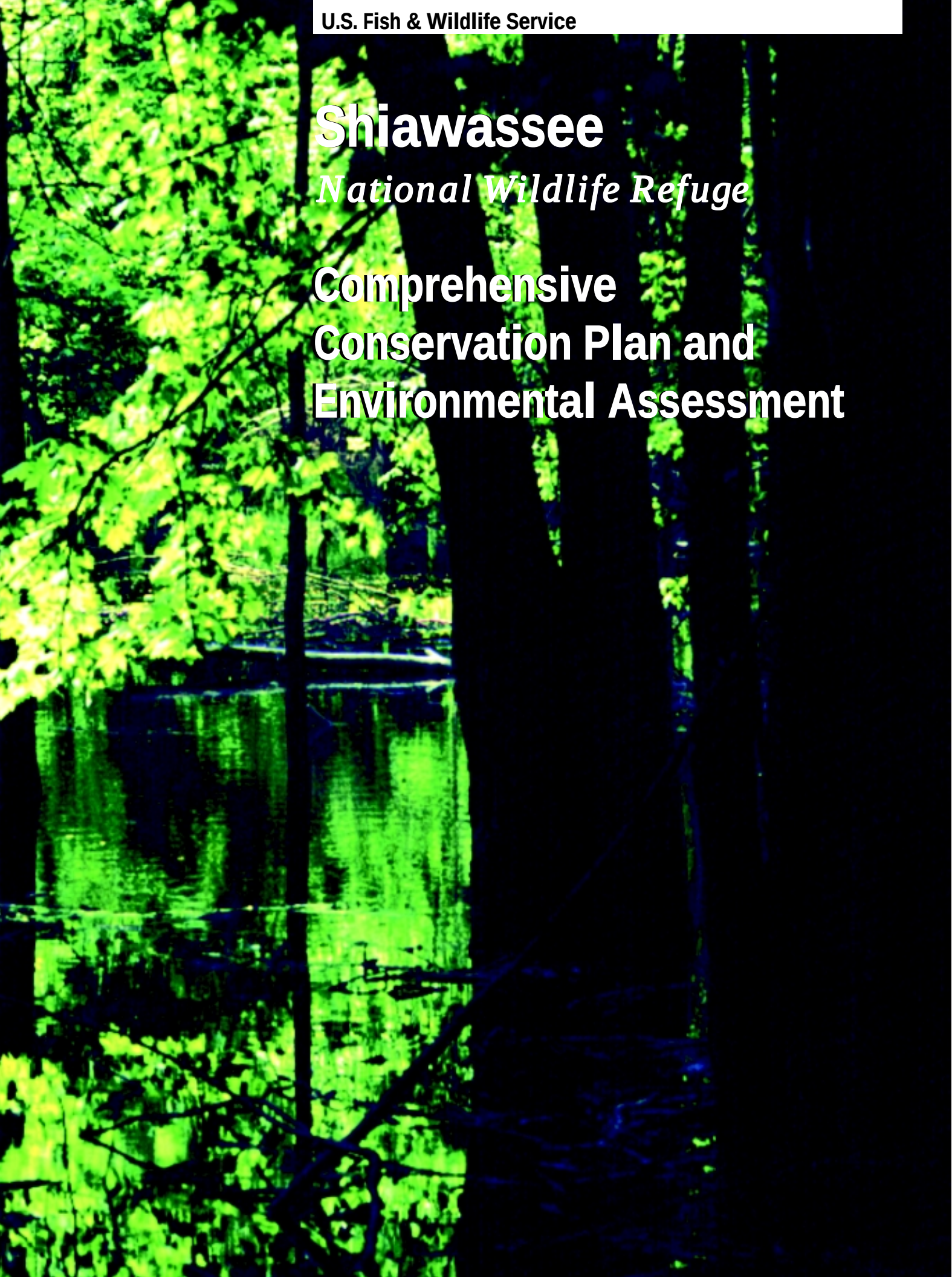
U.S. Fish & Wildlife Service



Shiawassee

National Wildlife Refuge

Comprehensive Conservation Plan and Environmental Assessment

Shiawassee National Wildlife Refuge

Comprehensive Conservation Plan Approval
U.S. Fish and Wildlife Service, Region 3

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Acknowledgments

Because it will serve as a guide to Refuge management for the next 15 years, public input into the Comprehensive Conservation Plan is vital. The Shiawassee National Wildlife Refuge staff and the planning team are grateful to all of the people who have contributed their time, expertise and ideas through open houses, focus group discussions, and written comments. All of your ideas have been valuable and will contribute to the success of this plan.

We are especially grateful to Kim LeBlanc and Myles Willard for contributing the superb photographs that appear in this Comprehensive Conservation Plan. We thank the members of the Friends of Shiawassee National Wildlife Refuge for their help and dedication to the environment. And, finally, we are grateful to everyone who contributes time and energy as a Refuge volunteer. You are truly the backbone of conservation.

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Chapter 1: Introduction and Background

Shiawassee National Wildlife Refuge – a large area of *wetlands*[1] and forests within the agricultural and urban landscape of Michigan's lower peninsula – is recognized as globally significant to migratory waterfowl and is proximate to a large urban and tourist population. In this plan we describe how we will provide for migratory *species* within our boundaries, work with partners to improve habitats beyond our boundaries, expand opportunities for wildlife viewing and fishing, and develop environmental education and outreach programs to increase appreciation of fish and wildlife.

Introduction

The Shiawassee National Wildlife Refuge (Refuge) was established in 1953 and is 9,706 acres in size. The Refuge is located within Saginaw County, Michigan and is surrounded by both urban and agricultural areas.

Figure 1.1: Refuge Location

Refuge Purposes

The Refuge was authorized by the Migratory Bird Conservation Commission under the Migratory Bird Conservation Act (16 U.S.C. § 715 - 715s) "... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." Additional purposes designated under the Refuge Recreation Act (16 U.S.C. § 460k-l) are "... (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, [and] (3) the conservation of endangered and *threatened species*."

The Shiawassee National Wildlife Refuge is responsible for managing three other facilities: the 304-acre Wyandotte National Wildlife Refuge; the 602-acre Michigan Islands National Wildlife Refuge; and the Saginaw City-owned, 80-acre Green Point Environmental Learning Center (ELC). The management of the Wyandotte and Michigan Islands national wildlife refuges are described in separate *comprehensive conservation plan*s.

When established in 1953, the Refuge and the associated state area were envisioned as providing a

[1] For the convenience of non-technical readers, definitions to italacized words are provided in Appendix B.

place where waterfowl from the Saginaw Bay area could be held longer before they migrated to southern Illinois. Since its establishment, the Refuge has shown its importance to migrating waterfowl, including the Southern James Bay population of Canada geese and American black ducks, the production of waterfowl, and for other wildlife.

Shiawassee National Wildlife Refuge manages a variety of habitats that provide resting, foraging, and nesting opportunities for nearly 300 species of resident and migratory birds. The major habitat types include wetlands (3,771 acres), forests (4,225 acres), agricultural lands (1,180 acres), and grasslands (580 acres). This diversity of habitats also supports an abundance of plant, mammal, reptile, amphibian, and fish species.

Photo by Myles Willard

The management techniques currently used on the Refuge include control of water levels in moist soil units and pools, biological and chemical control of invasive plant species, prescribed burning, mowing, tree planting, grass seeding, furbearer trapping and hunting of white-tailed deer and Canada geese.

In 1995, the U.S. Fish and Wildlife Service considered alternative ways to better protect the Refuge resources at Shiawassee National Wildlife Refuge. After evaluating the *alternatives*, the Service decided to pursue the addition of approximately 7,500 acres to the existing Refuge (Shiawassee National Wildlife Refuge Additions Final Environmental Assessment, 1995). If all authorized acres are eventually acquired, the Refuge will include approximately 16,600 acres. The additions will be primarily along the Tittabawassee and Cass River corridors. These waterways are two of the four rivers that converge on the Refuge and make up Michigan's largest *watershed*, and their environmental integrity is vital to the health of the Refuge's core.

The staffing of Shiawassee National Wildlife Refuge consists of 10 positions:

- two refuge operations specialists
- one refuge manager
- one administrative technician
- one wildlife biologist
- one biological science technician
- two park rangers
- one engineering equipment operator
- one tractor operator

The park rangers are stationed at Green Point Environmental Learning Center.

The Refuge Mission

To preserve and manage an undeveloped expanse of floodplain forest, marshes, rivers, and associated habitat within an agricultural and urban landscape through habitat management, encouraging public stewardship, educational programs, and private land activities.

Purpose of and Need for the Plan

This Comprehensive Conservation Plan, or CCP, identifies the role the Refuge will play in supporting the mission of the *National Wildlife Refuge System* and provides guidance for Refuge management. The plan articulates management *goals* for the next 15 years and specifies *objectives* and *strategies* that will achieve those goals. Several legislative mandates within the National Wildlife Refuge System Improvement Act of 1997 have guided the development of this plan. These mandates include:

- Wildlife has first priority in the management of refuges.
- *Wildlife-dependent recreation activities* of hunting, fishing, wildlife observation, wildlife photography, environmental education and interpretation are the priority public uses of the National Wildlife Refuge System. These uses will be facilitated when they do not interfere with our ability to fulfill the Refuge's purposes or the mission of the National Wildlife Refuge System.
- Other uses of the Refuge will only be allowed when they are determined to be appropriate and *compatible* with the Refuge purposes and mission of the National Wildlife Refuge System.

This CCP will enhance the management of the Shiawassee National Wildlife Refuge by:

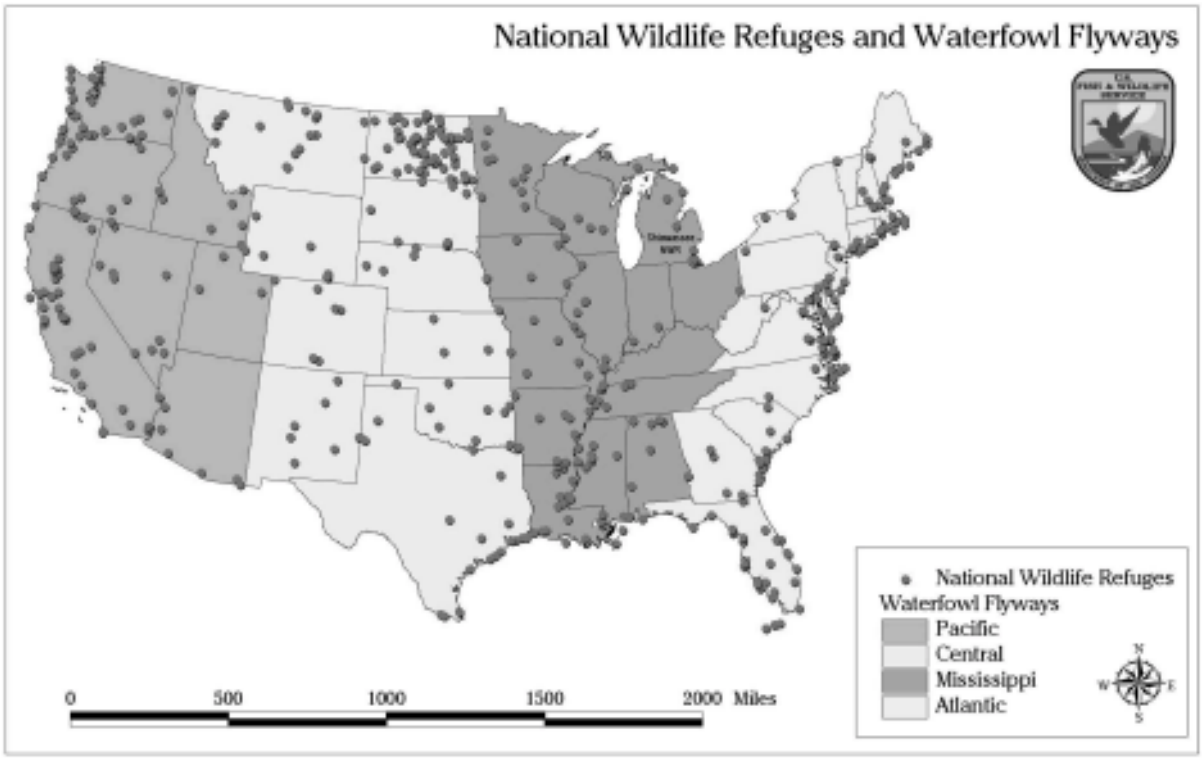
- Providing a clear statement of direction for future management of the Refuge.
- Giving Refuge neighbors, visitors, and the general public an understanding of the Service's management actions on and around the Refuge.
- Ensuring that the Refuge's management actions and programs are consistent with the mandates of the National Wildlife Refuge System.
- Establishing continuity in Refuge management.
- Providing a basis for the development of budget requests on the Refuge's operation, maintenance, and capital improvement needs.

The U.S. Fish and Wildlife Service

> *"Working with others to conserve, protect, and enhance fish and wildlife and their habitats for the continuing benefit of the American people."*
>
> ***Mission of the U.S. Fish and Wildlife Service***

The U.S. Fish and Wildlife Service is the primary Federal agency responsible for conserving, protecting, and enhancing fish and wildlife and their habitats for the continuing benefit of the American people. Specific responsibilities include enforcing Federal wildlife laws, managing migratory bird populations, restoring nationally significant fisheries, administering the Endangered Species Act, and restoring wildlife habitat such as wetlands. The Service also manages the National Wildlife Refuge System.

Figure 1.2: National Wildlife Refuges and Waterfowl Flyways



The National Wildlife Refuge System

> *"To administer a national network of lands and waters for the conservation, management and, where appropriate, restoration of the fish, wildlife and plant resources and their habitats within the United States for the benefit of present and future generations of Americans."*
>
> ***Mission of the National Wildlife Refuge System***

Managing the National Wildlife Refuge System has evolved into a significant role for the Service. Founded in 1903 by President Theodore Roosevelt with the designation of Pelican Island as a refuge for brown pelicans, the National Wildlife Refuge System is the world's largest collection of lands specifically managed for fish and wildlife. The System is a network of more than 500 national wildlife refuges encompassing more than 93 million acres of public land and water. The majority of these lands – 82 percent – is in Alaska, with approximately 16 million acres spread across the other states and several island territories. Refuges provide habitat for more than 5,000 species of birds, mammals, fish, and insects. Like Pelican Island, many early national wildlife refuges were created for herons, egrets and other water birds. Others were set aside for large mammals such as elk and bison. Most refuges, however, have been created to protect migratory waterfowl. This is a result of the United States' responsibilities under international treaties for migratory bird conservation as well as other legislation, such as the Migratory Bird Conservation Act of 1929. A map of the National Wildlife Refuge System shows refuges dotting the four major flyways that waterfowl follow from their northern nesting grounds to southern wintering areas.

National wildlife refuges also play a vital role in preserving endangered and threatened species. Among the refuges that are well known for providing habitat for *endangered species* are Aransas National Wildlife Refuge in Texas, the winter home of the whooping crane; the Florida Panther Refuge, which protects one of the nation's most endangered mammals; and the Hawaiian Islands Refuge, home of the Laysan duck, Hawaiian monk seal, and many other unique species.

Refuges also provide unique opportunities for people. When it is compatible with wildlife and habitat needs, refuges can be used for wildlife-dependent activities such as hunting, fishing, wildlife observation, photography, environmental education and environmental interpretation. Many refuges have visitor centers, wildlife trails, automobile tours, and environmental education programs. Nationwide, more than 36 million people visited national wildlife refuges in 2000.

The National Wildlife Refuge System Improvement Act of 1997 established many mandates aimed at making the management of national wildlife refuges more cohesive. The preparation of comprehensive conservation plans is one of those mandates. The legislation requires the Secretary of the Interior to ensure that the mission of the National Wildlife Refuge System and purposes of the individual refuges are carried out. It also requires the Secretary to maintain the biological integrity, diversity, and environmental health of the refuge system.

Photo by Steve Lewis

Existing Partnerships

Partnerships with other Federal agencies as well as tribal, state, and city governments and schools are an important element in refuge management. Other agencies can provide invaluable assistance in research and maintenance. Partnerships with private groups greatly enhance public investment in the refuge, building enthusiasm for its mission and support in funding issues.

In addition to the official partnerships that the U.S. Fish and Wildlife Service holds on a national level, Shiawassee National Wildlife Refuge maintains informal partnerships with the Shiawassee Flats Advisory Council, The Friends of Shiawassee National Wildlife Refuge, The Great Lakes Basin Ecosystem Team, Saginaw Bay Watershed Initiative Network (WIN), the City of Saginaw, and Bridgeport Township. Within the Private Lands Program, the Refuge maintains partnerships with 14 Soil and Water Conservation Districts, local Pheasants Forever chapters, Great Lakes Regional Office of Ducks Unlimited, Inc., Michigan Duck Hunters Association, Michigan Wildlife Habitat Foundation, the Michigan Department of Natural Resources, the United States Department of Agriculture's Natural Resources Conservation Service, and the Service's State Private Lands Coordinator's Office.

Legal and Policy Guidance

In addition to the Refuge's establishing authority legislation and the National Wildlife Refuge System Improvement Act of 1997, several federal laws, executive orders, and regulations govern its administration. See Appendix F for a list of the guiding laws and orders.

Chapter 2: The Planning Process

Introduction

Photo by Myles Willard

The planning process for this comprehensive conservation plan began in December 1997. Initially, members of the regional planning staff and staff of Shiawassee National Wildlife Refuge identified a list of *issues* and concerns that were associated with the management of the Refuge. These preliminary issues and concerns were based on staff knowledge of the area and contacts with citizens in the community. Refuge staff and Service planners then asked Refuge neighbors, organizations, local government units, schools, and interested citizens to share their thoughts in a series of open houses and focus groups.

In 1999, the public was invited to open houses in January, February, and March for Shiawassee National Wildlife Refuge, Michigan Islands National Wildlife Refuge, and Wyandotte National Wildlife Refuge. Forty-two people attended open houses for Shiawassee National Wildlife Refuge in Bridgeport Township, Thomas Township, and at the Green Point Environmental Learning Center.

Another 25 people participated in focus groups representing environmental education, cooperative farming, hunting and fishing, and wildlife observation/photography use of the Shiawassee National Wildlife Refuge.

Service staff accepted oral and written comments at each open house and written comments were received in the mail after each open house. Thirty-two comments were received for Shiawassee National Wildlife Refuge.

Issues

Members of the public raised a diverse range of issues. The issues raised by the staff and public are organized into themes – public use, resource protection, maintenance, and general – and are discussed in the following paragraphs.

Public Use Issues

Public use of national wildlife refuges requires a delicate balance. The mission of the National Wildlife Refuge System is to conserve, manage and, when appropriate, restore the fish, wildlife and plant resources and their habitats. Recreational uses that are wildlife-dependent and that are compatible with the refuge purpose are considered an appropriate way of enhancing people's appreciation for fish and wildlife. However, what constitutes compatible human activity is not always clear, and people's expectations of refuge activities vary considerably.

