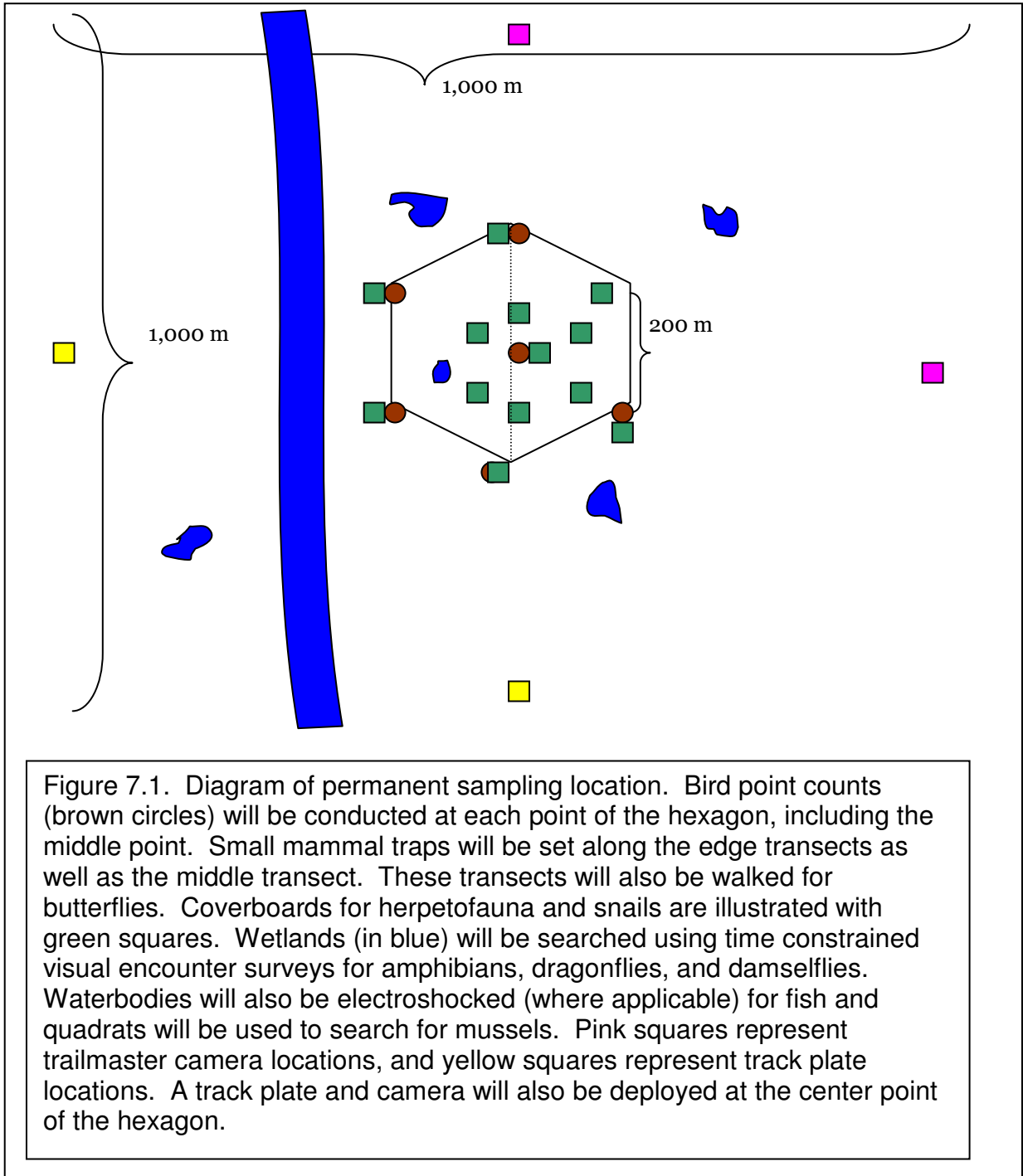## Objective 1: Current Inventory of Wildlife in Iowa

This objective is primarily concerned with estimating the statewide spatial distribution of species. Species occurrence and distribution would be 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 this Plan.

The design of the inventory and monitoring protocol will provide the ability to estimate the spatial distribution and status of many species. The overall protocol will determine how widespread or isolated a species is within the state and relate distribution to the condition of habitats. Permanent sampling sites would be established within the 19 habitats identified by this Plan and many appropriate sampling protocols have been incorporated to document the occurrence of as many species as possible. This design is based loosely on the US Forest Service's Multiple *Species Inventory and Monitoring Guide* (Manley et al. *draft paper, 2005 anticipated)* [1]. 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. 2004).

We have adapted the USFS Guide to include protocols for additional taxa on Iowa's SGCN list. Within each permanent terrestrial sampling plot, several techniques will be utilized to collect data on a wide variety of wildlife (Figure 7.1). For example, Sherman traps and Tomahawk traps will be used to catch small and meso-mammals. Point counts will be used to quantify birds. Cover boards and time constrained searches will be used to search for herpetofauna and land snails, and line transects will be walked to search for butterflies, dragonflies, and damselflies. In addition, any water bodies that fall within the sampling area will be examined using seining, or if appropriate, electrofishing for fish and timed visual or excavation surveys for mussels. We will also be convening workshops with aquatic experts to develop additional protocols for monitoring aquatic habitats.