Participants in open house events and focus group meetings expressed a wide range of philosophies on public use of Shiawassee National Wildlife Refuge. Some people would like to see management of the Refuge focus on wildlife and habitat with no increase of public access and public use of the Refuge. Other people would like to see an expanded trail system and enhanced access for activities such as horseback riding, automobile tours, environmental education, hiking, hunting, fishing, boating, and bicycling.

The subject of airboats on rivers flowing through the Refuge drew a strong response from people who believe that the Refuge should provide a tranquil place to view birds. Airboat operators were described as having "disregard" for anglers and wildlife observers. Comments included concerns about safety on the river as well as the noise disturbance. Participants suggested a variety of solutions, including instituting a no-wake zone; expanding noise abatement codes; strictly enforcing wildlife harassment codes; and implementing horsepower or speed restrictions.

Resource Protection Issues

Meeting participants voiced many opinions about the priority of resource protection issues. Some people said that enhanced law enforcement is a critical need, and others said that reducing the amount of sediment and chemical waste that flows through the Refuge should be a priority. Control of exotic species, such as purple loosestrife, round goby and zebra mussel, as well as invasive species such as phragmites, were cited as protection issues. Concern was also expressed about mosquito control. Prioritizing land acquisition is another expansion issue facing Shiawassee National Wildlife Refuge, according to open house and focus group participants.

Photo by Kim LeBlanc

Maintenance Issues

Dike maintenance was the primary maintenance issue that emerged from the public involvement process. The need to maintain dikes was described as a top priority, particularly for dikes damaged by burrowing muskrats and, in moist soil units, wave action. Recognizing the role the Refuge plays in relieving flood pressure, people recommended conserving some areas of the Refuge as flood retention areas.

General Issues

Some people said that the cultural diversity efforts at the Refuge are failing to reach targeted communities. Others suggested that monitoring of the Partners for Wildlife habitat restoration efforts is needed to evaluate what has been accomplished so far. Comments on revenue issues included statements that current staffing at Shiawassee National Wildlife Refuge needs more funding. Other participants questioned the U.S. Fish and Wildlife Service's plans to expand the Refuge when its ability to manage or maintain the existing wildlife Refuge is already a challenge.

Chapter 3: The Refuge Environment

Geographic/Ecosystem Setting

The Great Lakes Basin Ecosystem

The U.S. Fish and Wildlife Service has adopted an approach to fish and wildlife conservation that is described as an *ecosystem approach*. What this means is that the Service is working to perpetuate dynamic, healthy *ecosystems* that ultimately will foster natural *biological diversity*. The strategy behind this effort is interdisciplinary and integrates the expertise and resources of all stakeholders.

Photo by Kim LeBlanc

Shiawassee National Wildlife Refuge lies within the Great Lakes Basin Ecosystem, a system shared with Canada and eight states. This ecosystem is made up of the world's largest freshwater body, which holds 18 percent of the world's supply of freshwater, covers 95,000 square miles, has 9,000 miles of shoreline, includes more than 5,000 tributaries, and has a drainage basin of 288,000 square miles.

The Basin contains critical breeding, feeding, and resting areas as well as migration corridors for waterfowl, colonial nesting birds, and many other species of migratory birds. At the same time, the Great Lakes Basin Ecosystem faces a variety of biological concerns, including the impact of exotic species, the precarious nature of the aquatic community structure, and contaminant levels.

Certain species within the Great Lakes basin have drawn special concern. Fish species of special interest include lake trout, lake sturgeon, lake whitefish, walleye, Pacific salmon, and landlocked Atlantic salmon and their forage. Native mussels are a management concern because they are being seriously impacted by zebra mussels and are in danger of *extirpation* from the Great Lakes Basin. Thirty-one species of migratory, non-game birds that the Service considers of management concern are found in the Great Lakes ecosystem. At least 20 of these species are frequently found at Shiawassee National Wildlife Refuge.

A recent survey of biological diversity in the Basin identified 130 globally rare or endangered plant and animal species. The bald eagle, peregrine falcon, Kirtland's warbler, piping plover, Mitchell's satyr and Karner blue butterflies, Indiana bat, gray wolf, lake sturgeon, deepwater sculpin, and pugnose shiner are some of the threatened, endangered, and candidate species that inhabit the Great Lakes ecosystem. The bald eagle, peregrine falcon, and lake sturgeon are found at the Refuge.

The Great Lakes Basin Ecosystem is divided into seven focus areas. The Saginaw Bay and Watershed focus area contains the Saginaw Bay Watershed, the largest in Michigan, which covers more than 8,000 square miles in 22 counties. The Saginaw River and its four major tributaries (Cass, Flint, Shiawassee, and Tittabawassee) drain nearly 75 percent of the watershed. Shiawassee National Wildlife Refuge lies in the heart of the watershed, and these four rivers flow through the Refuge and affect its habitats and wildlife.

The Saginaw Bay Watershed

The Saginaw Bay Watershed (Watershed) contains habitat supporting a variety of plant, fish, and wildlife species (see Figure 3.1). Migratory birds in the area include some 29 species of ducks, geese and swans; 119 species of songbirds; and 21 species of hawks, falcons and owls. Anadromous and *interjurisdictional fish* in the Watershed include salmon, shad, sturgeon, walleye, and perch. Federally endangered and threatened species found in the area include bald eagle, peregrine falcon, and eastern prairie fringed orchid.

Figure 3.1: The Saginaw Bay Watershed

Grassland and wetland plant communities in the area provide dabbling ducks, such as mallard and blue-winged teal, with nesting and feeding habitat and provide black duck and canvasback with migration habitat on their way to and from their northern breeding grounds. Forest, grassland, and marsh plant communities provide nesting and migration habitat for birds with diminishing regional populations, such as the least bittern, American bittern, cerulean warbler, and red-shouldered hawk (U.S. Fish and Wildlife Service, 1995). Bottomland forests provide nesting habitat for bald eagles, and the floodplain and riverine communities provide migration and wintering habitat. Wetland plant communities of emergent marshes and floodplain forest provide spawning and nursery habitat for northern pike and yellow perch. The riverine communities provide spawning and feeding habitat for species like lake sturgeon, walleye, salmon, and shad.

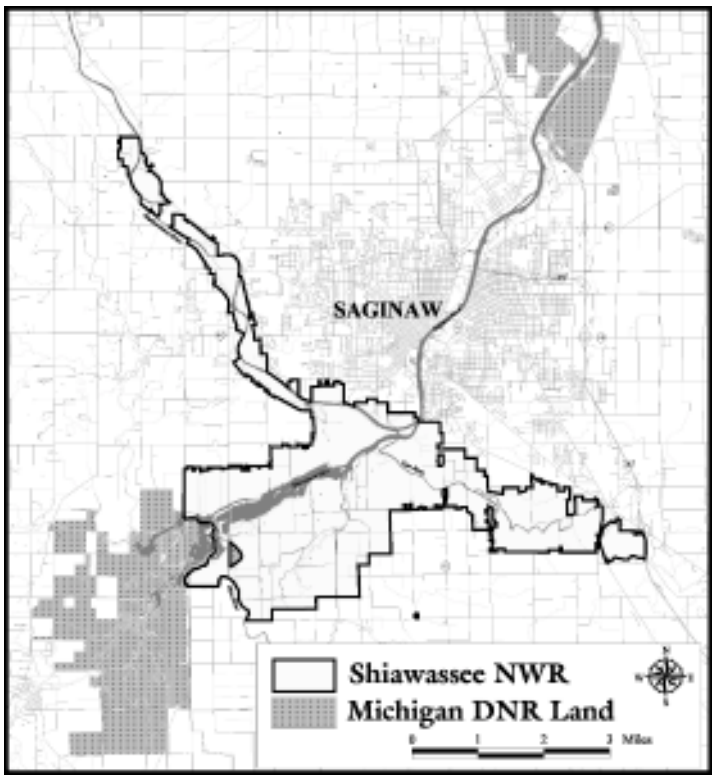
Since settlement by Europeans, the Watershed has been important for timber harvest, agriculture, commercial and residential development, and transportation. These uses continue to be important.

Prior to European settlement, the area now designated as Saginaw County had a mixture of approximately 75 percent upland forest and 25 percent wetlands. Currently about 23 percent of the land in Saginaw County is in a natural condition. About half of the natural land is bottomland forests and other types of wetlands. Most of the natural areas are small in size and are isolated from each other. Many of the wildlife species that use these areas (especially songbirds) require larger areas of habitat than are now available or

expected to be available with continued urban development. Although birds like the American robin, blue jay, downy woodpecker and black-capped chickadee do well in fragmented forested areas in suburbs, others like the pileated woodpecker, yellow-throated vireo, cerulean warbler, and broad-winged hawk are highly sensitive to forest fragmentation and need forested areas more than 100 acres in size (Herkert, et al., 1993).

Declining numbers of wetlands and their isolation from other supporting habitats within the Watershed affect an estimated 111 bird species that utilize wetlands for feeding, nesting, or resting. Eight of these species have special federal or state endangered or threatened status because their population levels are declining either nationally or statewide. In addition, about 40 percent of the mammals and 75 percent of the reptiles and amphibians within the Watershed are dependent on wetlands. For fish, wetland habitat and water quality are important to the distribution and population size of the 71 species that are found within the Watershed. These wetlands are often essential for critical life stages such as spawning and nursery areas for both forage and game fish species. Changes in the quality and quantity of these areas affect not only the fish but most of the bird and animal populations found in the watershed and uses by man. The availability and quality of wetland and riverine communities, together with water quality, limit the population and diversity of the fishery resources vital to such a large portion of the animal and bird population using the watershed. (Department of the Interior Report, 1992).

Figure 3.2: Shiawassee NWR and Other Wildlife Areas



The continued growth of the Saginaw metropolitan area has placed increasing demands on surrounding open space for recreation and residential and commercial development.

Two major wildlife areas managed by the Michigan Department of Natural Resources complement the Refuge in the lower Saginaw River Watershed. The Shiawassee River State Game Area neighbors the Refuge upstream, and the Crow Island State Game Area is located downstream from the Refuge between Saginaw and Bay City. (Figure 3.2)

Migratory Bird Conservation Initiatives

Nongame Bird Conservation Initiatives

Nationally and internationally, several nongame bird initiatives have been developed in recent years. Shiawassee National Wildlife Refuge will strive to implement the conservation strategies they outline to the extent possible and practical.

Partners In Flight (PIF) deals primarily with landbirds and has developed Bird Conservation Plans for numerous physiographic areas across the U.S. (see http://www.partnersinflight.org). These plans include priority species lists, associated habitats, and management strategies. Shiawassee National Wildlife Refuge lies within Partners in Flight Physiographic Area No. 16, Upper Great Lakes Plain.

The U.S. Shorebird Conservation Plan (see http://www.manomet.org/USSCP.htm) and the North American Waterbird Conservation Plan (see http://www.nacwcp.org) have regional components that identify priority species and conservation strategies, mostly focused around habitat, that will address the needs of these groups of birds.

Photo by Kim LeBlanc

All migratory bird conservation programs will be integrated under the umbrella of the North American Bird Conservation Initiative (NABCI). This is a continental effort to have all bird initiatives operate under common Bird Conservation Regions and to consider the conservation objectives of all birds together to optimize the effectiveness of management strategies (see http://www.dodpif.org/nabci/index.htm). The goal of NABCI is to facilitate the delivery of the full spectrum of bird conservation through regionally-based, biologically-driven, landscape-oriented partnerships. As part of NABCI, Important Bird Areas have been designated (see http://www.audubon.org/bird/iba).

Shiawassee National Wildlife Refuge has been designated as an Important Bird Area (IBA), globally significant to migratory waterfowl. The IBA program began in Europe in 1985, is administered in the United States by the American Bird Conservancy, and is an integral part of the Partners in Flight Bird Conservation Strategy. The IBA program seeks to establish a global network of protected areas critical for those species for which a site-based approach is appropriate. Shiawassee's designation as an IBA is an affirmation of its importance to waterfowl.

North American Waterfowl Management Plan

Signed in 1986, the North American Waterfowl Management Plan (NAWMP) outlines a broad framework for waterfowl management strategies and conservation efforts in the United States, Canada, and Mexico. The goal of the NAWMP is to restore waterfowl populations to historic levels. The NAWMP is designed to reach its objectives through key joint venture areas, species joint ventures, and state implementation plans within these joint ventures.

The entire State of Michigan is within the Upper Mississippi River and Great Lakes Region Joint Venture. Areas within Michigan have substantial use by waterfowl during migration, particularly the coastal waters and marshes of Saginaw Bay, the Lake St. Clair and Erie complex, and the eastern Upper Peninsula along the St. Mary's River and northern Lake Huron. However, emphasis for Michigan in the Joint Venture is waterfowl reproduction and the maintenance of healthy populations of other resident wetland wildlife.

The greatest potential to increase Michigan wetland wildlife populations exists on relatively productive lake plain landscapes where agricultural practices have eliminated

or significantly altered wetlands and associated uplands. These landscapes dominate the Saginaw Bay region. (Upper Mississippi River & Great Lakes Region Joint Venture Implementation Plan Update, 1998)

The Saginaw Lake Plain and the Huron Clay Plain are primary focus areas within the most recent Joint Venture Plan. The focus areas include the area around Shiawassee National Wildlife Refuge and the "Thumb" of Michigan, which are in the Shiawassee Private Lands Coordination Area. The habitat objectives for these focus areas emphasize the restoration/creation of functioning, productive wetlands and grasslands on private land, land managed by the Michigan Department of Transportation, and State/Federal lands, plus acquisition of agricultural lands adjacent to public lands to create or restore wetlands and grasslands.

Shiawassee National Wildlife Refuge staff are actively involved with the North American Waterfowl Management Plan in Michigan and serve on the State Implementation/ Steering Committee. The Refuge has received more than $350,000 in North American Wetland Conservation Act grants to acquire land and restore wetlands and grasslands on the Refuge and within the Private Lands Coordination Area.

In addition to the area-focused Joint Venture, the Refuge participates in the species-focused Black Duck Joint Venture. The purpose of the Black Duck Joint Venture is to promote and coordinate data gathering about the black duck. Black ducks and mallards are banded at Shiawassee National Wildlife Refuge as part of the Joint Venture effort. Data gathered at Shiawassee contributes to information gathered in Canada, the Great Lakes, and northeastern United States. Together, this information will guide black duck protection and management projects in Canada and the United States.

Michigan Wetland Management District

Photo by Kim LeBlanc

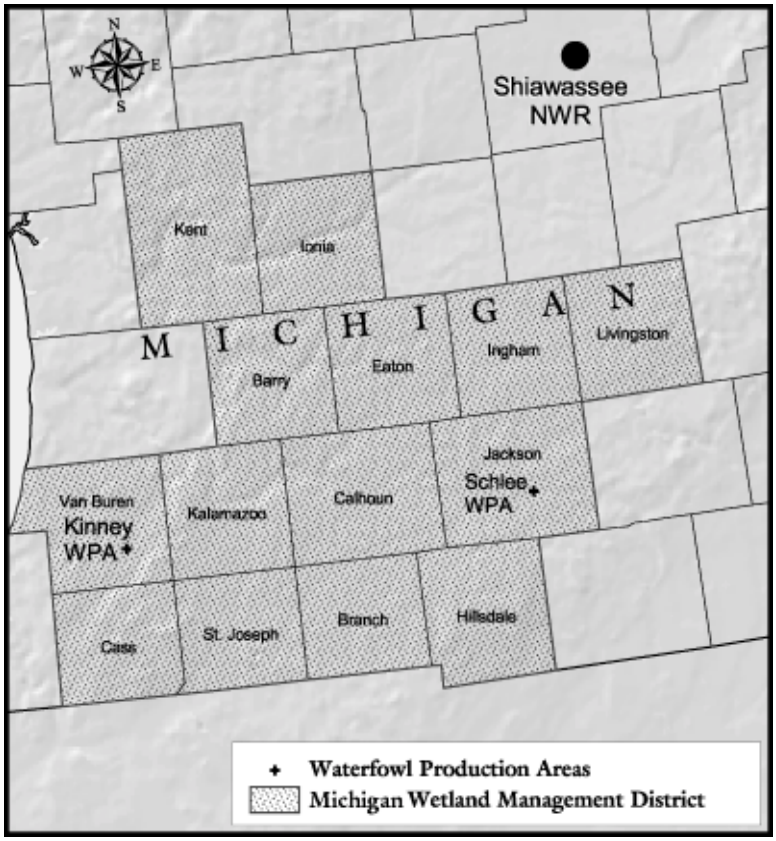
Introduction and Background

The Michigan Wetland Management District is a unit of the National Wildlife Refuge System that is distinct from Shiawassee National Wildlife Refuge and other refuges in Michigan. The Wetland Management District, administered by the Michigan Private Lands Office in East Lansing, presently includes two Waterfowl Production Areas, Schlee and Kinney, that total 237 acres. These Waterfowl Production Areas are managed cooperatively by the Michigan Department of Natural Resources (DNR). See Figure 3.3.

The Waterfowl Production Area Program, as authorized by Congress in 1958 by amendment to the Migratory Bird Hunting Stamp Act, was initiated in 1961 to preserve natural wetlands that were rapidly being destroyed nationwide by agricultural drainage, housing development and other commercial land use practices. To date, there are nearly 3,000 Waterfowl Production Areas covering approximately 668,000 acres. Nearly 95 percent of Waterfowl Production Areas are located in prairie pothole areas of North Dakota, South Dakota, Minnesota, and Montana.

In 1980, with approval from then Governor Milliken and support from the Michigan DNR, the Service announced it was proposing to acquire up to 30,000 acres of wetlands in a 14-county area of south-central Michigan under the Waterfowl Production Area Program.

Figure 3.3: Wetland Management District and Waterfowl Production Areas



This was part of a larger plan to acquire 100,000 acres of breeding duck habitat in the Great Lakes region. In Michigan, it was estimated that more than half of the 11 million acres of wetlands were lost between the 1780s and the 1980s (Dahl 1990). Destruction of wetlands important to both wildlife and people prompted actions by the Service to preserve waterfowl breeding habitat in Michigan.

In 1981, with realty support from the Michigan DNR, the Service acquired the 160-acre Schlee Waterfowl Production Area in Jackson County and the 77-acre Kinney Waterfowl Production Area in Van Buren County. Property was acquired through fee title purchase from willing sellers. Property was selected based on the importance of the wetland to waterfowl production and the value of the upland as nesting habitat.

Under a Memorandum of Understanding with the Michigan DNR, the Service retains primary jurisdiction and is principally responsible for the management of these lands, while the DNR is directly involved in day-to-day management of the land. Monetary constraints in fiscal year 1982 and subsequent years resulted in no additional Waterfowl Production Areas being acquired in Michigan. In recent years, conservation partners have expressed interest in renewing the Waterfowl Production Area effort in Michigan.

Waterfowl Production Area Resources

Schlee Waterfowl Production Area and Kinney Waterfowl Production Area were acquired and are managed to maintain wetland and grassland cover for waterfowl and other wildlife. The habitat is managed to provide breeding, nesting and brood-rearing cover primarily for grass-nesting waterfowl such as blue-winged teal and mallards. The Waterfowl Production Areas are also open for public use including hunting and other wildlife-dependent activities such as wildlife observation, photography, and environmental education.

The 160-acre Schlee Waterfowl Production Area is located approximately 8 miles east of the City of Jackson. The Waterfowl Production Area consists of approximately 108 acres of grassland, 46 acres of wetland, and 6 acres of upland forest and other habitat. The soils consist primarily of sandy loams in the upland and hydric silt loam, and muck or ponded soils in the wetlands. Eight depressional wetland basins ranging from less than 1 acre to approximately 24 acres provide a diverse marsh habitat across the property. Warm

season grasses are maintained on the upland areas through rotational mowing of the area on a 3-year cycle. Woody encroachment on the area is controlled by mowing, hand-cutting, and selective use of herbicides.

Sixty species of birds have been observed on the Schlee Waterfowl Production Area, including 10 species of waterfowl. Wading wetland birds, shorebirds and grassland birds are commonly observed on the property. Muskrat, deer, rabbits and other mammals, as well as a variety of amphibians and reptiles, are present. Federally-listed threatened or endangered species are not known to occupy the area.

The 77-acre Kinney Waterfowl Production Area is located approximately 18 miles southwest of the City of Kalamazoo and consists of approximately 31 acres of wetland, 37 acres of grassland, and 9 acres of upland forest. Upland soils consist primarily of loam or sandy loam, while the wetlands have ponded soils. The entire wetland habitat is associated with the 150-acre Grass Lake, a portion of which is included in the Waterfowl Production Area. Upland habitat is maintained primarily in warm season grasses through rotational mowing of the area. A small portion of the area was planted to fruit-bearing shrubs.

Photo by Myles Willard

Wildlife species using the Kinney Waterfowl Production Area are similar to that at the Schlee Waterfowl Production Area. Water-dependent and grassland birds are commonly observed, but a species list has not been recorded. A variety of mammals, amphibians and reptiles are also present on the site.

Surveys by the Michigan DNR record regular use by sportsmen hunting waterfowl and other species. The areas also get use by nonconsumptive users. The Schlee Waterfowl Production Area has been used by the Jackson County Conservation District for environmental education.

Additional Responsibilities

In addition to administering the Michigan Wetland Management District, the Michigan Private Lands Office also coordinates the statewide Partners for Fish and Wildlife Program. Private Lands staff coordinate closely with staff at other Service offices as well as partners from governmental agencies, conservation organizations, and other areas to provide technical assistance and on-the-ground habitat restoration assistance to private landowners.

Future Management

Management of the two Waterfowl Production Areas by the Michigan DNR, with oversight by the Michigan Private Lands Office, is expected to continue into the future. Management will continue to focus on providing high quality wetland and grassland habitat to benefit waterfowl and other migratory birds. We expect the wildlife-dependent public uses to continue. The Service will seek to improve management of conservation easements within the Michigan Wetland Management District. We intend to reinvigorate the program and, working with partners in Michigan, acquire additional Waterfowl Production Areas over the next 15 years.

Region 3 Fish & Wildlife Resource Conservation Priorities

The Government Performance and Results Act (GPRA) required the Service to identify its most important functions and to direct its limited fiscal resources toward those functions. A group worked from 1997 to 1999 to evaluate how best to identify the Service's most important functions in Region 3. The group recognized that the Service has a complex array of responsibilities specified by treaties, laws, executive orders and judicial opinions, and these responsibilities dwarf the agency's budget.

Figure 3.4: Region 3 of the USFWS

The group recognized that at least two approaches are possible in identifying conservation priorities – habitats and species. The group chose to focus on species because (1) species represent biological and genetic resources that cannot be replaced; (2) a focus on species conservation requires a concurrent focus on habitat; and (3) by focusing on species assemblages and identifying areas where ecological needs come together, the Service can select the few key places where limited efforts will have the greatest impact. Representatives of the migratory bird, endangered species, and fisheries programs in Region 3 identified the species that require the utmost attention given our current level of knowledge. Representatives prioritized the species based on biological status (endangered or threatened, for example), rare or declining levels, recreational or economic value, or "nuisance" level. The group pointed out that species not on the prioritized list are important too, but when faced with the needs of several species, the Service should emphasize the species on the priority list. Figure 3.4 identifies the states within Region 3. The table in Appendix E contains the resource conservation priority species that occur at the Refuge.

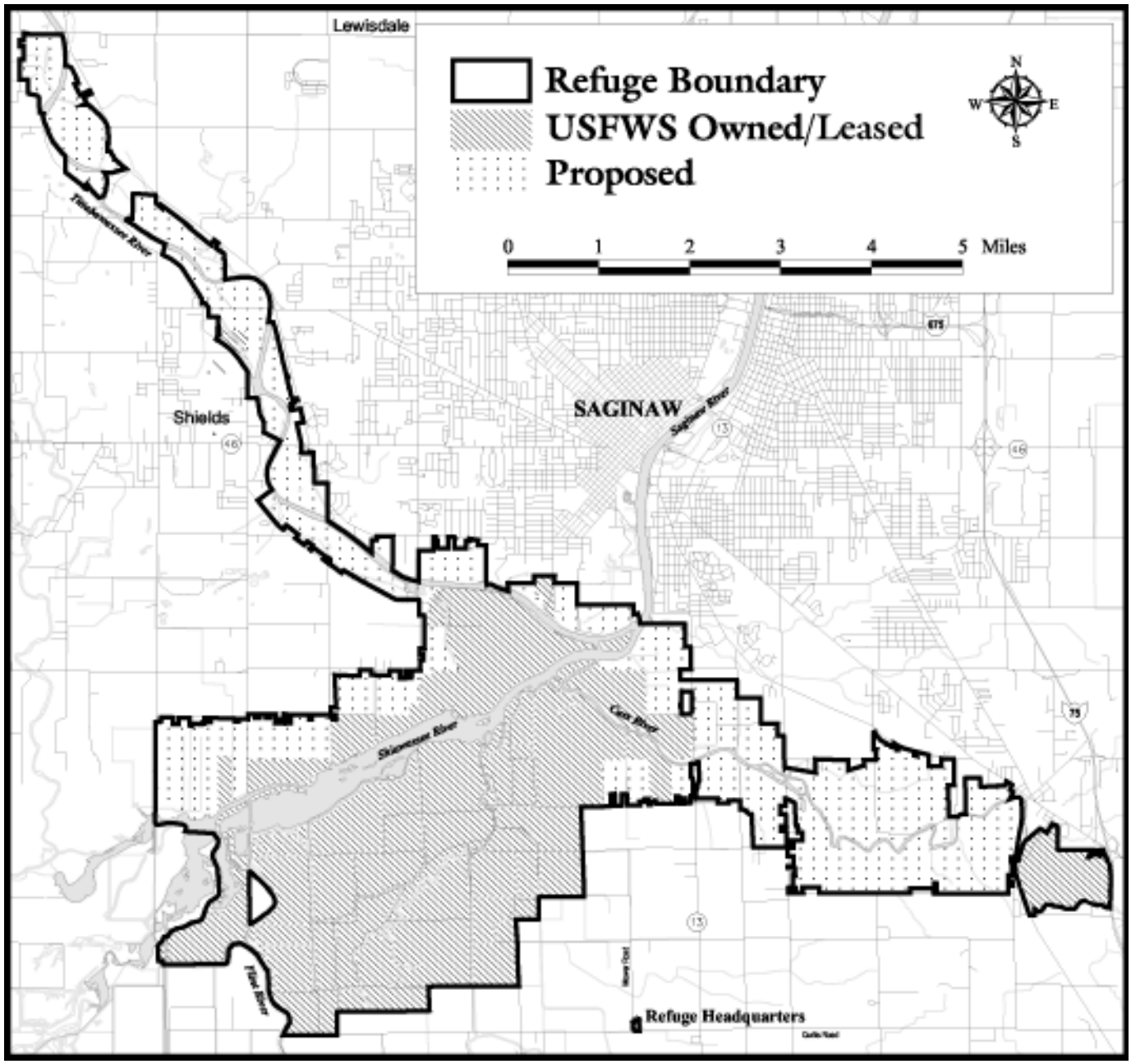
We have considered the ecosystem context, the over arching conservation programs, state listed species, and the regional resource conservation priorities as we wrote this comprehensive conservation plan.

Refuge Resources, Cultural Values and Uses

General

The Refuge represents an important waterfowl concentration area and crossroads for migrating geese, ducks, and other migratory birds. The Refuge is a combination of cropland, wetlands, bottomland hardwood forest, and scattered grasslands. Historically, the area was forested bottomland with scattered marshes. The Refuge lies in the floodplain of the Tittabawassee, Shiawassee, Flint and Cass rivers. (See Figure 3.5) Typical bottomland timber species found within the Refuge are willow (*Salix spp.*), cottonwood (*Populus deltoides*), hickory (*Carya spp.*), oak (*Quercus spp.*), maple (*Acer spp.*), green ash (*Fraxinus pennsylvanica*), and elm (*Ulmus spp.*). Most of the area is wet. Constant repair of dikes is necessary to protect the area from seasonal flooding of the Saginaw River System.

Figure 3.5: Shiawassee National Wildlife Refuge Boundaries



Geology and Minerals

The lands in the Refuge were formed by scouring of glacial ice during the Wisconsin glaciation. During this period, a glacial lake covered the area and drained into Lake Michigan. The lake covered the area to an average elevation of approximately 695 feet above mean sea level. In addition, several large streams draining more than 6,000 square miles converged on the lake. As a result, the Refuge is covered by lacustrine sediments, with interfingering sandy/ gravelly deltaic deposits. The area is largely covered by poorly drained heavy soils that require extensive tiling and drain systems to make them available for crop use.

Underlying the soils are Pennsylvania Coal deposits. These beds are an average of 500 feet in depth and are found from 20 to 200 feet below the surface. The formation is present throughout the Refuge. The only other formations found in the Refuge are salt/ gypsum beds. Coal and salt mining occurred in the area from the 1890s to 1950. Currently, there is no coal mining anywhere in the state and no mining of any type in the Refuge.

Soils

Soils within the Refuge have been identified and mapped by the U.S. Department of Agriculture, Natural Resource Conservation Service (Soil Conservation Service). The soil series are principally loams and clays. The Refuge follows river corridors, which results in most soils having a high water table. Because of the high water table, almost all of the soils are poorly drained. The soils are also severely limited in their ability to support buildings, recreational facilities, and agriculture in an unaltered state. Only when they are properly tiled, drained, and diked are they suitable for these uses. Because they are continually eroded by flooding and wave action, dikes require frequent repair to the slopes. Elevations vary within the Refuge from 580 to 615 feet mean sea level. Most of the Refuge is at or below the 595-foot contour, generally considered the elevation limit of the area known as the Shiawassee Flats.

Photo by Kim LeBlanc

Water and Hydrology

The Tittabawassee, Shiawassee, Flint, Bad, Cass Rivers and other tributaries converge just south of Saginaw to form the Saginaw River. The Saginaw River flows to Lake Huron, 22 miles to the north. The Saginaw River Watershed drains an area of approximately 4 million acres (one-sixth of the lower peninsula). The rivers that form the Saginaw River form a large floodplain known as the "Shiawassee Flats." The river flows are generated by runoff throughout the watershed and often cannot be carried by the Saginaw River channel. Flooding occurs when the tributaries reach flood stage together, when ice blocks the river channels, or seiche activity from northeast winds pile up lake water as far upstream as St. Charles. Flooding of the tributaries occurs almost every year. Most of the floods occur seasonally in the spring and fall. However, changing runoff patterns have resulted in flooding even during the summer months.

According to well records, static groundwater levels in the area range from 5 feet to 26 feet below the surface. Groundwater is generally hard and high in dissolved solids. Many wells encounter high salt concentrations and are unsuitable for drinking purposes.

Water quality in the rivers and streams varies widely. Dissolved oxygen levels are generally well above the minimum standard set by the State while nutrient levels (phosphorus and nitrogen) are often high enough to cause algae blooms. Hardness and dissolved solids often reach levels close to the Michigan Water Quality Standards. Chloride and fecal coliform levels have exceeded the standard.

History of Water Management and Flood Control

Since its inception, the Refuge's water management has been intertwined with flood control. In 1954, the Service assumed responsibility for dikes and ditches on agricultural lands that were soon to be acquired by the government. In an agreement among the Army Corps of Engineers, Michigan DNR, and the U.S. Fish and Wildlife Service, the Service agreed to construct water storage basins on lands purchased within the original boundary proposal. The agreement was part of a much larger plan for water control on the Saginaw River System. The larger plan, called the Saginaw Valley Flood Control Project, was developed by the Army Corps of Engineers and involved many local, State, and Federal agencies or governments.

In 1957, the Refuge consisted of 4,300 acres and construction was well under way to raise what is now known as the Trinklein Dike (project labeled riverside dike 6132b-C-15) to an elevation of 591 feet. A pumping station and an electrical power source for drainage of the area behind the dike were also constructed. The construction on the Refuge occurred before Congress approved the Saginaw Valley River Flood Control Project in 1958. By 1959, the Refuge wrote an interim water management plan and operated Pools 1A and Grefe as wetland units.

In 1960, the local communities were asked to support the flood control project. However, communities were split on whether or not to financially support the Project. Some local communities supported portions of the Project, and those projects went ahead. Examples of these smaller projects are flood control works at Flint and Frankenmuth. However, the main "Shiawassee Flats" portion of the planned Project never obtained sufficient local financial support. By 1969 the DNR and the Service were voicing concerns over how the Project would impact activities on their lands.

While the Saginaw Valley Flood Control Project sputtered along through the '60s, the Refuge continued to develop lands under its management. By 1965, the Refuge included 7,000 acres and operated Pool 2 as a shallow marsh wetland unit (see Figure 4.1 for a map of the management units). By 1966, the Refuge had grown to 8,870 acres. By 1968, the Refuge completed construction of Pool 3 and readied it for operation as a managed wetland. As the decade ended, the Refuge operated four wetland units covering 920 acres.

Photo by Myles Willard

In the 1970s, the Refuge continued to expand its water management capabilities. The Refuge developed Moist Soil Units 1-4, constructed Pools 4 and 5, and rip-rapped the exterior dike around the Trinklein Unit. By the end of the decade, the Refuge operated 10 wetland units covering 2,153 acres. The Trinklein Unit today consists of Farm Unit 1 and Trinklein 1N, 1C and 1S.

While the Refuge and the DNR continued to develop their land during the 1970s, local residents, with congressional support, renewed interest in the Saginaw Valley Flood Control Project in 1975. This renewed interest caused the Army Corps of Engineers to begin preconstruction planning for the project. In 1976 and 1977, the Army Corps of Engineers evaluated whether or not it was necessary to modify the authorized plan. The Corps concluded that the original plan needed to be changed because of changed conditions and lack of support for the original concept. The various parties worked together to develop an acceptable alternative. The new plan called for the development of a system of *offset levees* to protect the Shiawassee Flats area. By the end of the decade, a draft Environmental Impact Statement had been written for the Project and interested parties were beginning to express their concerns and comments.

During the 1980s, the Refuge added 114 acres (to make a total of 8,984 acres), improved water control structures and dikes, added rip-rap to strategic dikes, and developed one additional wetland unit. At the end of this period, the Refuge operated 11 wetlands covering 2,439 acres. While the Service was improving and developing lands and habitats under its stewardship, the Saginaw Valley Water Control Project was finalized.

The Army Corp of Engineers issued a formal record of decision in 1983 that favored the offset levee plan. The plan included several activities that directly affected Refuge management. The plan called for:

- Improving 14 miles of levees for 2.5-year flood protection plus 2 feet of freeboard on State and Federal lands.
- Widening and cleaning Spaulding Drain from Ambrose Road to Ferguson Bayou, with the channel width increased from 125 to 200 feet and no deepening.
- Utilizing flood storage areas on State and Federal lands (2,660 acres on the Refuge).
- Reconstructing the Curtis Road Bridge. Additional measures in the plan did not directly affect Refuge management, but because of them a larger volume of water would move through the area.

Again, political and financial pressures kept the Project from progressing. As a result, in the mid 1980s the Flint River Dike Board was formed. The board obtained funding and advanced a plan for protecting private lands along portions of the Flint River. The plan followed the general design approved by the Army Corps of Engineers in 1983, and construction began in 1988. Work on the Refuge portion of this Project started in 1989 and was finished in 1990. Only Phase I of this Project was completed before funding ended. In a later phase of the project, additional levees were to be constructed on the Refuge.

Because the flood control and dike projects have been idle for 10 years or more, we think that any renewal of activity would require a review of recent information and conditions and a new planning effort.

Over the last 10 years, the Refuge renovated dikes along Pools 1A, Grefe and Pool 2, rip-rapped a large portion of the exterior dike on Pool 2, and repaired its water control structures. In 1994, the Refuge began to convert the Trinklein Unit from cropland. In the conversion, the Refuge restored 240 acres of land to its original wetland condition and added three managed wetland units. The Refuge also increased its land holdings by 162

acres. This new unit was also moved toward wetland management. With these new units, the Refuge operated 15 wetlands covering 2,713 acres within a total Refuge acreage of 9,706.

Lack of widespread support and funding has again idled flood control and dike commission projects, and no construction is anticipated in the near future.

Flood problems for the Shiawassee Flats have intensified over the years. Although flooding is influenced to some extent by the water level of Lake Huron and weather conditions, draining, tiling, diking, and removing wetland habitat in the Saginaw River Watershed have intensified flooding. If there is a rainstorm upstream, the river level peaks sooner and with a bigger volume than in the past. Floods occur with higher peaks and they occur more frequently than in previous years. Flood waters also recede more rapidly than in the past. These factors, combined with the flood control objectives of moving the water to Saginaw Bay as quickly as possible and having the Refuge act as a flood storage basin, greatly stress the Refuge's facilities. Damage to dikes, trails and service roads is common. The bottomland forest floor is saturated for shorter periods, which is affecting the plant community. In addition, floods are bringing and leaving more sediment – and contaminants – to the Refuge. These effects challenge the Refuge's ability to achieve its water management and associated wildlife objectives.

Construction Permits
When major wetland development and rehabilitation projects are contemplated, the Service applies for construction permits from the Michigan Department of Environmental Quality (DEQ) and the Army Corps of Engineers. As long as certain conditions are met, normal maintenance activities such as levee repairs and ditch maintenance are authorized and conducted under National Permit No. 3.

Cooperative Agreements
The Refuge has three cooperative agreements that affect water management on the Refuge. In a 1987 agreement with the Saginaw County Drain Commission, the Refuge agreed to issue special use permits to the Commission for the establishment and maintenance of county and inter-county drain facilities. The permits allow access, parking areas, and material/borrow/fill sites as needed along county drains.

A second agreement is with the Army Corps of Engineers and the Michigan DNR and relates to the Saginaw Valley Flood Control Project. The agreement, which began as an oral agreement, became formalized when the Project was approved and an *environmental assessment* completed in 1983. Under this agreement, the Refuge is obligated to provide flood storage basins as a secondary benefit after fish and wildlife management concerns are addressed. The areas designated for this storage are Pools 1A, Grefe, 2, 3, 5 and Eagle and North marshes along with the surrounding bottomland woods.