Inventorying and monitoring fish and mussel species in aquatic habitats may need separate sampling locations and will incorporate both passive and active capture techniques. Ideally each water body located on public land would be monitored, at least in the area adjacent to public lands. Larger water bodies would be searched for fish using electrofishing, minnow traps, and netting/seining (Murphy and Willis 1996). Visual timed searches of the substrate surface will be combined with a double-sample excavation protocol for a subset of plots to determine mussel occurrence and density following Strayer and Smith (2003) and Smith et al. (2001). In addition to the information acquired on wildlife, the design will also incorporate field data collection on the plant species composition and habitat classifications within the sample sites where the wildlife protocols are implemented. This will allow us to collect information at the microhabitat scale to draw more specific correlations between species occurrence and habitat characteristics/environmental variables.

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[1] http://www.fs.fed.us/psw/programs/snrc/whatsnew/msim/msim_tech_guide_review_draft_april04.pdf last accessed 4/07/05

Figure 7.1. Diagram of permanent sampling location. Bird point counts (brown circles) will be conducted at each point of the hexagon, including the middle point. Small mammal traps will be set along the edge transects as well as the middle transect. These transects will also be walked for butterflies. Coverboards for herpetofauna and snails are illustrated with green squares. Wetlands (in blue) will be searched using time constrained visual encounter surveys for amphibians, dragonflies, and damselflies. Waterbodies will also be electroshocked (where applicable) for fish and quadrats will be used to search for mussels. Pink squares represent trailmaster camera locations, and yellow squares represent track plate locations. A track plate and camera will also be deployed at the center point of the hexagon.

Inventorying Habitat

The above described habitat data collection will be done in addition to information currently collected by the IDNR Geographic Information Systems Section which periodically evaluates Landsat Satellite Imagery to compile landcover classification data (year 2002 is the last complete data set) similar to that recommended by Schoonmaker and Luscombe (2005). This allows the IDNR 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 changes in habitats. However, when coupled with the ground-truthing and habitat data collection which should occur at each of the permanent sampling locations, we expect to be able to discover potential problems with the GIS system and will be able to address these as they arise.

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. (2005) suggests that presence and absence data can be used as a surrogate 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 would be established due to the higher cost per sampling unit, but would examine a smaller group of species more in-depth.

Objective 2: Monitoring Species and Their Habitats

Once the initial inventory and survey has been completed, the same sites will be re-visited using the same protocols (unless we discover that these need to be revised). This set of second visits will convert the inventory into the monitoring program. Depending on funding, we anticipate that the sample sites will be visited repeatedly every 2-5 years, with a subset of sites from each habitat being sampled every year to ensure continuity. As with the inventory program, the monitoring program will have protocols to examine the plant species composition and the habitats within each sampling site.

The number of sites to be visited per year has yet to be determined and will be dependent upon both funding available and the number of sites needed per habitat class to statistically track changes in species occurrence. A factor in the decision of the number of sites to be visited per year will depend 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. 2004).

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. We anticipate that knowing both changes in habitat and changes in species occurrence will allow for inferences to be drawn about correlations between the two. We emphasize, however, that this would be the impetus for future research as opposed to definitive conclusions.

Field technicians will be under the direction of the IDNR or cooperators, as either paid technicians, summer interns through universities, or well-trained volunteers. Data analysis will be conducted by the IDNR. All field technicians will undergo training that will include species identification and handling techniques, habitat classification techniques, and other training specific to the data being acquired.

Data Management and Archiving

Currently the state of Iowa has no central location for data deposition. In the past, this information has either been deposited at individual universities and small colleges or left to the knowledge of the individual who collected the data. Many schools in Iowa are no longer hiring natural history professors and the positions traditionally held by those retiring individuals are being re-filled by physiologists or geneticists that happen to work on a given taxonomic group. To insure continuity, a central natural history database should be established that would include information on the fauna and flora of the state, as well as water quality data. Such a database would allow IDNR staff and researchers from universities and other agencies access to previously acquired information quickly and easily. The database would include information on animal species occurrence with GPS coordinates, numbers, size, and condition in an easy to search format. It could be maintained by a new permanent position created within the IDNR or it could be contracted out to an individual or company with oversight from the IDNR.

However, Iowa is also committed to using the US Geological Survey/NBII Natural Resource Monitoring Partnership monitoring locator database (http://biology.usgs.gov/status_trends/nrmp/MonitoringPartnership.htm) (last accessed 2/3/2006). The goals of this partnership are to improve the accessibility of monitoring efforts to resource managers to aid in decision making for multiple purposes at multiple scales. The main components of this database are a library for protocols in use across the US and also a GIS application to aid in locating on-going and historical monitoring projects. While this database will not house the actual data associated with a monitoring project, it will allow an interested part y to contact the monitoring project leader to share information.