Photo by Myles Willard

The third agreement is with the Flint River Dike Board and is an outgrowth of the Saginaw River Flood Control Project. In this agreement, the Refuge agreed to follow the Flint River Plan and work with local commissions and communities to implement the plan while recognizing fish and wildlife concerns.

Fish, Wildlife and Plant Resources

Vegetation

Water and the effects of water dominate the ecological processes on the Refuge. A variety of vegetative communities that are associated with large rivers and their floodplains are found within the authorized boundaries of the Refuge. (See Figure 3.6) These communities include some of the last remaining bottomland hardwood forests in Saginaw County. Bottomland forests are the transitional habitats between aquatic and terrestrial communities. In the Refuge, most of these forests are lowland hardwood wetlands. They are characterized by extensive lateral flooding during times of heavy precipitation. Soils are frequently either moist or saturated. This community type consists of maple, oak, hickory, ash, willow, elm and cottonwood.

Another dominant community type is emergent marsh habitat, which consists of cattail, bulrush, sedges, reed canary grass, cut-grass, cord grass, water plantain, smartweed and millet. A shrub and grass habitat type is often found along the edges of the marsh community. The brush species are usually buttonbush, willow, ash, dogwood, and cottonwood. Wetter grass species such as reed canary grass are often mixed in with these species. There are also areas of open land *vegetation*, which includes the grasslands and croplands. The croplands are usually farmed for corn, winter wheat, soybeans or barley. However, the fields are very susceptible to seasonal flooding along the river corridors and must be diked and tiled to be productive. The grasslands are usually abandoned farmlands that are seasonally flooded and are reverting to open field habitats.

Much of the land in the Refuge is classified as wetland by the Army Corps of Engineers, the U.S. Fish and Wildlife Service, the State of Michigan, and other agencies responsible for land stewardship. Upland forest is another vegetation cover type found in the authorized boundaries of the Refuge. This *vegetation type* is found on slightly higher elevations and in drier soil conditions and is a true terrestrial community. Upland forests are characterized by little lateral flooding during times of heavy precipitation and soils are more mesic in nature. This community type comprises beech, sugar maple, basswood, and birch. See Appendix E for a list of flora on the Refuge.

Birds

The Refuge's array of habitats satisfy the requirements of diverse birds. Scientific surveys, organized bird counts, and casual observations have recorded more than 260 species of birds using the Shiawassee Flats area (Appendix E).

A Note on Bird Count Methodology: Before discussing the abundance of birds on the Refuge, we need to describe how the reported numbers are derived. The number of birds on the Refuge is determined by following a specific route and counting birds that are seen. The route is shown in Figure 3.7. This technique has the advantage that it is standardized and has been used over many years. However, because the standard route only covers a portion of the Refuge, not all birds are included in the count. The counts, therefore, are an index and are less than the actual number of birds that are on the Refuge.

The count best represents use in the Refuge's non-forested habitats. Although interior forest species are counted once a year with a standard procedure, we have little confidence in the numbers of forest interior species and do not report them here. Bird use of the Refuge (and the resulting count) is highly variable. Therefore, the Refuge reports only the average peak numbers that have been counted along the survey route. These numbers present a general picture of the relative abundance of the birds on the Refuge.

Figure 3.6: Current Land Cover

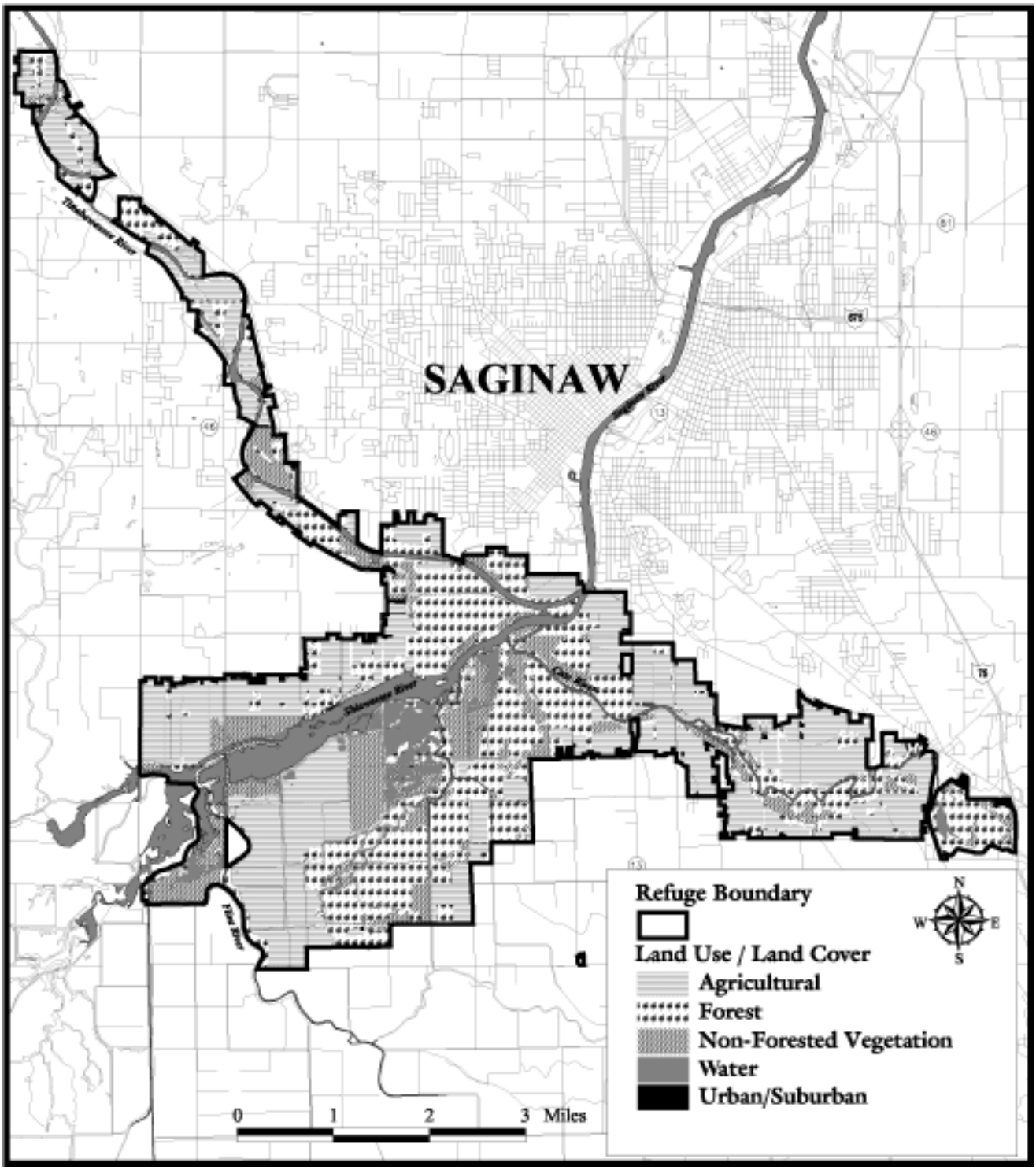
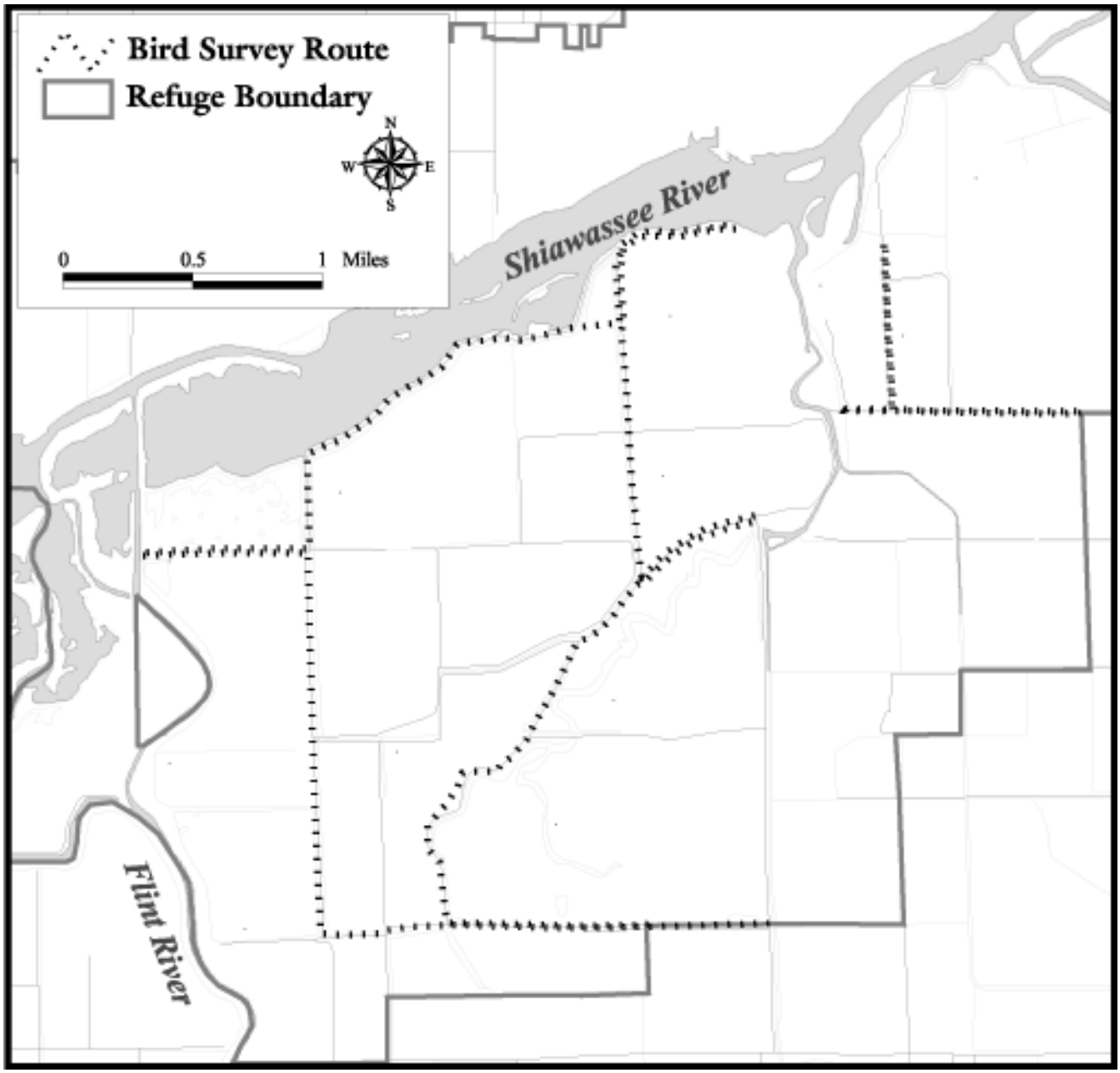


Figure 3.7: Route Used in Bird Counting



The Tittabawassee, Shiawassee, Flint and Cass River bottoms are important stopover habitats for migrating waterfowl. Portions of the waterfowl flights from both the Mississippi and Atlantic flyways use this area each spring and fall. Peak waterfowl numbers for the Refuge exceed 40,000-50,000 ducks, 20,000-30,000 geese, and 700-1,200 swans. Two notable species that are common on the Refuge in the fall, winter, and early spring are the American black duck and Canada geese from the Southern James Bay Population. The area also provides nesting and rearing sites for resident geese and ducks.

Refuge wetlands provide food, nesting, and roosting areas for more than 40 species of shore and wading birds. Most of the shore and wading birds are transients. They use the area to rest and to obtain protein essential for migration and successful reproduction. Average peak numbers for shorebirds are 1,800-2,000 and for wading birds are 400-500. However, some species are known to nest within the Refuge. These include the green heron, least bittern, sora and Virginia rails, common moorhen, pied-billed grebe, spotted sandpiper, killdeer, American coot, and American bittern. Recently, great blue herons have again begun nesting on the Refuge after being absent for a few years.

The bottomland forests in the Refuge are important habitats for many neo-tropical migrants and other songbirds. The forests provide some of the last remaining habitat in the Saginaw area for nesting and migration by a variety of warblers, thrushes, vireos, woodpeckers, and flycatchers.

Refuge grasslands provide food, nesting, and cover for more than 20 species of passerines. Average peak numbers for grassland species on the Refuge are 1,200-2,000.

The Refuge supports at least 15 species of raptors on a seasonal or permanent basis. The mix of open fields, wetlands, and woods are essential habitats for most of these birds. The red-shouldered hawk, osprey, and bald eagle (all are species of concern on State and Federal lists) have been observed using the area. Average peak numbers for raptors on the Refuge are 70-120.

Mammals

More than 30 mammals have been recorded in or near the Refuge (Appendix E). White-tailed deer are abundant in the area because of the mix of forested lands, wetlands, shrubs, croplands, and grasslands. Wetlands provide the optimum cover for deer during severe winter weather. The deer population has been as high as 130 deer per square mile and as low as 10 per square mile. Currently, we are trying to hold the density at 30 deer per square mile. Deer management is guided by plans developed in consultation with the Michigan DNR and concerned citizens. Coyotes and fox are among the large mammals that are common to the area. The wetlands also provide excellent furbearer habitat for such species as the muskrat, beaver, opossum, raccoon, mink and, occasionally, otter. The forested and upland areas support rabbit, mice, voles, shrews and squirrels.

Photo by Kim LeBlanc

The area within the authorized Refuge boundary provides migration corridors for mammals to move to and from the larger core area of the Refuge. This migration allows for new species to move into the area and fill unused niches and it permits an interchange of individual animals, which helps maintain the vigor of the local population.

Reptiles and Amphibians

Surveys have recorded 18 species of reptiles and amphibians on the Refuge and its expansion area (Appendix E). This list includes one State-listed threatened species (eastern fox snake) and one Federal candidate species (Blanding's turtle).

Threatened and Endangered Species

One federally-listed threatened animal species, the bald eagle, regularly uses the Shiawassee National Wildlife Refuge. In addition, 16 State-listed endangered or threatened animal species use habitats in the Shiawassee Flats Area. These species include residents and migrants. The Refuge is likely providing support to all of these species. The 17 Federal or State species reported using the Shiawassee Flats Area and their classification are shown in Table 1.

The only plant species on the Federal and State lists of endangered and threatened species that is known to occur in Saginaw County is the Eastern prairie fringed orchid (*Platanthera leucophaea*). The species has not been documented on the Refuge, but little definitive inventory work has been done. Proper conditions for the species, however, do exist on the Refuge and in its expansion area.

Fish

The Refuge's sloughs, rivers, and marshes support more than 70 species of forage and game fish. Because of the Refuge's location at the junction of all the major tributaries forming the Saginaw River and its connection with Saginaw Bay, its wetland habitats are integral for life stages to many of the fish using the bay. With no migratory impediments leading to the most productive shallow water bay on Lake Huron, these habitats are critical, particularly as spawning and nursery areas. Northern pike and lake sturgeon use these areas. The large populations of shiners, minnows, and other forage fish not only support game fish populations – yellow perch, crappie, walleye, channel catfish, and pike – but also support a diversity and large numbers of wading, water, and predatory bird species along with some waterfowl populations. A number of Great Lakes fish – white bass, white sucker, and walleye – move to the Refuge and beyond every year to spawn. The Shiawassee Flats and other Refuge wetlands provide nursery areas for these fish populations. With diminishing wetland resources the Refuge has a unique role in protecting fish habitat and valuable fish resources.

The Saginaw Bay Watershed is extensively degraded and has lost much of its habitat diversity. Coastal and riparian wetlands that provided for a significant northern pike population, once an important commercial fishery, have been lost or degraded through development. Only a remnant northern pike population exists today in Saginaw Bay. Restoration of extensive areas of riparian wetland habitats could provide a much needed boost to this depleted population. Some stretches of the Tittabawassee River are believed to contain habitat for the lake sturgeon (Species of Special Concern) with anecdotal reports of adult sightings in the river. Occasionally adult and sub-adult sturgeons are caught in commercial nets in Saginaw Bay, so there is potential to restore the population by enhancing and protecting the spawning habitat in the Tittabawassee River. In addition, a number of other Saginaw Bay fish species use these wetland habitats for reproduction, nursery, and feeding purposes. The walleye fishery found in the Saginaw Basin is nationally known, providing a high-quality recreational fishing experience. Surveys conducted by the Michigan DNR have shown more than 71 species of fish using the lower Tittabawassee, lower Cass, and the Saginaw River System (Appendix E). Several Great Lakes species ascend the river system to spawn. These include the walleye, white bass, white sucker, chinook salmon, and steelhead.

Table 1: Threatened and Endangered Species in the Shiawassee Flats Area

Species	Federal		State	
	Endangered	***Threatened***	***Endangered***	***Threatened***
Fishes				
Channel darter *Percina copelandi* (Jordan)			X	
River darter *Percina shumardi* (Girard)			X	
Lake sturgeon *Acipenser fulvescens* (Rafinesque)				X
Reptiles				
Eastern fox snake *Elaphe vulpina gloydi* (Conant)				X
Birds				
Short-eared owl *Asio flammeus* (Pontoppidan)			X	
Prairie warbler *Dendroica discolor* (Vieillot)			X	
Peregrine falcon *Falco peregrinus* (Tunstall)			X	
King rail *Rallus elegans* (Audubon)			X	
Long-eared owl *Asio otis* (Linnaeus)				X
Red-shouldered hawk *Buteo lineatus* (Gmelin)				X
Merlin *Falco columbarius* (Linnaeus)				X
Common loon *Gavia immer* (Brunnich)				X
Bald eagle *Haliaeetus leucocephalus* (Linnaeus)		X		X
Least bittern *Ixobrychus exilis* (Gmelin)				X
Osprey *Pandion haliaetus* (Linnaeus)				X
Caspian tern *Sterna caspia* (Pallus)				X
Common tern *Sterna hirundo* (Linnaeus)				X
Plants				
Eastern prairie fringed orchid *Platanthera leucophaea*	X	X		

Invertebrates

Little is known about the invertebrates on the Refuge. A formal, complete survey has not been done. Appendix E contains a listing of the species that have been documented on the Refuge. We recognize that the list represents only a small portion of the species that actually exist on the Refuge.

Land Use

The area within the authorized boundary of the Refuge totals 16,600 acres. Portions of the Refuge are adjacent to the Saginaw metropolitan area, with residential developments bordering several sections of the Refuge. Overall trends in the Saginaw area are toward continued development and movement from urban to rural areas. Agriculture lands are being altered by urban sprawl and development. The number of farms in the Saginaw Bay Watershed has decreased by 70 percent over the last 40 years. Major components of the private property within the authorized Refuge boundary are undeveloped aquatic and terrestrial habitats. The loss of these habitats would further threaten the health of the watershed and the quality of life in the area.

Mosquito Control

The Saginaw County Mosquito Abatement Commission controls nuisance and disease vectoring mosquitoes in Saginaw County. The Commission's activities include disease and mosquito surveillance, killing mosquito larvae and adults, reducing sources, and public education. In general, the public supports the Commission's activities. Under an agreement with the Refuge, the Commission controls mosquitoes on a portion of the Refuge.