Reporting, Periodic Review, and Evaluation

The monitoring protocol will undergo a peer review process prior to implementation. Once implemented, the protocols will undergo an internal review every 1 to 2 years and if problems are noticed, advice will be sought from outside sources (e.g. university faculty and non-government organization scientists). In addition to the IDNR review, information from the monitoring program will be presented at the cooperator's meetings. Results from the monitoring program will be reported in regular progress reports, beginning with an "Inventory Assessment" once the initial round of the program has been completed and the data has been analyzed. At this time any problems encountered with the data collection protocol will be addressed and specific directions for research recommendations will be suggested. The first report, and those that follow, will be made available to the public through the IDNR website. It may be possible to test the validity of using indicator species by

examining the results of certain species individually from data collected through the monitoring program. Therefore, periodic internal and external peer review would become even more critical. An additional benefit that will result from periodic review will be the opportunity to evaluate current objectives and establish new objectives and goals of the program.

We do expect that some species may be completely missed by the inventory and monitoring programs but believe that the information gained on a large number of species outweighs this short-coming. Once we know exactly which species are not being adequately monitored, it would be prudent to advertise for proposals to do true research projects with these animals. Scientists would compete for a pre-determined amount of money associated with the research budget of the Plan. Figure 7.2 illustrates how we envision the decision making process concerning SGCN research and action needs to progress.

Figure 7.2. Decision making process concerning SGCN.

Additional Benefits

While stressing that at this time, the critical objective of this program is to determine statewide distribution and population statuses for as many species of concern as possible, there are additional potential objectives of the inventory and monitoring plans which may be able to be addressed through the monitoring data collection. These included the following (Objectives 3-5):

Objective 3: Strengthening Vertebrate GAP Models

The Gap Analysis Program predicted species occurrences based upon given habitat classification and locations throughout the state of Iowa. At the present time, the GAP models are only available for birds, mammals, amphibians, and reptiles. Aquatic GAP models for fish are presently being developed but will not be completed before this plan is finalized. Aquatic GAP models will be incorporated in future planning efforts. 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. 2004)) to create predicted areas of occurrence for birds, mammals, amphibians, and reptiles.

To strengthen the models, the study site habitats could be classified into landcover areas within the predicted ranges would be further stratified using the GAP ancillary data characteristics. Ideally, we will have data collected as part of the monitoring program for each species for which GAP models were created. Information from the monitoring program will include geographic locations, species occurrence probabilities, and habitat classifications, which can then be compared against the original GAP models to determine accuracy. Alternatively, this data could be used to change the model predictions if a GAP round 2 was initiated.

Objective 4: Impact and Stress Assessment

The third element in the Plan includes the 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 stresses chosen by the state biologists and other experts.

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 stress, 2) areas where steps have been taken to ease/prevent the stress, and 3) areas where the stress is allowed to go forward un-impeded. It may be possible that this can be accomplished within the framework of the long-term monitoring program.

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 stress or the management programs.

Monitoring the Effectiveness of Individual Conservation Actions

The IWAP lists a total of 28 actions to address the 6 visions of Iowa. A handful of these can be measured through scientific research, others will need to be measured through sociological research and public opinion. For example, the management actions (e.g. restore native plant communities and wildlife habitats; reintroduction programs for wildlife species; invasive species management) can be monitored through before and after, control and impact studies (see objective 5). To a somewhat less scientific extent we can also evaluate the progress made in protecting large areas of habitat (under the Creating Healthy Ecosystems vision) by inventorying new land acquisitions and habitat acres and also by monitoring the SGCN on private lands enrolled in conservation easement programs.

However, other actions, (e.g. market-based research to determine wildlife recreation interests; developing consistent messages about the value of wildlife and their habitats) may represent less-tangible goals as far as determining the effectiveness of the actions for wildlife populations. In regard to these actions, we must somehow monitor public opinion and decide what level of public support constitutes effectiveness.

Objective 5: Evaluation of Management Protocols and Restoration Programs (*ADAPTIVE MANAGEMENT*)

Regardless of what management protocol is followed, i.e. 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 may be critical to evaluate the results of management decisions on specified groups of species. This already is underway for selected public wildlife areas, with projects to evaluate the effects of patch-burn grazing at a major grassland landscape for prairie-chickens and other SGCN in southern Iowa, and to evaluate avian SGCN use of restored or recreated prairie and other grassland types in northern Iowa's prairie pothole region.

Most likely the same protocols and procedures would be used for this objective as for Objective 4. However, as these impacts would result from planned management programs, this could be addressed by manipulative experiments or more formal applications of adaptive resource management protocols. Ideally, data would be collected for several years pre- and post-implementation. Again, if species occurrence (or possibly abundance) was the parameter of interest, it may be possible

to address this objective within the monitoring program, however, if more specific question 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 has been analyzed, then decisions as to 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 SGCN, then the action could be implemented elsewhere. Should it be determined that the action did not help the SGCN, then that action would most likely not be implemented on other lands. Ideally, we will be able to evaluate several similar actions at one time to determine the best, most cost-effective, action for the SGCN. However, we realize that what might benefit one species may be harmful to another and anticipate that several discussions involving exactly what species we are trying to enhance will be needed to truly evaluate the effect of the action being adapted. This is sometimes described as the "trial and error" method. While not the most effective means of adapting management to the needs of wildlife, it often is the most practical when funding is limited.

Research Priorities – Conservation Actions

Statewide distribution and status information is a priority for all SGCN. Additional areas for research will undoubtedly be identified as the results of the inventory and monitoring program become available. IDNR and other knowledgeable wildlife researchers have already identified other priority projects (Tables 7-3, 7-4 and 7-5). Progress on addressing this list needs to begin even as the survey and monitoring projects are conducted.   These projects should be rigorously designed from a statistical standpoint to evaluate the effect of given actions (or inactions). The ideal design would include pre-and post- treatment data collection on wildlife in affected sites as well as control sites. These projects will be prioritized and a subset will be funded each year funds are available.

Adapting Conservation Actions in Response to New Information or Changing Conditions

Iowa will use new information or changing conditions (e.g. money, politics, environmental catastrophes) to adapt our conservation actions by meeting with all collaborators at least every other year beginning in 2007 with a formal conference including scientific presentations of on-going or recently completed research and monitoring projects in addition to round-table discussions to address new information and changing conditions. Issues which warrant immediate attention (e.g. a 100-year flood occurring, resulting in the need for urgent research into a SGCN dependent upon floodplains for nesting purposes) can be decided at that time or at any time by the Implementation Team (see Chapter 9).

In addition to the bi-yearly meetings, a formal review of the IWAP will be conducted every 10 years (see Chapter 9, IWAP Review). This review will include a review of the achievements, the status of wildlife and habitats, stresses that have been resolved or have intensified, the public's acceptance of the IWAP and its achievements. Figure 7.3 illustrates this process.

Figure 7-3. Process of evaluation on monitoring, actions, and research for IWAP.
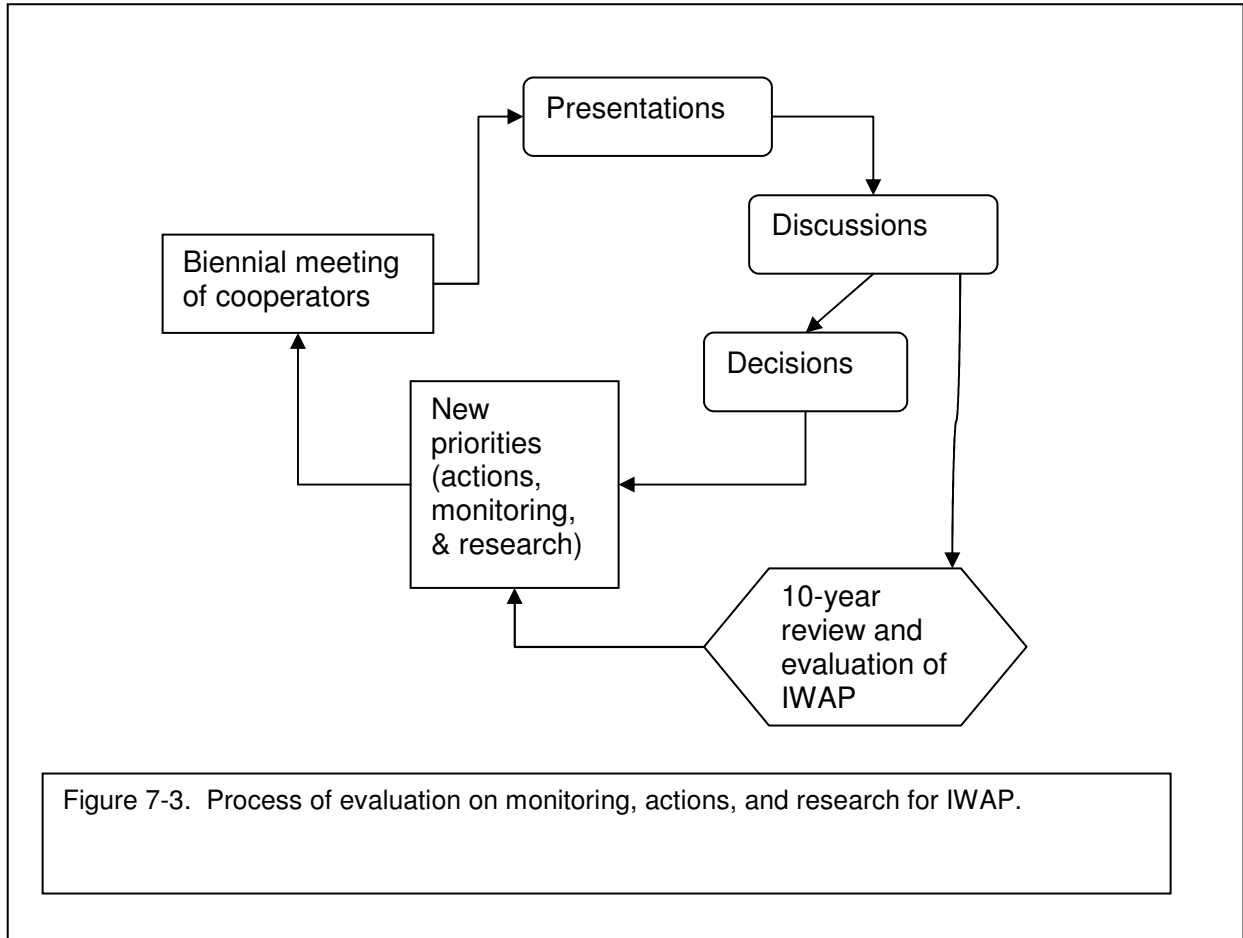
Research and Monitoring Costs