Currently, the Commission carries out operations on approximately 4,000 acres of land within the authorized boundaries of the Refuge. Of these, 1,000 acres are owned by the Refuge. Operations consist of applying the larvacide Bti (*Bacillus thuringensis israelensis*) against spring floodwater mosquitos. If a monitoring program detects high species concentration levels or the presence of disease pathogen antibodies, additional spot treatments are carried out.

The Service has numerous concerns about mosquito control on national wildlife refuges. These concerns include impacts to non-target organisms that are food for wildlife; disturbance to wildlife from mosquito control activities; alteration of habitats; and compliance with laws and policies governing management of national wildlife refuges. The one concern that both the Service and mosquito control agencies share is the concern for the health and safety of the public (U.S. Fish & Wildlife Service, 1999).

Contaminants

Principal contaminants present within the authorized boundaries of the Refuge include those associated with point and nonpoint sources from industrial, municipal, and agricultural operations. The Cass and Shiawassee rivers carry fertilizers and pesticides from farms. These rivers introduce organochlorine products into the bottomlands of the Refuge. The Flint and Tittabawassee rivers move through large municipal and industrial areas and bring polychlorinated biphenyls (PCBs) and dioxin. The Michigan Department of Public Health recommends limiting the consumption of fish from the Saginaw River and from the Tittabawassee River below Midland.

According to the Michigan Environmental Response Division, 10 potential contaminated sites lie near or within the authorized boundary of the Refuge. The sites range from debris and rubble deposits to more serious problems such as municipal landfills. Sites found within the authorized boundary of the Refuge include the Tittabawassee and Saginaw rivers; a site along the banks of the Cass River in Spaulding Township, and a rubble/debris deposit in Saginaw Township south of Route 46, adjacent to the Tittabawassee River. The remaining six sites lie outside of the authorized Refuge boundary but within one-half mile of the boundary.

Photo by Myles Willard

Transportation corridors that cross the Refuge pose another potential source of contaminants. There is the potential for hazardous chemical spills from accidents on the two railroads and the several public highways that cross the authorized Refuge boundaries.

Socioeconomic and Political Environment

The Refuge is located in portions of Spaulding, Bridgeport, Saginaw, James, and Thomas townships and parts of the City of Saginaw in Saginaw County, Michigan. Large urban areas are located north and east of the Refuge while the areas to the south and west are predominately suburban and rural communities. The estimated population of Saginaw County in 1998 was 210,101 people. Saginaw County contains three cities and five incorporated villages, and approximately 750 square miles of rural land. Although the county is experiencing a slowly declining population (.9 percent 1990-98), new construction, particularly of single family housing, continues to reduce open space. Saginaw County is a relatively diverse community; minority populations account for about 22 percent of the total population.

Saginaw County's economy is based largely on manufacturing or industrial jobs; the top employers include Delphi Saginaw Steering Systems, General Motors Power Train Division, St. Mary's Medical Center, and Delphi Chassis Systems. Other significant sectors of the local economy include retail sales, financial services, professional services, utilities, and food service. Most of the county's employment opportunities are concentrated around the City of Saginaw.

In 1993, Michigan State University researchers determined the economic contribution of the Shiawassee River State Game Area and the Shiawassee National Wildlife Refuge to the local economy (Leefers and Propst). They estimated that hunters, anglers, bird watchers, and hikers spent approximately $748,000 in Bay, Saginaw, and Tuscola counties when visiting the two areas. These activities supported 25 private-sector jobs in the three-county area, which corresponds to one private-sector job supported by each 1,740 visits by the public (43,514 visits in 1992).

The Shiawassee National Wildlife Refuge budget also provides approximately $500,000 per year to the local economy through staff salaries, Youth Conservation Corps (YCC) jobs for local high school students, expenditures for construction contracts on the Refuge, and purchases from local businesses for operation and maintenance of the Refuge.

Cultural Resources

Responding to the requirement in the law that comprehensive conservation plans will include "the archaeological and cultural values of the planning unit," the Service contracted for a cultural resources overview study of Shiawassee National Wildlife Refuge and the refuges it administers. This section of the CCP derives mostly from the draft report, "*Overview Study of Archaeological and Cultural Values on Shiawassee, Michigan Islands, and Wyandotte National Wildlife Refuges in Saginaw, Charlevoix, Alpena, and Wayne Counties, Michigan*," by James A. Robertson and others, Commonwealth Cultural Resources Group, Inc., dated May 1999.

Shiawassee National Wildlife Refuge has 31 reported sites on Refuge land. Attempts by the archeologist to relocate 17 sites resulted in not finding 10 of them. The sites are probably there, but failure to relocate them is indicative of previous land-altering activities and of alluvial sediments deposited from flooding. Two previously excavated sites are deeply-buried and exhibit stratified layers of prior alluvial sedimentation. Other sites are exposed due to erosion. There are no standing structures on the Refuge.

The archeologist identified 42 known sites on the Shiawassee National Wildlife Refuge expansion area. These sites include standing structures as well as archeological sites. The archeologist also identified the potential for adverse effects on farmsteads (farm buildings and the farm land) if the acquisition separates the buildings from the farm land.

Sites could include prehistoric archeological sites, historic archeological sites (Indian and Western), industrial and mining sites, farmsteads, and timbering sites. Evidence for the earliest culture, the PaleoIndian (10,000-8000 B.C.), is found only in fluted points in private collections from the area. The other prehistoric cultures are represented in the archeological record: Archaic (8000-550 B.C.) and Woodland (600 B.C.-A.D. 1600).

As of June 10, 1999, Saginaw County contains 35 properties on the National Register of Historic Places. Most of these properties are located in towns and cities, but three archeological sites listed on the National Register are within the Refuge expansion area.

The overview study identified a number of research questions. These questions should be considered in future investigations, even identification-inventory surveys.

The overview study identified Indian tribes, historical societies and museums, and other potentially interested parties that should be consulted in the search for and evaluation of cultural properties on the refuges. The land on which Shiawassee National Wildlife Refuge is located appears to have been empty of human occupation during the late prehistoric and proto-historic periods, although hunting parties from several tribes traversed it. Thus, determining an association between prehistoric cultures that created the archeological sites and modern Indian tribes is problematic. No evidence exists for the removal of human remains from any of the refuges, but two sites in the expansion area report human burials and collected human remains.

Public Use

In the *1997-2001 Saginaw County Parks and Recreation Plan*, the Saginaw County Parks and Recreation Commission identified several long range goals. The Refuge can help the County toward its goal "To preserve and protect adequate natural areas within Saginaw County and participate in environmental education programs designed to

promote a better understanding of the natural environment among County residents." (Saginaw County Metropolitan Planning Commission, 1997).

Photo by Kim LeBlanc

Several areas within 40 miles of the Refuge offer fish and wildlife-related recreation and/or education. The adjoining Shiawassee River State Game Area managed by the Michigan DNR offers hunting and fishing opportunities. Several Saginaw County Parks provide trails, fishing, and environmental education/interpretation programs. Bay City State Recreation Area, Hartley Outdoor Education Center, and Chippewa Nature Center offer environmental education and interpretative programs.

Interstate and state highways provide easy access to the Saginaw area. On an average day, more than 45,400 vehicles travel just east of the Refuge through Bridgeport on Interstate 75 (1997 Michigan DOT Traffic Count). The State's number one attraction, Frankenmuth, a German heritage town, and a large retail outlet in Birch Run lie within 25 miles of the Refuge.

Special Management Topics

Wilderness Review

As part of the CCP process, we reviewed lands within the legislative boundaries of Shiawassee National Wildlife Refuge for wilderness suitability. No lands were found suitable for designation as Wilderness as defined in the Wilderness Act of 1964. Shiawassee National Wildlife Refuge does not contain 5,000 contiguous roadless acres nor does the Refuge have any units of sufficient size to make their preservation practicable as Wilderness. The lands of the Refuge have been substantially affected by humans, particularly through agriculture.

Saginaw River and Bay Natural Resource Damage Assessment Settlement

In 1999, the Service, the State of Michigan and the Saginaw Chippewa Tribe settled a claim for natural resource damages in the Saginaw River and Bay. The primary defendant in this case was General Motors because of its long-term releases of polychlorinated biphenyls (PCBs) to the river. As part of the settlement, General Motors, the City of Saginaw, and the City of Bay City will pay $28.22 million in direct costs for sediment removal, restoration projects, and reimbursement of government costs. The settlement will result in the removal of contaminated sediments from the Saginaw River and it will restore and protect habitat in the Saginaw River and Bay area.

Three components of the settlement affect the Refuge. First, the defendants transferred Little Charity Island and about 222 acres of Big Charity Island to the Service for the purpose of habitat restoration and protection. Second, the Refuge received two 99-year leases of the Green Point Environmental Learning Center, which includes the interpretive center building and 80 acres of riparian and upland habitat. Third, 3 years after the settlement, the defendants are to transfer $520,000 to the Service for Green Point Environmental Learning Center activities.

The Service will manage the Charity Islands as part of the Michigan Islands National Wildlife Refuge, which is covered in a separate comprehensive conservation plan. The long-term leases make it possible to develop longer term plans for the Learning Center and its property. Furthermore, the additional funds will enhance the programs that can be offered at the Learning Center.

Chapter 4: Refuge Management

Current Refuge Programs

Habitat Management

Management of Refuge habitats involves a variety of techniques to control and enhance habitat conditions. The primary objective of habitat management is to provide fish and wildlife with diverse habitats to meet a variety of requirements for resting, feeding, and nesting.

Photo by Ed DeVries

In addition to direct manipulation of habitats, other Refuge activities indirectly support habitat management. Dike maintenance, for instance, facilitates water management, as does the maintenance of water control structures and pumps. Similarly, trapping for muskrats is permitted on the Refuge because high numbers of muskrats can cause extensive damage to dikes with their burrows. Trappers bid for the opportunity to trap on the Refuge. During the 1998 season, two trappers visited the Refuge 90 times, spent 287 hours trapping and removed 1,185 muskrats.

Wetland Management

Wetland habitats on Shiawassee National Wildlife Refuge include moist soil units, marshes, greentree reservoirs, open water pools, rivers, and stream habitats. The Refuge currently protects and manages 3,479 acres of wetland habitats. The Refuge staff manipulate water levels in the wetlands to affect habitat structure and waterbird use. However, the level of the Saginaw Bay and River affects the Refuge staff's ability to manipulate water levels in Refuge wetlands and, at its highest levels, floods the Refuge.

Most wetland habitats on the Refuge occur in distinct units. The Trinklein Units, however, offer a blend of habitats including moist soil, emergent marsh, and grassland. The acreage for each unit is displayed in Table 2. The location of the units is shown in Figure 4.1.

Moist Soil Units

In a normal year the water level is lowered during the summer to establish moist-soil vegetation. After plants are established in the summer, the unit is gradually reflooded in the fall to optimize use of the seed resources. During the spring the water level will gradually be lowered for use by migrating waterfowl, shorebirds, and waders. Four moist soil units total 385 acres.

Figure 4.1: Locations of Management Units

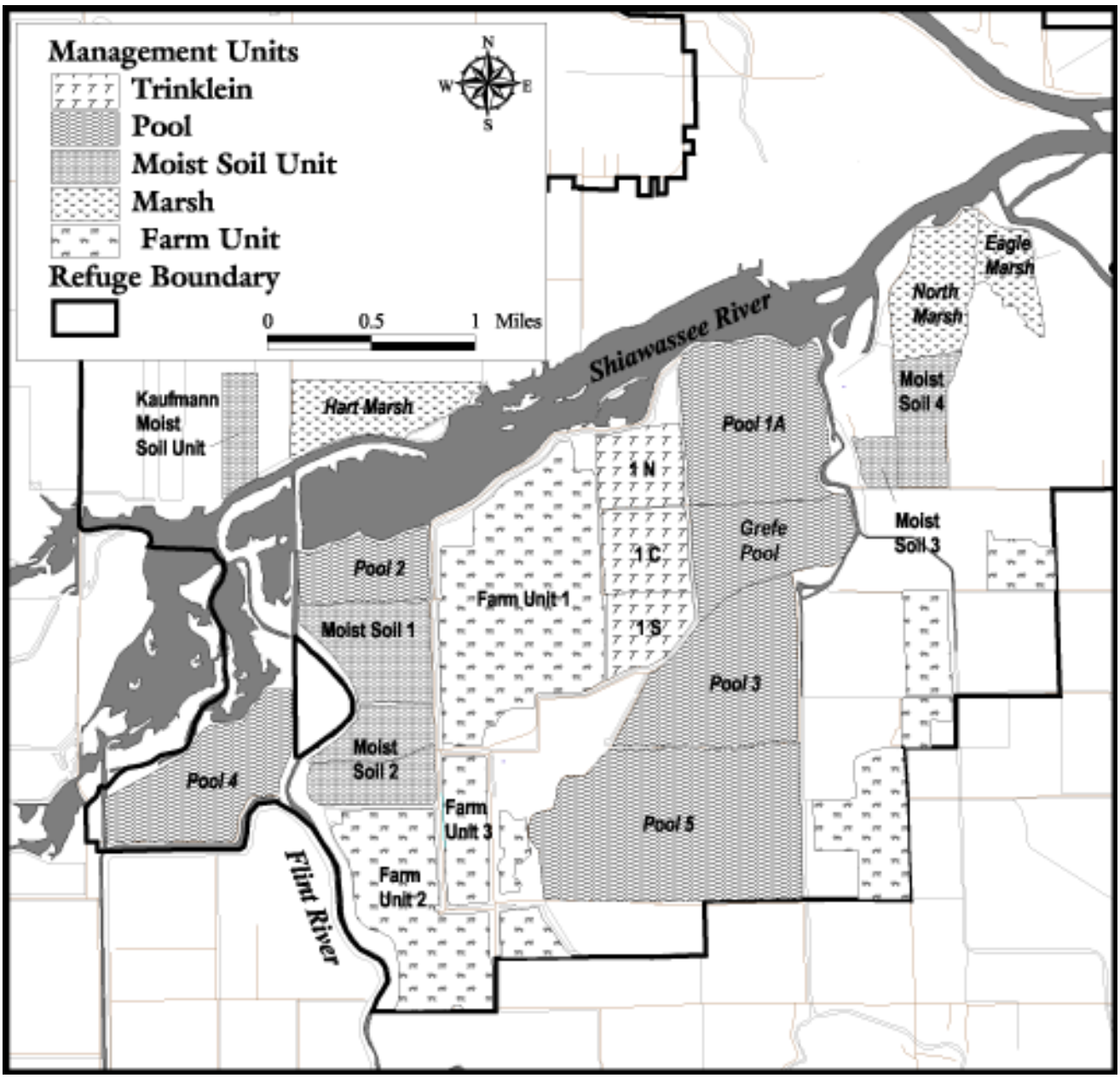


Table 2: Acreage of Management Units on Shiawassee National Wildlife Refuge

Wetland Units

Unit	Acreage	Unit	Acreage
Moist Soil Unit 1	137	Pool 5	520
Moist Soil Unit 2	75	Hart Marsh	90
Moist Soil Unit 3	92	North Marsh	113
Moist Soil Unit 4	82	Eagle Marsh	56
Pool 1A	315	Kaufman Marsh	51
Grefe Pool	190	Trinklein 1N	91
Pool 2	115	Trinklein 1C	79
Pool 3	300	Trinklein 1S	71
Pool 4	444	Rivers and associated Marsh	950

Grassland Tracts

Unit	Acreage
Switchgrass Unit	78
Schrems	61

Marshes

Marshes are important for waterfowl. The vegetation in marshes provides seeds, tubers, and browse. The vegetation also provides nest sites. The optimum mix in a semi-permanent marsh is 50 percent vegetation cover and 50 percent water. The 50:50 mix produces the maximum diversity and number of birds. In addition, the mix provides ideal nesting cover for waterbirds and substrates for invertebrates, which waterfowl and shorebirds also feed on. Refuge staff manipulate water levels and use prescribed fires to alter the vegetation structure in the marshes and to make food resources available to migratory birds. Pools 2 and 4 and the North Marsh provide emergent marsh habitat and total 672 acres.

Open Water Pools

Open water pools serve as loafing areas for waterfowl, year round habitat for marsh birds, and occasional seasonal habitat for shorebirds. In normal years, water levels are maintained about 2 feet deep in the spring and fall to provide a feeding and loafing area for migrating diving ducks. Summer water levels vary from year to year depending on how the Refuge staff wants to alter the vegetation structure in the pools. Pools 1a, 2, 4 and Grefe Pool are capable of being managed as open water pools and total 700 acres.

Greentree Reservoirs

The bottomland hardwood forests that have dikes around them function as greentree reservoirs. The intent is to flood the area during the spring and fall migrations to provide a feeding and loafing area. In normal years the Refuge staff try to flood the forests during the spring and fall, but not leave the area flooded too long. If the area is flooded too long, the trees will be stressed and killed. The two greentree reservoir units on the Refuge total 820 acres.

Forests
The forests on the Refuge are used by deer, squirrels, raccoons, hawks, owls, and a variety of forest interior bird species. The forests have been affected by the large number of deer in the past. Heavy browsing by the deer has decreased the regeneration of the forest. Since the deer numbers have been reduced, some seedlings have shown significant growth. The Refuge staff have attempted to supplement regeneration by planting seedlings. Floods have killed most of the new seedlings, however. The goal has been to create a two-tiered canopy of mast and cavity producing trees without jeopardizing populations of forest interior birds. The Refuge has a total of 3,519 acres of forested habitat, which does not include the greentree reservoir units.

Croplands
Cropland on the Refuge is farmed through cooperative farming agreements with four farmers. The primary objective of the cooperative farming program has been to provide food for waterfowl during the spring and fall migrations. Approximately half of the total acreage also supports the managed goose hunt. Narrow strips of winter wheat are planted adjacent to corn strips that serve as cover for hunters. The fields are in a soybean, corn, and barley/clover or winter wheat rotation. After farmers have harvested their share of the agricultural crops, birds have the opportunity to glean waste grains from the fields. The Refuge crop share of 30 percent is left standing in the field through winter and used as a food for early spring migrants. The Refuge has 1,182 acres in cropland.

Photo by Myles Willard

Grasslands
Refuge grasslands are used in the spring and fall by migrating grassland bird species. Ducks and geese also nest in the grassland. The chief management concern related to grasslands is the invasion of shrubs, trees, and noxious weeds into the grassland. Prescribed fire is the primary management tool used in maintaining grasslands. The Refuge has 580 acres of grasslands.

Fish and Wildlife Monitoring

Refuge staff and volunteers currently use 16 surveys to monitor wildlife use throughout the year. The surveys provide information for Refuge management and support state and national efforts. Data from the surveys are maintained in the Refuge files and forwarded to others when appropriate.

In addition to the long-term monitoring projects, in a collaborative effort with the Alpena Fishery Resources Office and local sportsmen and conservation groups, the Refuge has developed shorter term fish survey projects. The first project assessed the presence of two new exotics – the Ruffe and Round goby – and two endangered species in Refuge waters. The second project assessed spawning activity of certain game and forage fish in the Refuge wetlands.