Estimated costs for the research, survey and monitoring programs recommended in this chapter are summarized in Table 7-6. Costs are estimates based on similar studies undertaken in Iowa or surrounding states. Priorities are difficult to establish until the amount and timing of funding available to address research needs becomes known. Costs for some short term survey projects Table (7-2) could be absorbed by the long term monitoring program if that becomes a reality. Some of the individual research studies could be combined to maximize efficiency and reduce overall costs if sufficient funds are available for expanded work. Costs listed in the tables for research and short term surveys are assumed to end when studies are complete.

Table 7-3. Land Management Research Needs – updated in 2012
Blue – indicates study currently (or past) funded

Topic	Further Description
CRP	- Do CRP seedings and other management techniques really affect wildlife? Quail & songbirds - Relative impacts of CRP on water quality improvement? Benefits to SGCN associated with trout streams, other systems?
Goat Prairie management	- Impacts of tree and shrub encroachment on goat prairies and sensitive species (e.g. timber rattlesnake) - Value of these sites to butterflies & other wildlife
Effect of prescribed fire	- Exclusion & re-introduction of fire on native grasslands - Exclusion & reintroduction of fire on woodlands, savannas, and forests - Effect of fire on butterflies - Management guidelines for fire use and SGCN
Effect of public land crop and grazing rotation	- Pre- and post-management study to address impacts on SGCN (birds & insects) - Effects of mowing and grazing on butterflies
Farming practices	- Impacts of different farming practices (e.g. organic vs. chemical fertilizer) on songbird, herptile, &/or fish populations - Impact of aerial application of fungicide on fish and amphibians
Land acquisition	- How large must core tracts be to conserve species with minimum viable population sizes? - Comparison of large core tracts vs. targeted corridors for aquatic SGCN - Pre- and post-effects of land management techniques
Restoration and new habitat projects	- Identifying faunal differences between native and restored sites (prairie, wetland, savanna) - Feasibility of introducing new species - Sources for amphibian and insect colonizers for new sites - Effectiveness of nitrate removal in restored wetlands - Impacts of hydrologic regime restoration (i.e. is it hydrologic regime or habitat restoration that impacts SGCN?) - Coldwater stream fish species restoration - Warm water stream aquatic species restoration
Timber harvest	- Impacts of timber harvest to create early successional habitat and maintain prairie & Savanna (pre-and post- management studies – neotropical migrants and ruffed grouse, etc.) - Are Iowa forests sources or sinks for interior forest nesting birds like the cerulean warbler? - Determining a suitable deer density that balances public demand with impacts on forest birds and other taxa
Wind turbines	- Effects on nesting success of breeding birds? - How can turbines be modified so as to not cause bat mortality?

Topic	Further Description
Urbanization (& habitat changes from historic conditions)	- Impacts on SGCN - Are any SGCN benefiting from urbanization? - How do SGCN relate to increases with red foxes in urban areas (& decline of foxes in rural/wild areas)
Water quality	- Impacts of water quality on dragonflies & other SGCN - Are common species declining due to water quality issues (e.g. muskrats, fish)? - Benefits from wetland restoration, hydrologic regime restoration, habitat programs (e.g. CRP) & management actions

Table 7-4. Species Specific Research Needs – updated in 2012

Blue – indicates study currently (or past) funded

Topic	Further Description
Birds of prey	- Habitat and prey preferences of migratory birds of prey
Carp Bullhead	- Impacts of carp &/or bullhead management on species of greatest conservation need - Management techniques for controlling carp in shallow lakes
Eels Sturgeon	- Eel ladders: Development of eel & sturgeon passage structures for Mississippi Lock & Dam structures
Shovelnose sturgeon	- Evaluate genetic & morphological differences between shovelnose sturgeon in Iowa's Mississippi River tributaries
Fish	- Reproductive needs of paddlefish, grass pickerel, Topeka shiners, &/or suite of SGCN fish associated with Missouri River tributaries
Ornate box turtle	- Population assessment in the Loess Hills
Plains pocket mouse	- Population assessment and habitat use in the Loess Hills
Prairie butterflies	- Habitat components and obligate plant hosts for selected declining species - Why are they declining (especially skippers)?
Inventory high priority butterfly species	- Arogos skipper, Common ringlet, Baltimore checkerspot, Ozark Baltimore Checkerspot, Olympia marble, Silvery blue, Leonard's skipper, Dusted skipper, Ottoe skipper, Purplish copper, Poweshiek skipper, Mulberry wing, Byssus skipper - Also survey by region/habitat: e.g. Loess Hills, wetlands, forests
Ottoe skipper	- Why is this species not colonizing new sites?
Prairie chickens	- Impacts of trees on lek predations (e.g. how many? What distance) - Minimum area habitat size requirements for a self-sustaining population

Topic	Further Description
Rare fish	- Habitat and water quality requirements of rare fish on the Lower Cedar River (&/or of the suite of SGCN fish associated with Missouri River tributaries)
Reptiles & amphibians	- Habitat status and use of all Iowa herps with emphasis on state and federal T & E species - Impacts of public land management on herps (especially wetland management) - Status and distribution of: Mudpuppy, Wood Turtle; Speckled Kingsnake; Worm Snake
Ruffed grouse	- Habitat suitability and use in NE Iowa - Use of aspen and other early successional habitat
Snakes	- Can created hibernaculas help reverse snake population declines?
West Nile virus	- Occurrence, frequency, and impacts on birds
Quail	- "dirty fields" – comparing chemical vs. organic/no chemical corn impacts on quail numbers
Cerulean warblers	- Does Iowa have suitable breeding habitat to support a population of CEWA?
Bats	- Natural history of bats in Iowa - Impacts of windfarms
Shorebirds	- Impact of current wetland management strategies on shorebirds (in relation to duck habitat management)
Mussels	- Is recruitment occurring in areas of known high species diversity? - Is recruitment occurring in areas that have exhibited drastic declines? - Genetic variation in populations. - Are mussels in Iowa streams using the same host fish as elsewhere? - Do lowhead dams inhibit movement of host fishes (leading to declines in mussel reproduction? - Is mussel recruitment tied to fish recruitment?
Land snails	- Develop list of terrestrial snails presently occurring within Iowa
Bird SGCN	- More information is needed on grassland vs shrubland needs of SGCN birds in SE Iowa - More information is needed on birds within the Loess Hills region
Mammal SGCN	- More information is needed on the status and distribution of: White-tailed Jackrabbit; Franklin's Ground Squirrel; Pocket Gopher; Least Shrew; Indiana Bat; Bog Lemming; Prairie Vole; Gray Fox; Spotted Skunk and Southern Flying Squirrel
Fish SGCN	- More information is needed on habitat needs, impacts of habitat restoration, and species recovery of SGCN.

Table 7-5. Area-Specific Research Needs – updated in 2012
Blue – indicates study currently (or past) funded

Topic	Further Description
GIS and landscape modeling	- E.g. – continued development of the Grassland Bird Conservation area model to identify geographic focus areas for habitat protection, restoration, and management - Comparison of corridors vs. core tracts for aquatic SGCN & water quality
Headwater streams	- Community composition, impacts of agricultural runoff, &/or hydrologic regime impacts
Identifying critical habitat components	- Landscape factors affecting species of greatest conservation need (Structural features, landscape configurations, and amounts of habitat)
Investigative interactions	- What is the relative importance of disease, predation, nest parasitism, introduced species, land use, &/or abiotic factors (e.g. climate change)?
Sinkholes and Algific Talus slopes	- ATS sites with rare and endangered species need to have the sinkholes mapped - Update status of land snails restricted to these areas.
Invasive species & impacts on wetland wildlife populations and production	- Effects of water level management vs. herbicide & manual removal of canary grass - Effects of water level management vs. pesticide & manual removal of purple loosestrife - Effects of water level management vs. pesticide & manual removal of black willows - Effects of water level management vs. pesticide & manual removal of rough fish
Shallow lakes program	- Benefits to SGCN – shorebirds, dragonflies, amphibians, reptiles, etc. - Short-term impacts to SGCN (e.g. – Blanding's turtles) - Evaluate the shallow lakes of the Prairie Pothole region to inform management plans that will benefit SGCN
Lead impacts	- Impacts of lead on SGCN
Invasive Species	- Impact of Asian carp on fish & mussels
Climate Change	- Potential impacts to SGCN

Table 7-6. Estimated research and monitoring costs.

Project	Description	Cost[1]	Occurs
Surveys and Monitoring			
Short Term Surveys	Table 7-2	$2,220,000	Project Duration
Long Term Monitoring		$2,000,000	Annually
Research			
Land Management	Table 7-3	$2,000,000	Project Duration
Species Management	Table 7-4	$775,000	Project Duration
Area-Specific	Table 7-5	$2,850,000	Project Duration
Total		**$7,845,000**	Project Duration
		$10,000,000	5-Year Monitoring

[1] Costs are based on 2005 dollars. Costs are estimates by the Plan author and Steering Committee. Costs may be revised depending on the amount and timing of funding for IWAP.