Waterfowl
Mid-December Goose Count – In coordination with the Michigan DNR, geese are counted over a standard route in this one-day survey. The data are forwarded to the DNR, which uses the data to evaluate both flyway and local goose populations.

Goose Neck Collar Survey – The data are collected during the bi-weekly waterfowl counts and submitted to the Service to provide information on the migration and population of Canada geese.

Photo by Kim LeBlanc

Mid-Winter Waterfowl Survey – Data are gathered on a onetime count over a standard route and forwarded to the Service. The Service uses the data to provide information on population trends for some species' winter distribution.

Bi-weekly Waterfowl Count – All waterfowl species are counted over a standard route for the entire year. During peak use, the counts may be conducted weekly. The data are provided to the DNR, and the Refuge uses the data for evaluating habitat management and trends in use.

Waterfowl Brood Survey – All waterfowl broods are counted over a standard route three times between April and early July. The data are used by Refuge staff to assess habitat conditions for waterfowl production.

Wood Duck Nesting Box Survey – Volunteers visit the boxes during the winter to gather the data and prepare the boxes for the coming spring. The data, which are used for population information, are forwarded to the Service.

Wood Duck Breeding Bird survey Route – Once a year in late May, a count is conducted along a standard 25-mile route. The data are submitted to the Service and are used in a national effort to assess the population trends of wood ducks.

Marsh Birds and Shorebirds

Woodcock Singing Ground Survey – One time in April, a standard survey is conducted off-Refuge. The data are forwarded to the Service. The Service uses the data to provide an index to woodcock abundance and to estimate woodcock population trends for states, provinces, management regions, and the continent.

Marsh Bird Call Survey – Twice during May through July data are collected along a standard route. Refuge staff use the data to assess the breeding populations, trends, and habitat condition.

International Shorebird Survey – Volunteers collect data biweekly along a standard route weekly or, at a minimum, every 10 days throughout the shorebird migration period, which is typically from late March until late November. The data are forwarded to the Manomet Observatory for Conservation Sciences in Manomet, Massachusetts. The Center staff use the data to map migration routes, timing, and staging areas and to monitor shorebird population trends.

Passerine/Neotropical Migrants

Bi-weekly Migratory Bird Survey – All birds, excluding waterfowl, are counted over a standard route year-round. Refuge staff use the data to monitor trends in bird use and assess habitat and management. Portions of the survey are reported to national, state or local data bases, including the Michigan Seasonal Bird Survey.

Forest Interior Point Counts of Breeding Birds – Refuge staff conduct the count once during June. Approximately 15 points are visited. Data is used to assess the neo-tropical forest interior breeding bird use, trends, and habitat conditions.

MAPS – In 1999, Refuge volunteers began Monitoring Avian Productivity and Survivorship (MAPS) studies on the Refuge. MAPS uses mist nets and point counts to determine the breeding success and survival rates of selected songbird species, which helps the Refuge staff to understand the population dynamics of these and similar species. This provides insights into the causes of population changes. (See http://www.im.nbs.gov/maps/cover.html for a description of MAPS.)

Raptors

Mid-Winter Bald Eagle Survey – The count occurs along a standard route on one day in January. The survey is coordinated with the Michigan DNR as part of a national effort. The Snake River Field Station of the USGS analyzes the data to provide information on eagle population trends, distribution, and habitat.

Amphibians

Michigan Frog and Toad Survey – A volunteer collects data three times annually during the breeding season at standard sites in the south central portion of the Refuge. The data are submitted to the Michigan DNR Natural Heritage Division, which uses the data to monitor frog and toad populations in the State of Michigan.

White-tailed Deer

White-tailed Deer Sex Ratio Counts – Once a month from late May to September, Refuge staff count deer along a standard route. Refuge staff use the data in management of the deer herd.

Winter Aerial Deer Count – The Michigan DNR conducts the count and submits the data to the Refuge. Refuge staff use the data to estimate the deer population.

Photo by Myles Willard

Habitat Monitoring

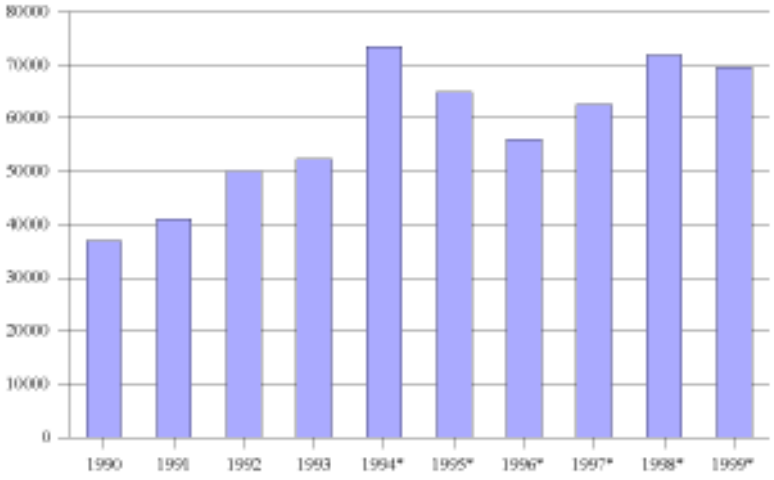
The Refuge conducts little formal habitat monitoring. Vegetation is measured along line transects before and after prescribed burns. When deer numbers were high on the Refuge, deer browse surveys were conducted. Now that deer numbers are lower and vegetation is beginning to respond, formal browse surveys are no longer conducted.

Public Use

Public use at Shiawassee National Wildlife Refuge has grown steadily over the last decade. Figure 4.2 depicts estimates for total Refuge visits over the past 9 years. These numbers represent all visitors to the Refuge. They are based on estimates by the Refuge staff at parking lots and boat ramps.

In 1998, hunting, fishing, and trapping accounted for 6 percent of the total visitation. Hiking, bicycling, cross country skiing, wildlife observation, and photography accounted for 82 percent. Education accounted for 5 percent. The remaining 7 percent included administrative visits and group meetings.

Figure 4.2: Refuge Visits



* includes visits to Green Point Envrionmental Learning Center

Waterfowl Hunting

The Refuge currently holds a managed goose hunt. The Michigan DNR processes applications for two pre-registered goose hunts. In 1998, 1,013 visits were recorded for the goose hunts. Visitors spent 5,452 hours hunting. Hunters are charged a fee of $4 per day. Senior citizens are charged $2 per day. No change is envisioned in the fee program that helps defer administrative costs.

For the past 16 years, the State of Michigan has been permitted to administer a waterfowl hunting program in Pool 4 (Refuge land) and adjoining marshes.

Deer Hunting

The Refuge holds a managed deer hunt to help control the herd's size. The Michigan DNR handles the application process. In 1998, 581 hunters accounted for 1,232 visits and spent an estimated 8,671 hours pursuing deer. Deer hunters are charged a $10 fee.

Fishing

Although fishing is not allowed from dikes, banks or shorelines within the Refuge, the navigable rivers and drains that intersect the area attract fishing enthusiasts using watercraft. With the cooperation of the Alpena Fishery Resources Office and the Service's Recreational Fishing Program, the Refuge purchased an accessible dock to improve fishing opportunity on the Cass River. An estimated 2,050 anglers fished river waters within the Refuge in 1998.

Wildlife Observation

In 1998, an estimated 58,429 visits included hiking, bicycling, cross-country skiing, birdwatching, and nature photography.

Education/Interpretation

Green Point Nature Center (Center) was officially opened in 1978 by the City of Saginaw with support from the Michigan DNR, the Federal Land and Water Conservation Fund, and the City of Saginaw. During the past 10 years thousands of children and adults have learned about nature at the Center.

In a spending cut, the City of Saginaw closed the Green Point Nature Center in 1988. To protect and maintain the building, a city staff member kept an office at the Center. In September of 1993, the Service agreed to lease the Center from the City. In the following years, the Service continued to lease and operate the Center as the Green Point Environmental Learning Center. In 1998, the Service received a 99-year, renewable lease for the Center from the City as a part of the General Motors settlement. In addition, the Center will receive $520,000 in the year 2002 as part of the settlement.

Photo by Myles Willard

The Service's mission for the Green Point Environmental Learning Center is to provide environmental education and interpretation opportunities for the youth and adults of Saginaw and surrounding communities. All of its programs are based upon the theme "Water, Wildlife and You." Key program topics include the Great Lakes Ecosystem and migratory birds.

The addition of Green Point Environmental Learning Center has dramatically increased the educational use on the Refuge. An estimated 3,600 people visited the Center in 1994. Approximately 940 of these visitors were students who came to the Center for environmental education. In 1998, 6,744 people visited the Center and 3,556 people participated in environmental education programs on and off the Refuge.

Pest Management

Integrated management of invasive or pest plants, animals, and insects is a program on the Refuge in support of high quality habitats and human health. Our primary goal is to provide complex habitat structures to meet the nesting, feeding, and resting requirements of fish and wildlife.

We use a variety of techniques in the integrated management of invasive pests. The techniques include monitoring the invasive species, manual and mechanical manipulations, timing of activities, chemical and biological control techniques, and the introduction of competitive species.

Animal Pests

With high densities, white-tailed deer, muskrat, beaver, raccoons, and woodchucks can severely affect habitat quality or other species. Through management, the Refuge maintains acceptable densities of these species. The techniques used vary from mechanical operations such as water level manipulation and planting of lure crops to direct

removal by hunting and trapping. Other techniques include reinforcement of dikes and placing protective tubing around trees or placing chemical deterrents on trees or plants.

Plant Pests

Invasive or pest plants can affect many habitat types found at Shiawassee National Wildlife Refuge. Purple loosestrife, reed canary grass, and phragmites may invade wetlands; cottonwood and willow may invade moist soil units and grasslands, and buckthorn may displace more preferred woody species in forest. To reduce encroachment of these species, we use several management techniques - hand pulling individual plants, mowing, burning, water level manipulations, plowing, and chemical and biological applications. The technique we choose is influenced by management objectives, intensity of encroachment, best land use practices, cost, and timing of application.

Of particular note is our effort to provide and use biological control techniques against purple loosestrife. Beginning in 1996, we began a 5-year program to rear and then distribute Galerucella species beetles to areas being invaded by purple loosestrife. The beetle has been approved as a biological control agent by the U.S. Department of Agriculture, the Fish and Wildlife Service, and other federal and state agencies. Over the course of 4 years the Refuge reared between 75,000 and 100,000 beetles for release. The beetles were distributed on Shiawassee National Wildlife Refuge and two other federal refuges.

Management of Insect Pests

Insect pests can threaten Refuge habitats, the health of other wildlife, and human health. Examples of potential insect pests are gypsy moths and mosquitoes. Currently, the Refuge has agreements with partner agencies to treat these insects when outbreaks reach detrimental levels. We expect to change our approach to mosquito control. See the mosquito control section under 'Planned Refuge Programs.'

Archaeological and Cultural Resources

The Refuge Manager considers potential impacts of management activities on historic properties, archeological sites, traditional cultural properties, sacred sites, human remains and cultural materials. Prior to ground disturbing activities, the Refuge Manager informs the Regional Historic Preservation Officer in a timely manner to allow analysis, evaluation, consultation, and mitigation as necessary for every Refuge undertaking.

The Refuge has a museum and museum collections (art, ethnography, history, documents, botany, zoology, paleontology, geology, environmental samples and artifacts). Museum collections at the Refuge (including the Environmental Learning Center) include art, history, zoology, paleontology, and artifacts. These collections are managed under a Scope of Collection Statement (10-31-94). To date, four archeological investigations have produced artifacts from Refuge lands. Most artifacts are stored at six repositories; only one is under a cooperative agreement.

Archeological investigations and collecting are performed only in the public interest by qualified archeologists working under an Archaeological Resources Protection Act permit issued by the Regional Director. Refuge personnel take steps to prevent unauthorized collecting by the public, contractors, and Refuge personnel. Violations are reported to the Regional Historic Preservation Officer.

Special Management Areas

Partners for Fish and Wildlife Program

The Refuge's Private Lands Office administers a 22-county Private Lands Coordination Area located in central Michigan. (See Figure 4.3) Within the Coordination Area, 349 wetland basins were restored through the Services's Partners for Fish and Wildlife Program for a total of 1,967 acres from 1994 through 1998. Native grassland nesting habitat was seeded on 12 sites for 355 acres from 1996 through 1998. The Private Lands Office provides technical assistance and cost-sharing to complete the work if the landowner agrees to maintain the area for a period of 10 years or more. The Partners for Fish and Wildlife program is a voluntary program that focuses on restoring and enhancing wetland and grassland habitats that provide wildlife, fisheries, water quality and recreation benefits. One Refuge staff person works exclusively on the Partners for Fish and Wildlife program.

Within the Private Lands Coordination Area, the refuge operations specialist (private lands) biologist provides technical assistance to the Michigan DNR, Farm Services Agency, Natural Resources Conservation Service, private conservation organizations, and private individuals on wetland issues, habitat conservation and enhancement, and regulatory requirements. The Refuge staff person works closely with the Natural Resources Conservation Service and Farm Service Agency on wetland actions and farm debt retirement programs and administration of the Wetland Reserve and Conservation Reserve Programs.

Farm Services Administration Conservation Easements

Shiawassee National Wildlife Refuge is responsible for managing conservation easements within the Shiawassee Fish and Wildlife Management District (FWMD), a 44-county area of Michigan (see Figure 4.3). The conservation easements were obtained through the procedures of the Farm Services Administration (FSA), formerly the Farmers Home Administration. When the FSA acquires property through a default of loans, it is required to protect wetland and floodplain resources on the property prior to resale to the public. The authority and direction for the FSA actions comes from the Consolidated Farm and Rural Development Act (7 U.S.C. 1981, 1985); Executive Order 11990 providing for the protection of wetlands; and Executive Order 11988 providing for the management of floodplain resources.

The U.S. Fish and Wildlife Service assists the FSA in identifying important wetland and floodplain resources on the property. Once those resources have been identified, FSA protects the areas through a perpetual conservation easement and assigns the management responsibility to the Service. The easement areas become part of the National Wildlife Refuge System.

The Shiawassee Fish and Wildlife Management District (FWMD) currently administers 113 conservation easements totaling 4,658.12 acres. Two of the 113 conservation easements have been transferred to County Soil Conservation Districts to be managed as outdoor education areas. The FWMD became responsible for its first easement in 1989 and others have continued to be added since then. Most of the easements were obtained in the early 1990s. The most recent additions were two easements added in fiscal year 1999. Shiawassee WMD has the most conservation easements of any Service station in the eight-state Great Lakes Region.

Figure 4.3: Shiawassee Fish and Wildlife Management District

Management of easements continues to be a problem with current staffing levels. Subdividing of easements due to land sales is increasing the number of landowners and management responsibilities (currently 113 easements are owned by 122 landowners). It appears this will continue to occur and continue to cause management concerns for the Shiawassee FWMD.

Planned Refuge Programs

Introduction

We recognize that we face challenges from outside the Refuge boundaries. These challenges include more frequent flooding with higher flows along with increased potential for contaminants. As interest and population grows in the Saginaw area, public use pressure may challenge the Refuge's wildlife purposes. And, because of the proximity to the urban population and its crime problems, the Refuge may experience some of the same illegal activities. We intend to work outside our boundaries to confront these challenges.

We also recognize the opportunities open to the Refuge. We have the ability to provide a remarkably large natural area for wildlife within an urban and agricultural landscape. We have the ability to provide wildlife-dependent recreation close to an urban and tourist population, and we have the ability to provide an environmental message of stewardship to these same populations.

We intend to take advantage of our opportunities. We will provide a diversity of habitat for wildlife while recognizing the importance of the Refuge to waterfowl. We will expand the lands that we manage by acquiring lands within the authorized boundary of the Refuge as funds and willing sellers permit. In addition, we will expand our interaction and services to the public. We will make the Refuge more accessible. We will expand and improve our educational opportunities and reach out to more people.

Photo by Myles Willard

Several circumstances are coming together now that encourage us to think that our intentions are realistic. First, we were authorized to expand our boundaries in 1996. Second, congressional interest in planning and the recognition of comprehensive conservation plans in the budgeting process give us encouragement that our plans will be implemented. Third, the General Motors settlement affords us new opportunities. Fourth, the Refuge and its mission are experiencing growing public support through the Friends group, local governments, and volunteers. This support is best exemplified by support for a Great Lakes Discovery Center at Bridgeport, where several groups are working together to build the center.

Briefly, these are our plans.

Fish and Wildlife

We intend to provide a large acreage of wetland habitat and unfragmented forest. We intend to diversify and enlarge natural habitats by eliminating mosquito control and by reducing cropland. We intend to monitor use of the habitat by fish and wildlife as a way of evaluating our management. We intend to work outside our boundaries as partners in restoring habitats on private lands and better managing our conservation easements.

Photo by Myles Willard

Basically, this is an adjustment of our efforts within our boundaries and an expansion of our efforts outside our boundaries.

Wildlife-dependent Recreation

We intend to continue past programs and make more of the Refuge available for wildlife observation through trails and an auto tour route. We intend to provide sites for bank fishing. We also intend to increase the feeling of security among our visitors through an increased law enforcement presence.

Environmental Education and Outreach

We intend to expand our environmental education and outreach programs. The General Motors settlement will permit an expanded environmental education program at Green Point Environmental Learning Center, and public support for the Great Lakes Discovery Center at Bridgeport will allow us to introduce the Refuge, the Service and its partners to more people.

We are excited about the potential for the next 15 years.

Refuge Habitats

Given the rate of natural succession and land use changes, we are not likely to see the completion of the Refuge in 15 years. All of the land within the authorized boundaries will probably not be in public ownership in 15 years, and all of the land will probably not be converted from its current use to the desired habitat. Nevertheless, to put our immediate actions in context, we have depicted our long-term vision for habitats on the Refuge in Figure 4.4 and Table 3.

The landscape depicted in Figure 4.4 represents our vision for when all land within the authorized boundaries is in public ownership and we have converted the lands to desired habitats. Our vision for habitats is based primarily on what habitats would occur naturally through succession and natural processes. Our vision of habitats is based on our knowledge of historical vegetation, soil moisture, current land use and land cover, and a desired future of habitats with less fragmentation.

As we acquire land and move toward our long-term vision of the landscape, we will likely move through stages in our management of habitats. For instance, some of the higher, drier areas that are envisioned to be grasslands in the long run may be farmed in the near-term to maintain them free of brush and noxious weeds until they can be converted and managed as grasslands.

The remainder of this section contains the primary strategies that more explicitly define the Refuge's management direction for the next 15 years (2001-2016). This direction is based on the Refuge System mission, the National Wildlife Refuge System Improvement Act of 1997, the purposes for which the Refuge was established, goals defined for the Great Lakes-Big Rivers Region, as well as agency policies and directives. Under the Migratory Bird Conservation Act, the Refuge's purpose is "...for use as an inviolate

Figure 4.4: Long-term Vision for Refuge Habitats

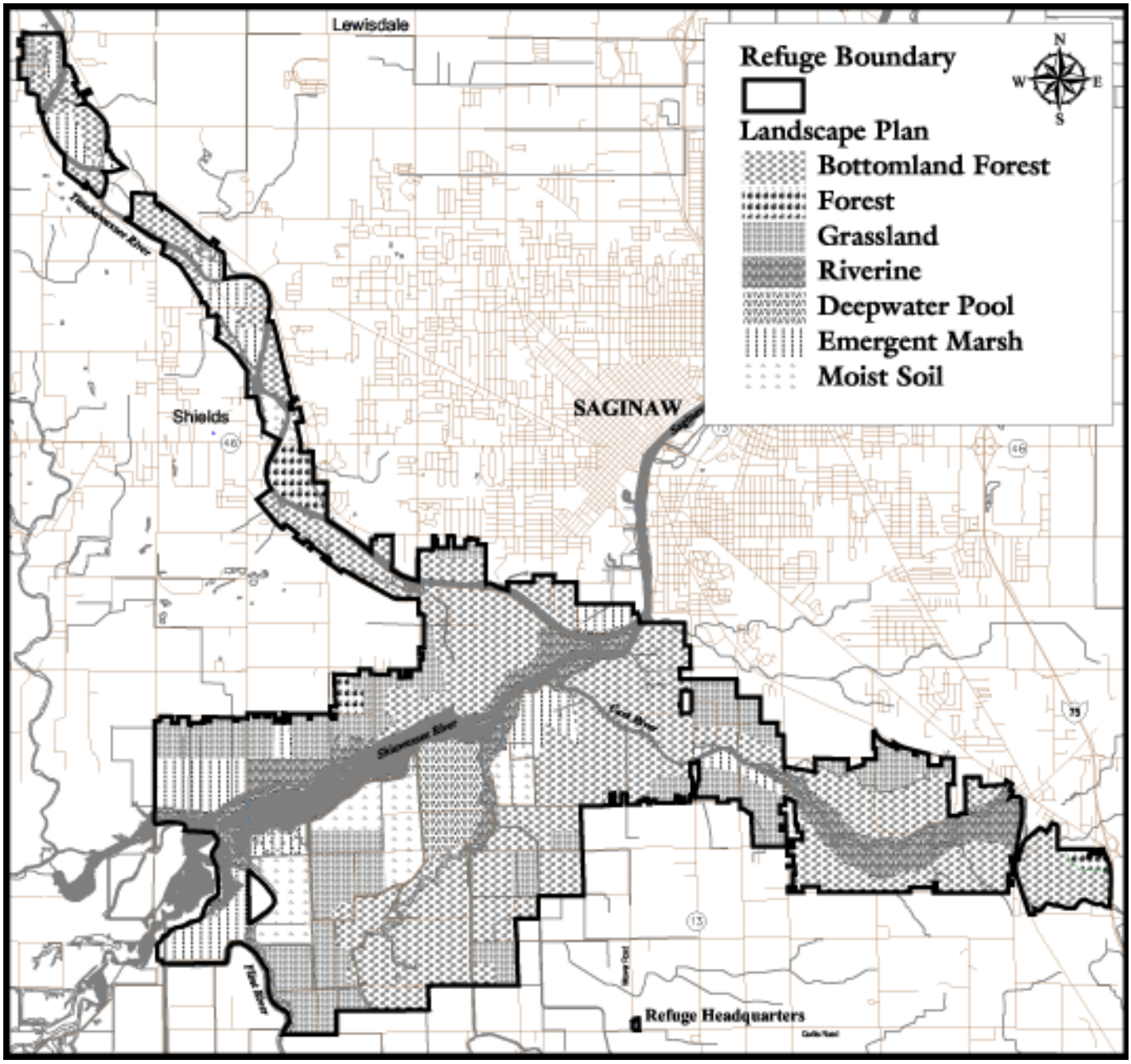


Table 3: Major Habitats – Current and Future

	Current	Future[1]	Long-term Vision
Moist Soil Units	385	1,042	1,115
Marshes	672	778	1,858
Open Water Pools	700	503	503
Greentree Reservoirs	820	820	820
Forests	3,519		337
Grasslands	580	1,358	3,045
Croplands	1,182		
Bottomland Forest		3,034	6,957
Riverine[2]		1,687	2,729
Total	**7,858**	**9,222**	**17,364**

[1] This table is intended to show the general trend and intent for habitats. Acres are not directly comparable across the table because the classification categories under 'current' differ from the other columns. 'Future' reflects the goals and objectives of the Comprehensive Conservation Plan. 'Long-term Vision' reflects the acres depicted in Figure 4.4,

[2] 'Riverine' includes river acres and marsh and bottomland forest acres associated with the river.

sanctuary, or for any other management purpose, for migratory birds." Under the Refuge Recreation Act, the Refuge's purpose is "suitable for: 1) incidental fish and wildlife-dependent recreational development; 2) the protection of natural resources, and 3) the conservation of endangered species or threatened species..."

Following the rationale of Schroeder, King, and Cornely (1998), we have chosen to base the Refuge's core management direction on habitat objectives. Schroeder et al. reason that many factors affect wildlife populations and many of these factors are outside the control of a refuge manager. However, a refuge manager can work to provide a high quality habitat, which is necessary for an abundant wildlife population. Schroeder, King, and Cornely argue that it is logical "to focus on the habitat conditions required to provide the greatest potential for the species or resource of concern."

The primary thrust of habitat management at the Refuge has been to provide diverse habitats to meet a variety of species requirements. We plan to continue to provide diverse habitats, which are defined more specifically in our habitat objectives. The potential benefits each species will receive from the habitats that we plan to provide are depicted in Appendix E. In interpreting the data in Appendix E, you should recognize that the contribution that a refuge habitat provides to a species is a function of the time of year the species is at the refuge and the number of acres of habitat available.

For Region 3 Resource Conservation Priorities (U.S. Fish and Wildlife Service, Region 3, 1999), Shiawassee wetlands provide migration and nesting habitat for species of recreational and economic value concern. Rare and declining species are also benefitted across all habitats.

Avoidance of Adverse Impacts to Listed Species

To assure that listed species will not be adversely affected, proposed species are not jeopardized, or critical habitat is not adversely modified, we will observe the following guidelines as we implement the Shiawassee CCP.

Photo by Kim LeBlanc

Bald Eagle (*Haliaeetus leucocephalus*)
No disturbance will take place during critical periods within protective zones as described in the 1983 Northern States Bald Eagle Recovery Plan, Appendix E, Management Guidelines for Breeding Areas.

Indiana Bat (*Myotis sodalis*)
No suitable trees will be removed between April 30 and October 1. Suitable trees include any species greater than 9 inches diameter at breast height. Exceptions include healthy plantation red pine (*Pinus resinosa*) (straight clean bole, no splits, cracks, breaks, dead limbs or other damage) or other suitable trees for which a competent wildlife biologist determines via exit survey that no bats (any species) are present.

Eastern Massasauga Rattlesnake (*Sistrurus catenatus catenatus*); Eastern Prairie Fringed Orchid (*Platanthera leucophaea*)
Although not currently listed, the Eastern massasauga rattlesnake is a candidate for listing. Neither species is known on the Refuge, so no adverse effects are expected. As the CCP is implemented, the Refuge will seek opportunities for conservation of both species on and off the Refuge. We will use Johnson et al., 2000, The Eastern Massasauga Rattlesnake: A Handbook for Land Managers, USFWS, Ft. Snelling Minn., and USFWS, 1999, Eastern Prairie Fringed Orchid (*Platanthera leucophaea*) Recovery Plan. Ft. Snelling, Minn., to guide our conservation efforts.

Goals 6 and 7 of the plan deal with the private lands and conservation easement activities of the Refuge. These activities are on scattered tracts throughout much of Michigan's lower peninsula. We do not know of any listed species that occur on these tracts, but a number of federal listed species may occur and could potentially be affected by strategies under goals 6 and 7. To assure that listed species will not be adversely affected, or proposed species are not jeopardized, we will observe the following guidelines as we pursue goals 6 and 7. In addition to avoiding adverse effects, we will consider potentially beneficial habitat management or restoration projects for listed, proposed or candidate species through consultation with species experts.

Kirtland's Warbler (*Dendroica kirtlandi*)
No burning or tree removal activities will take place in jack pine (*Pinus banksiana*) stands less than 22 years old and greater than 40 acres in size unless current census data indicate the species is not present.

Piping Plover (*Charadrius melodus*)
No construction activities and no human activity that could disturb nesting or foraging piping plovers on occupied Great Lakes beach will take place between April 15 and August 15.

Piping Plover Critical Habitat
No disturbance will take place as described above for occupied units. No activities will occur that would remove any primary constituent element (66 FR 22938, May 7, 2001) on any designated unit.

Northern Copperbelly Watersnake (*Nerodia erythrogaster neglecta*)
This species is currently found in small scattered occurrences in Hillsdale, Cass and St. Joseph counties. It was recently found as far north as Eaton County and earlier in Oakland County. Potential adverse effects on the species are similar to Eastern massasauga. We will avoid actions that modify any buttonbush (*Cephalanthus occidentalis*) or scrub-shrub wetland, modify (burn, mow, brush hog, herbicide) or destroy any upland or wetland connections between such habitats, or drain, flood or otherwise modify hydrology permanently or seasonally in southern Michigan. We will avoid adverse effects by careful site surveys in southern Michigan counties and early coordination with species experts. We will consider habitat restoration and site protection for the benefit of the species in consultation with species experts.

Eastern Massasauga Rattlesnake (*Sistrurus catenatus catenatus*)
In occupied sites, we will avoid actions that favor vegetational succession from open to closed canopy, modify any wetland, modify (burn, mow, brush hog) or destroy any upland or wetland connections between wetlands (habitat fragmentation), or drain, flood or otherwise modify hydrology permanently or seasonally in southern Michigan. We will use the threats section, pages 16-30, of The Eastern Massasauga Rattlesnake: A Handbook for Land Managers (Johnson et al. 2000) as our guide to avoid actions that contribute to identified threats.

Mitchell's Satyr Butterfly (*Neonympha mitchelli mitchelli*)
We will undertake no activities that affect hydrology or vegetation in fen or former fen habitats in the southern three tiers of Michigan's counties without a careful pre-action site survey and planning. Activities that could adversely affect the species include wetland restorations, vegetation mowing and/or burning or herbicide application in occupied sites. These same activities may also benefit the species if properly planned. Before considering any action, we will review the Recovery Plan and coordinate with species experts.

Karner Blue Butterfly (*Lycaeides melissa samuelis*)
We will not initiate burning, mowing, disking, herbicide application or other vegetation or soil disturbance on sites occupied by this species or sites with wild blue lupine. We recognize that oak-savannah or other prairie restoration activities are valuable to this species. We will consider these activities subject to Service guidelines and further Section 7 consultation, including formal consultation on occupied sites.

American Burying Beetle (*Nicrophorus americanus*)
This species has not been seen in Michigan for years, and we assume that it is not present. But, as with all species, we will seek to stay current on species occurrence.

Clubshell Mussel (*Pleurobema clava*)
The clubshell mussel is currently found only in Hillsdale County. Habitat restoration activities that improve stream water quality in Hillsdale and other southern Michigan counties should benefit the species. We will avoid any activities that directly affect stream beds or introduce siltation to streams.

Northern Riffleshell Mussel (*Epioblasma rangiana*)
This species may be extirpated from recent occurrence in Detroit River. There are recent (1999-2000) indications of remnant populations in the Black River drainage of Sanilac and St. Clair counties. As with the clubshell, we will avoid activities that disrupt stream beds or introduce siltation. Actions that directly or indirectly improve stream water quality should benefit the species.

Pitcher's Thistle (*Cirsium pitcheri*)
This species is found only within active Great Lakes shoreline dune systems. We will avoid any activities, such as dune stabilization projects or earth moving activity, that directly disturb occupied sites or that would disrupt natural sand dune disturbance processes.

Eastern Prairie Fringed Orchid (*Platanthera leucophaea*)
We will avoid mowing, brushing, burning, flooding or herbicide use in occupied or potential sites. This species, which is found in remnant lake plain prairies, has a high potential to be adversely affected directly by habitat restoration activities that alter vegetation and hydrology. The same activities, however, may benefit the species when properly planned and timed. A beneficial project that may result in an adverse effect (short-term harm) can proceed after careful site surveys, planning, early coordination with species experts and a project specific Section 7 consultation.

Small Whorled Pogonia (*Isotria medeoloides*)
There is only one Michigan record (Berrien County on private land) for this species. Due to its rare and local distribution in Michigan, CCP actions are not likely to affect this species. Because any action that disturbs or alters vegetation could affect the species, we will avoid adverse effects for projects in Berrien County by seeking current information prior to implementation.

The above discussion of avoiding adverse effects and CCP goals applies to project sites where listed, proposed or candidate species are known to occur or where it is necessary to assume they are present. On these sites, CCP actions that adhere to the above restrictions should have no effect on the listed species. Where CCP actions that may not comply with the adverse effects restrictions on occupied sites (i.e., restoration on an occupied Karner blue butterfly site) are desired, site or project specific Endangered Species Act (ESA) Section 7 consultation will be required. On sites where surveys or other current information provides certainty that ESA species are not present, actions that are determined to have no effect on listed species may proceed without additional Section 7 contact with the Ecological Services field office. Projects on unoccupied sites that are determined to benefit listed species, that is, not likely to adversely affect species, should receive field office concurrence. Early coordination with the field office is advisable where any uncertainty exists.

Climate Change Impacts
The U.S. Department of the Interior issued an order in January 2001 requiring federal agencies under its direction that have land management responsibilities to consider potential climate change impacts as part of long range planning endeavors.

The increase of carbon within the earth's atmosphere has been linked to the gradual rise in surface temperature commonly referred to as global warming. In relation to comprehensive conservation planning for national wildlife refuges, carbon sequestration constitutes the primary climate-related impact to be considered in planning. The U.S. Department of Energy's "*Carbon Sequestration Research and Development*" (U.S. DOE, 1999) defines carbon sequestration as "...the capture and secure storage of carbon that would otherwise be emitted to or remain in the atmosphere."

The land is a tremendous force in carbon sequestration. Terrestrial biomes of all sorts – grasslands, forests, wetlands, tundra, perpetual ice and desert – are effective both in

preventing carbon emission and acting as a biological "scrubber" of atmospheric carbon monoxide. The Department of Energy report's conclusions noted that ecosystem protection is important to carbon sequestration and may reduce or prevent loss of carbon currently stored in the terrestrial biosphere.

Preserving natural habitat for wildlife is the heart of any long range plan for national wildlife refuges. The actions proposed in this comprehensive conservation plan would preserve or restore land and water, and would thus enhance carbon sequestration. This in turn contributes positively to efforts to mitigate human-induced global climate changes.

Primary Facilities

Two primary facilities on the Refuge will serve the public. The Green Point Environmental Learning Center will focus on environmental education and its audience will be school children. The planned Great Lakes Discovery Center will introduce and orient the general public to the Refuge. The Green Point facility is well located to serve the urban schools of Saginaw. The Great Lakes Discovery Center will be accessible to a large public audience on Interstate 75. The purposes of the facilities will not be exclusive, however. We will welcome the public and encourage their trail use at Green Point and some structured environmental education activities will take place at the Great Lakes Discovery Center. Visitor services at the primary facilities will be complemented by a restored environmental education site within the Refuge and through information available at the Refuge office.

Green Point Environmental Learning Center will remain the focal point for all Refuge environmental education activities. Green Point has the advantage of being easily accessible to the urban Saginaw schools. Because some educational activities are best done nearer the Refuge core, we intend to reestablish an environmental education site that was destroyed by flood waters over 10 years ago. This site will support field environmental education by providing restrooms, shelter, and tables. School children, youth groups, and educators will continue to be the primary audiences at Green Point, but drop-in visitors will be welcome too.

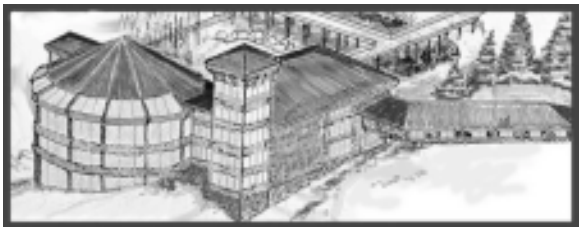
Photo by Myles Willard

The Great Lakes Discovery Center will emerge from a unique public/private partnership among the Service, other natural resource agencies, and a variety of non-governmental organizations. The Vision of the Great Lakes Discovery Center is to inspire a sense of appreciation and stewardship in the people who interact with the Great Lakes Basin and its natural resources, utilizing the latest technology in a state-of-the-art facility. The partners propose to achieve the Vision through an educational facility that blends multimedia technology with a variety of "natural" experiences. The Center and its programs will be designed to make visitors, area residents, school children, and "passers-by" more aware of the impact humans have upon the Great Lakes Basin.

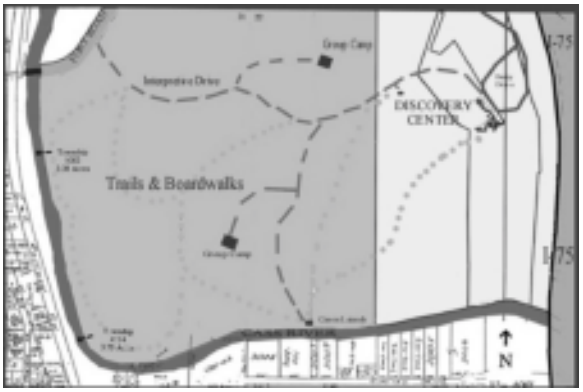
The Friends of the Shiawassee National Wildlife Refuge, a private non-profit organization, has assembled a team of organizations and public agencies that include, but are not limited to:

Michigan United Conservation Clubs
Trout Unlimited
Saginaw County Convention and Visitors Bureau
Spicer Engineering
Andersen Foundation
The Conservation Fund
The Nature Conservancy
Michigan Sea Grant
Swan Valley School District
Saginaw Valley Watershed Initiative Network
Michigan Department of Natural Resources
Great Lakes Fishery Commission
National Conservation Training Center
Saginaw Basin Land Conservancy;
National Park Service
U.S. Forest Service
Bridgeport Charter Township
Saginaw Valley Audubon Society
Ducks Unlimited, Inc.
Pheasants Forever
Saginaw County Planning Department
Mattison Company
U.S. Geological Survey
Partnership for the Saginaw Bay Watershed
United Auto Workers
Saginaw County Historical Society
Natural Resources Conservation Service
Saginaw Chippewa Indian Tribe
RC Associates, Inc.
Saginaw Bay Advisory Council
Ruffed Grouse Society;
U.S. Fish and Wildlife Service
Bay City
Birch Run and Bridgeport Chambers of Commerce

Many of these organizations and agencies will be responsible for creating and delivering environmental displays and learning opportunities at the Discovery Center. They will also use the resources of the Discovery Center as a platform to conduct training and research into environmental issues that impact the Great Lakes Basin.



The Service will possess the "platform" around which the environmental groups will build the specific details and programming. In 1999 the Service purchased 116 acres in Bridgeport Township known as the Warner Tract. This will be the site for the Center. The site lies along the Cass River adjacent to Interstate 75. Bridgeport Charter Township has provided an additional adjoining 300 acres through a 99-year lease.