The biggest unknown is the cost for the long term monitoring effort. Preliminary estimates based on field tests (funded under Iowa State Wildlife Grant Study T-4-P-1) are that each sampling site will cost about $4,000 for the multiple species sampling that will occur. A minimal goal would be to complete the initial round of survey and inventory work in 5 years. This would produce the first-ever statewide view of the status and distribution of all wildlife species. At that time the potential of the project to become a long term monitoring program will be evaluated and adjustments implemented if any are needed. To make this a reality would cost $2,000,000 annually for field surveys, or $10 million for the initial 5 years. Experience and data gained from the initial years of the project may increase or decrease this cost.

Fig. 7.4. Examples of Iowa Habitats and SGCN

Habitat: **Warm Season Herbaceous Vegetation**

Location: Grand River Grasslands, in southwestern Iowa
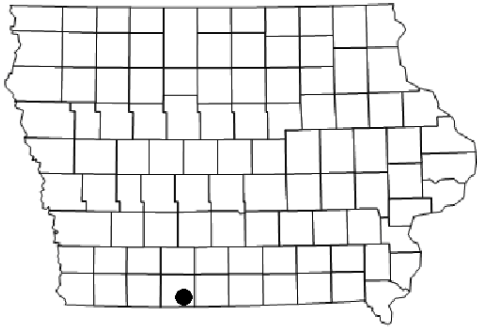
Roger Hill photo

Description: A region of southwestern Iowa in which the landscape is dominated by grasslands (~70%), primarily tame grass pastures, tame grass Conservation Reserve Program (CRP) lands, with scattered remnants of tallgrass prairie and oak savanna.

Example Associated SGCN: ** = Key species (also pictured above)
- Northern Harrier (*Circus cyaneus*)
- Greater Prairie-Chicken (*Tympanuchus cupidio*)**
- Short-eared Owl (*Asio flammeus*)
- Henslow's Sparrow (*Ammodramus henslowii*)
- Franklin's Ground Squirrel (*Seprmophilus franklinii*)
- Prairie Vole (*Microtus ochrogaster*)
- Spotted Skunk (*Spilogale putorius*)
- Regal Fritillary (*Speyeria idalia*)
- Byssus Skipper (*Problema byssus*)
- Smooth Greensnake (*Opheodrys vernalis*)
- Northern Prairie Skink (*Eumeces septentriolnalis*)

Example Habitat Stresses:
- Detrimental grazing
- Conversion to row crops
- Fragmentation and loss of connectivity
- Conversion to non-native grasses
- Fire suppression (leading to woody invasion).

Fig. 7.4 cont. Examples of Iowa Habitats and SGCN

Example Actions to Address Stresses:
- Landowner education; cooperative "grassbanking"; patch-burn grazing (response measure then would be the amount of education programs, public opinion, the amount of grassland, and the effectiveness of patch-burn grazing systems)
- Work with landowners to re-enroll or extend CRP contracts (response measure would then be the number of landowners who re-enroll)
- Permanent protection of key connecting tracts (response: amount and location of protected tracts)
- Work with landowners to restore native flora and suppress non-natives (response: number of landowners participating AND the effectiveness of these programs by measuring wildlife response)
- Conduct periodic prescribed burns on public and private land (response: effectiveness of these burns)

Example Inventory, Survey, Monitoring and Research Needs
- Conduct multi-taxa baseline faunal inventories
- Track changes in grassland cover and fragmentation with remote sensing/GIS
- Research the effects of patch burn grazing on SGCN
- Identify and monitor all prairie-chicken lek sites and determine number required for population growth and stability

Possible Partnerships to Address Issues and Needs
- Iowa Department of Natural Resources
- US Fish and Wildlife Service
- US Geological Survey
- USDA Natural Resources and Conservation Service
- Missouri Department of Conservation
- Ringgold County Conservation Board
- The Nature Conservancy in Iowa
- The Iowa Natural Heritage Foundation
- Iowa State University
- Private landowners

Fig. 7.5. Examples of Iowa Habitats and SGCN

Habitat: **Forest**

Location: Yellow River forest, in northeastern Iowa
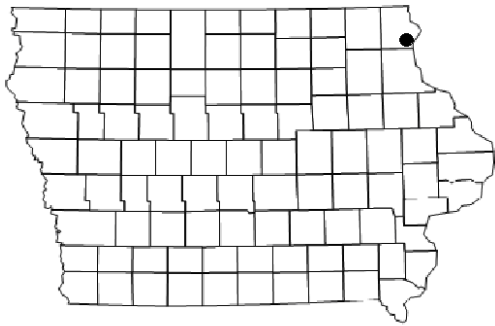
Doug Harr photo

Description: A region of northeastern Iowa in which significant portions of the landscape are dominated by a 60% canopy of tree species with interlocking crowns. This area is also interspersed with patches of open grassland pastures, small remnant prairies on steep hillsides, successional shrublands and row crop agriculture. Mississippi River tributary streams bisecting the area, such as the Yellow River, also host riparian forests.

Example Associated SGCN: ** = Key species
- Red-shouldered Hawk (*Buteo lineatus*)
- Wood Thrush (*Hylocichla mustelina*)
- Cerulean Warbler (*Dendroica cerulea*)**
- Southern Flying Squirrel (*Glaucomys volans*)
- Timber Rattlesnake (*Crotalis horridus*)
- Iowa Pleistocene Snail (*Discus macclintokii*)
- Edward's Hairstreak (*Satyrium liarops*)
- Slimy Sculpin (*Cottus cognatus*)

Fig. 7.5 cont. Examples of Iowa Habitats and SGCN

Example Habitat Stresses:
- Fragmentation and loss of connectivity
- Conversion for residential use
- Timber harvest
- Fire suppression (on hill prairies)

Example Actions to Address Stresses:
- Landowner education (response measure: number of education opportunities and public opinion)
- Plant native trees and shrubs to fill gaps, decrease edge and restore corridors (response: amount of area restored and wildlife response)
- Limit clear cuts to less than five acres; leave seed trees and snags (response: number of cuts > 5 acres)
- Maintain mature bottomland timber stands (response: amount of land in mature stands)
- Work with county and local governments to create environmental zoning (response: number of environmental zoning successes compared to failures)
- Remove (cut/burn) invading red cedars from hill, or "goat", prairies (response: amount of area cleared)

Example Inventory, Survey Monitoring and Research Needs
- Conduct multi-taxa baseline faunal inventories
- Track changes in forest canopy cover and hill prairies with remote sensing/GIS
- Identify and monitor refugia for less mobile SGCN
- Research the value of microsites to butterflies and other invertebrates

Possible Partners to Address Issues and Needs
- Iowa Department of Natural Resources
- US Fish and Wildlife Service
- US Geological Survey
- National Park Service
- The Iowa Natural Heritage Foundation
- Blufflands Alliance
- Minnesota Department of Natural Resources
- Iowa Audubon Important Bird Areas Program
- Iowa State University
- Luther College
- Private landowners

Fig. 7.6. Examples of Iowa Habitats and SGCN

Habitat: **River**

Location: Confluence of the Lower Cedar and Iowa Rivers with the Mississippi River, in southeastern Iowa
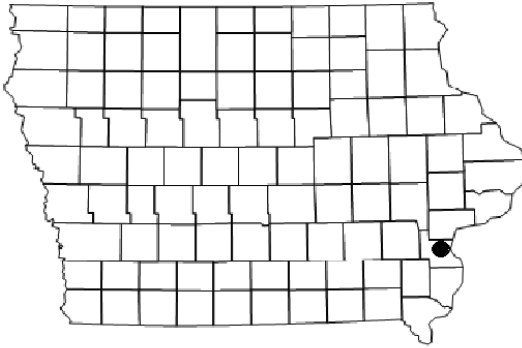
USFWS photo

Description: Large, permanent, slow-moving rivers draining major portions of Iowa, characterized by expansive floodplains with attendant backwaters, oxbows and associated saturated uplands, floodplain forests and sandy areas

Example Associated SGCN: ** = Key species (also pictured above)
- King Rail (*Rallus elegans*)
- Prothonotary Warbler (*Protonotaria citrea*)
- Least Shrew (*Cryptotis parva*)
- Yellow Mud Turtle (*Kinosternon flavescens*)
- Eastern Massasauga Rattlesnake (*Sistrurus catenatus catenatus*)
- Grass Pickerel (*Esox americanus*)
- Higgins' Eye Pearlymussel (*Lampsilis higginsi*)**
- Royal River Cruiser [dragonfly] (*Macromia taeniolata*)

Example Habitat Stresses:
- Siltation
- Invasive/non-native species
- Loss of riparian habitat
- Loss of submergent/emergent plants

Fig. 7.6 cont. Examples of Iowa Habitats and SGCN

Example Actions to Address Stresses:
- Work with private landowners to control runoff through soil conservation practices (response measure: number of landowners participating vs number that do not)
- Reduce agricultural and development activities in floodplain (response: number of detrimental activities prevented vs those completed)
- Permanently protect "greenbelts" along riparian corridors (response: amount of area protected)
- Immediate removal/destruction of invasive species as encountered (response: amount of invasive species removed vs remaining)
- Public education regarding all aspects of stresses upon rivers (response: number of education opportunities and public opinion)
- Reintroduce Higgins' eye pearly mussel glochidia into Mississippi River tributary rivers (response: number of viable, self-sustaining Higgins' eye pearly mussel populations)

Example Inventory, Survey, Monitoring and Research Needs
- Conduct multi-taxa baseline faunal inventories
- Monitor expansion/contraction of invasive species
- Determine habitat quality requirements of rare fish in the Lower Iowa and Cedar Rivers
- Research the reproductive needs of grass pickerel

Possible Partners to Address Issues and Needs
- Iowa Department of Natural Resources
- US Fish and Wildlife Service
- US Army Corps of Engineers
- US Geological Survey
- USDA Natural Resources Conservation Service
- Louisa and Muscatine County Conservation Boards
- The Nature Conservancy in Iowa
- The Iowa Natural Heritage Foundation
- Iowa State University
- Private landowners

Existing Applicable Resources
- Upper Mississippi River Evaluation and Monitoring Program
- Upper Mississippi-Great Lakes Joint Venture (Iowa revised implementation plan)