Rendering and site plan courtesy of The Mattison Company

The 416-acre site contains a unique upland American beech/white pine forest, bottomland hardwoods, buttonbush marshes, and grasslands that provide habitat for numerous species of wildlife including bald eagles, warblers, beaver, river otter, and white-tailed deer. This unique site borders restaurants, hotels, and service stations.

The Great Lakes Discovery Center site is located within a few miles of Birch Run and Frankenmuth, two of the most visited tourist and shopping destination sites in Michigan. Saginaw, Bay City, Flint and Midland are all within 45 minutes of the Center site. Interstate 75, Michigan's major travel corridor between Detroit and northern Michigan, will provide an opportunity for millions of travelers to visit the Center.

A visitor entering the Great Lakes Discovery Center will have the opportunity to explore the diversity and inter-connectedness of the various natural systems that compose the Great Lakes Basin. Multimedia technology will transport visitors to remote locations throughout the Great Lakes to visually experience the variety and beauty of the ecosystem. The Center will also provide opportunities for "hands-on" experiences within the facility and on the surrounding lands and streams. Students and teachers from universities throughout the Basin will be able to use the Center for learning and teaching. Visitors to the Center will want to return again and again, in different seasons and to changing exhibits.

Planned features in the Discovery Center include:

- A 200-seat auditorium with a range of multimedia capabilities to transport visitors from their seat to remote locations across the region.
- A rotunda to house state-of-the-art exhibits.
- A museum to display "sensitive" materials and exhibits.
- A "natural" stream flowing through the Center to demonstrate the wetland filter process to all visitors.
- An observation tower with a 360-degree view of the area, including a variety of video monitors that allow the visitor to "virtually" view environmentally sensitive or interesting areas at off-site locations throughout the Great Lakes via WebCams.
- A laboratory capable of accommodating up to 25 students conducting research.
- A 200-seat meeting hall that will have the capabilities of being divided into four smaller rooms with kitchen facilities.
- Office space and support facilities for the staff and visitors.

Plans for the 416-acre Discovery Center site include:

- Accessible nature trails that may be used by walkers, cyclists, and cross-country skiers. The trails will include boardwalks, observation decks with spotting scopes, information kiosks, and interpretive signs.
- A restored native prairie grassland demonstration.
- A restored wetland demonstration.
- A bank fishing site on the Cass River.
- A casting pond where visitors can learn the art of fly fishing.
- The terminus of a canoe trail that begins off-site.
- An outdoor amphitheater for environmental education.
- A group campsite for youth groups visiting the Center.

The details and content of the exhibits will be the responsibility of the various participating groups. Each exhibit will provide an in-depth experience into the environmental diversity of the Great Lakes Basin. A project manager will coordinate the exhibit design and programming. The exhibits will be changed on a regular basis to provide a continued attraction to visitors.

The Friends of the Shiawassee National Wildlife Refuge and their partners have created an exciting vision for a facility that will benefit the residents of Michigan, visitors to the Great Lakes Basin, outdoor enthusiasts, schools, and universities. The Service and Bridgeport Charter Township have provided the platform for the vision, and the site is a part of the Shiawassee National Wildlife Refuge. The Center will be a U.S. Fish and Wildlife Service facility operated jointly by the Service and the partners. Funding for staff, operation, and maintenance will be determined by the Service and the partners when the facility has been planned in detail and construction is imminent.

The partners estimate that a $9 million capital investment is required to bring their vision to fruition. The investment will build the buildings, acquire the technology that will allow visitors to experience the breadth and depth of the ecosystem, and construct the on-site improvements that will provide the experiential benefits.

Our intent is to maintain the Refuge office and maintenance facility in their current location, because of the central location. This approach – environmental education at Green Point, Great Lakes Discovery Center at Bridgeport, and office and maintenance in their present location – takes advantage of existing facilities and makes the most of the opportunity to employ the Bridgeport site to bring an environmental message to a new audience.

Land Exchange

We have sought to exchange certain lands with the State of Michigan for several years. We intend to continue to pursue the land exchange to better our management and acquire additional habitat for wildlife. We would like to transfer the area in and around Pool 4 to the State of Michigan. In exchange we would like to acquire land of equivalent value on the east side of the Refuge near Highway 13. Figure 4.5 depicts the lands involved in the exchange.

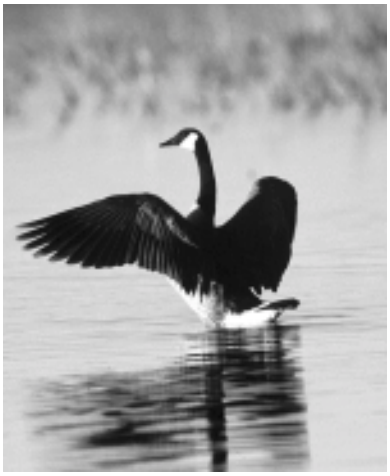
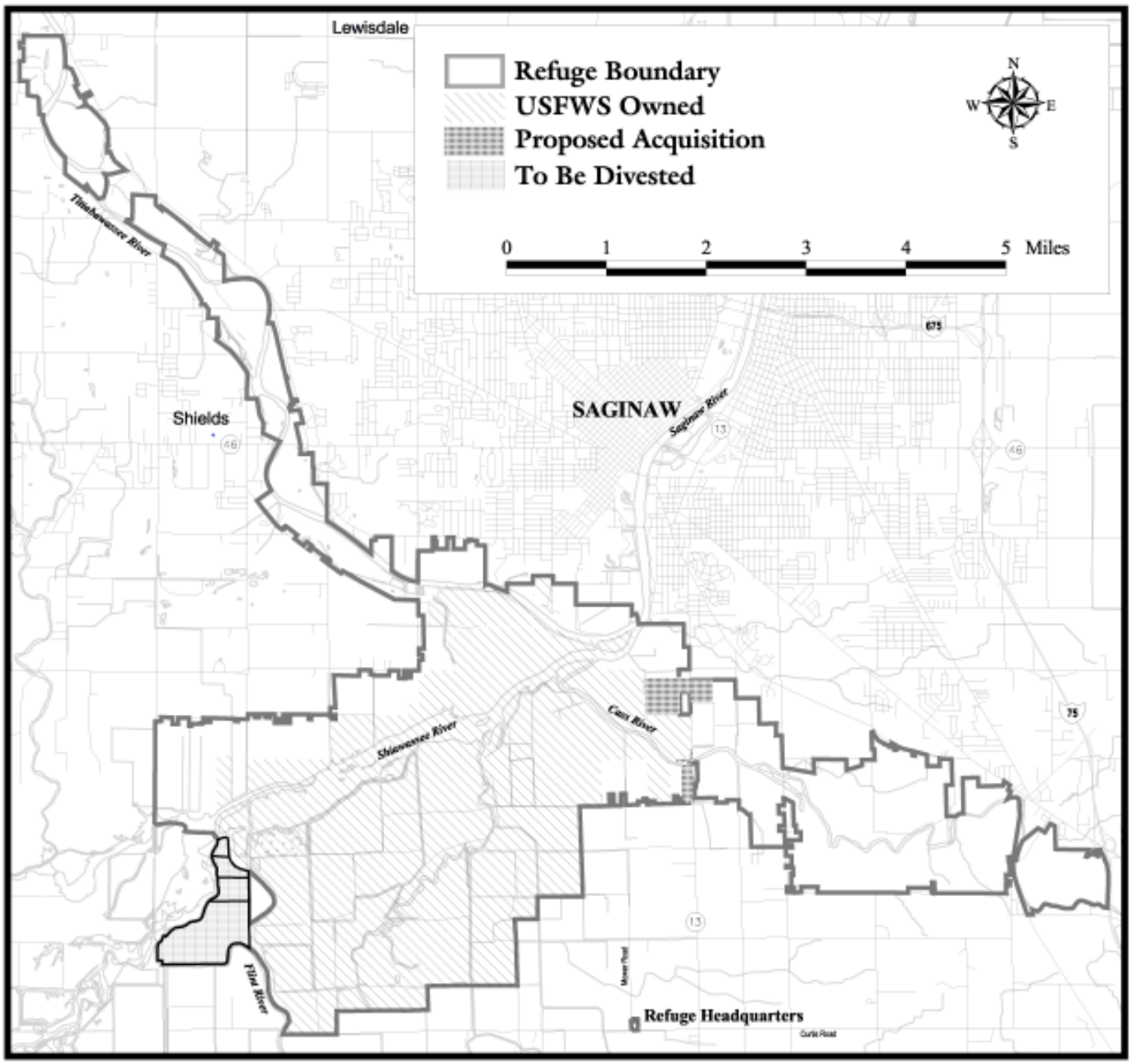


Photo by Myles Willard

More than 10 years ago the bridge across Miller Drain became unsafe and was removed. Since that time, farming in the unit known as Pool 4 has ended and it has been difficult for Refuge staff to visit and adequately manage Pool 4. To fulfill the need of management, the Michigan Department of Natural Resources has managed the hunting and wildlife in the area under a cooperative agreement. In use and management, Pool 4 is more closely associated with the Shiawassee River State Game Area, which is managed by the Michigan Department of Natural Resources.

Michigan owns land within the authorized expansion area of the Refuge. Because these lands are adjacent to existing Refuge lands and are isolated from other state lands, we believe it makes sense to manage them as part of the Refuge. Therefore, we intend to pursue the exchange, which will result in an adjustment of the Refuge boundary. Wildlife benefits are not expected to decrease and management efficiency is expected to increase as part of the exchange.

Figure 4.5 Land Exchange Proposal



Goals and Objectives

The goals that follow are general statements of what we want to accomplish in the next 15 years.

The objectives are specific statements of what will be accomplished to help achieve a goal. Objectives describe the who, what, when, where, and why of what is to be accomplished. Strategies listed under each objective specify the activities that will be pursued to realize an objective. The strategies may be refined or amended as specific tasks are completed or new research and information come to light.

In the numbering scheme that follows, the first number represents the number of the goal. The second number represents an objective within that goal. The third number represents a strategy within an objective. Thus, 3.2.1 represents the first strategy for the second objective within the third goal. This numbering scheme is used to index Refuge Operating Needs System (RONS) Projects in Appendix C and personnel needs in Chapter 5.

Goal 1: Habitat Management

Restore and/or maintain marshes, moist soil units, grasslands and floodplain forests for an optimum blend of breeding and migration habitat for a diversity of migratory birds. See Figure 4.4 and Table 2 for the ultimate habitat targets for the Refuge.

Floodplain Forest

1.1 Objective: Provide nine blocks totaling 1,150 acres of unfragmented bottomland hardwood forest made up of mast producing trees such as oak and hickory mixed with other species such as maple, ironwood, box elder, green ash, elm, and willow. The blocks should be linked by corridors whenever possible. The forest should also have a component of large nest and cavity producing trees such as cottonwood.

Each block should be at least 100 acres in size for forest interior bird species. This is considered the minimum block size needed for most forest interior bird species to successfully nest and will provide habitat for more than 50 other bird species that use woodlands as part of their habitat requirements (i.e. woodpeckers and orioles).

Strategy:
1.1.1 Reforest large unfragmented forest blocks. (RONS 00019)

1.2 Objective: Within 6 years selectively cut 350 acres of bottomland hardwood forest to promote multilayer forest to enhance the diversity of habitat and wildlife. The selective cuts will be carried out in a fashion to favor large mast producing or large nest and cavity trees, by thinning the wood surrounding the selected trees. The intent is to develop a two-tier forest with an overstory favoring the trees described above and an understory of mixed younger trees comprised of all the typical species found in bottomland forests in this area. (Minnesota Department of Natural Resources, 1998)

Strategies:

1.2.1 Within 1 year, write a forest management plan through contracting. (RONS 00020)

1.2.2 Selectively cut trees within 5 years after forest management plan is completed. (RONS 00020)

1.3 Objective: In 3 out of 5 years, shallowly flood (from 3 to 12 inches) the greentree reservoirs (pools 3 and 5) to provide 200-400 acres of food and loafing areas for migrating waterfowl and wading birds during the months of March and April and again from October through November.

Strategies:

1.3.1 Repair/rehabilitate the dikes around pools 3 and 5. (RONS No. 00001)

1.3.2 Install a pumping station to move water into and out of pools 3 and 5. (RONS No. 00002)

1.3a Objective: Manage newly acquired floodplain forest lands in a natural state, allowing seasonal floodwaters to inundate these areas in a natural cycle. The intent is to restore the natural ecological function of the river corridor, increase the river floodplain, and improve spawning potential for fish such as northern pike and yellow perch.

Strategy:

1.3a.1 As newly acquired floodplain forest becomes manageable, move any river dikes back from the banks to the exterior boundary of the unit.

Deep Water Pools

1.4 Objective: In 4 out of 5 years, of the 700 potential acres, flood at least 200 acres of deepwater pools at least 2 feet deep from February through March and October through November to provide a feeding and loafing area for diving ducks. Expected submergent plants in the pools include various species of pondweed.

Strategies:

1.4.1 Manage water levels in Units 1a, Grefe, 2, and 4 to provide the needed acreage. The details of what pools are to be flooded each year will be specified in the Refuge's water management plan. (RONS No. 97017)

1.4.2 Where possible, manage water levels to provide access of spring spawning fish to deep water pools.

Moist Soil Units

1.5 Objective: Provide a minimum of 200 acres of prime moist soil habitat ranging from mudflats to 8-inch depth, March through May and October through November, primarily for migrating shorebirds, waterfowl, and wading birds. Through the first half of spring, the habitat will be shallowly flooded up to 8 inches in depth to provide food for early

migrating waterfowl. Through the last half of spring, 25 percent of the moist soil habitat will be in mudflats to provide food for migrating waterfowl such as shoveler and teal and shorebirds. Spring vegetation is expected to provide structure and habitat for invertebrates used by waterfowl and shorebirds. In fall, 70 percent of the moist soil habitat will be seed producing plants for migrating waterfowl. The fall vegetation is expected to be comprised of plants such as wild millets, smartweeds, sedges, and bidens species.

Strategies:

1.5.1 Maintain dikes through a variety of techniques such as placement of filter fabric and rip rap on slopes exposed directly to current or wave erosion, mowing the dikes to maintain needed vegetation to stabilize the dikes, controlling woody vegetation, and repairing and maintaining water control structures. (RONS Nos. 97023, 98004, 98005 and 97017)

1.5.2 Subdivide Moist Soil Unit 1 into two units to optimize water management capabilities. (RONS No. 00017 and 97017)

1.5.3 Follow annual water management plan.

1.5.4 Hire a permanent seasonal tractor operator. (RONS No. 00015)

Emergent Marshes (Pools 2 and 4)

1.6 Objective: In 3 out of 5 years provide hemi-marsh of 50 to 70 percent emergent vegetation during the growing season in pools 2 and 4 for waterfowl, wading birds, and shore birds. The water depth in the marsh will range from 3 to 36 inches. The marsh will include open water interspersed with dense emergent vegetation such as cattail and bulrush. This will provide a blend of three different habitat structures:

Photo by Myles Willard

1. Open deep water pool with scattered emergent vegetation;
2. A medium deep (12 to 18 inches) hemi marsh of cattail and bulrush; and
3. A shallow water (1 to 8 inches) hemi marsh condition with some moist soil plants mixed with emergent vegetation.

Strategies:

1.6.1 Follow annual water management plan.

1.6.2 When possible, operate water levels to ensure access to marshes by spring spawning fish such as northern pike. (RONS 97017)

Grasslands

Photo by Kim LeBlanc

1.7 Objective: Provide 400 acres of grassland habitat that are a mix of cool and warm season grasses interspersed with broad-leaf forbs. We will favor native species of grasses and forbs. This habitat will provide nesting during the summer for ducks and nesting and foraging sites for species such as the bobolink, sedge wren, meadow lark, and savannah sparrow. These acres will also provide non-breeding habitat for short-eared owl, northern harrier and rough-legged hawks.

Strategies:

1.7.1 Add one permanent seasonal Tractor Operator to Refuge staff. (RONS No. 00015)

1.7.2 Burning, spraying, and mechanical manipulation of grassland to control invasive species when less than 85 percent of the total acreage of a unit is dominated by desired grassland structure. (RONS No. 97023)

1.7.3 Cool season grasses reseeded to restore vigor after 5 to 8 years. (RONS No. 97023)

1.7.4 Purchase a no-till grass drill to restore Refuge grasslands. (RONS No. 00016)

Croplands

1.8 Objective: Over the life of this plan, reduce cropland acres while providing for waterfowl, wildlife depredation ,and wildlife-dependent public uses.

Rationale: The current, dominant opinion among wildlife biologists is that natural foods should be favored over agricultural crops in wildlife management. They maintain that natural foods provide more food value for a wider variety of species than high carbohydrate foods such as corn and soybeans. Biologists point to the well documented species diversity of birds in wetlands and grasslands compared to monotypic agricultural fields as evidence of their point.

Although we forego some *wildlife diversity* with crops at Shiawassee National Wildlife Refuge, we do gain four wildlife and management benefits with crops. First, crops provide high carbohydrate food for migrating waterfowl. Although the crops are probably not essential to migrating waterfowl in the Saginaw area, the crops do supplement the other foods available. Second, refuge crops lure waterfowl and reduce depredation of crops on neighboring agricultural lands. Over the life of this plan and beyond, we expect that neighboring land uses will change from dominant agriculture to developed lands and that the value of reducing depredation will be decreased. Third, crops attract wildlife for hunting and wildlife viewing, which increases the quality of these wildlife-dependent public uses. If the timing and water depths are right, shorebirds find shallowly flooded row crops to be very attractive as feeding locations. Typically there are good

populations of polychaetes and other invertebrates in the fields. For example, the observation deck at the Curtis Road parking lot overlooks a "wet spot" in a Refuge agricultural field that attracts many shorebirds – especially plover species. Over the life of this plan, we expect to develop through education and interpretation an increased appreciation among visitors for natural environments and their benefits. And, fourth, under the conditions that crops are managed at Shiawassee, the crops increase the species diversity and abundance of birds besides waterfowl. Because the cropland at Shiawassee incorporates grass filter strips and exists in a complex made up of nearby wetlands and forests, cropland benefits killdeer, horned lark, snow bunting, lapland longspur, short-eared and snowy owl, barn swallow, savannah sparrow, vesper sparrow and downy woodpecker.

Cropping can be used on a case-by-case basis for specific management purposes, as well. Moist soil unit management, for example, typically includes a rotation of row-cropped agricultural plants to control weeds and woody vegetation.

When we acquire new lands, sellers will be offered a 2-year option to continue to farm the land. After the 2-year option expires, cooperative farmers will be encouraged to move from the wet, core area of the Refuge to acquired lands if the acquired lands meet the following conditions: the land is presently in crops; the cropland is more than 1,000 feet from any river channel; and the cropland does not flood more than once a year. At no time will cropland acreage on the Refuge exceed 1,182 acres except for a short term while lands are being acquired. This acreage will continually decrease until we reach our objective.

We will consider the retention of small food plots to enhance wildlife viewing as we write a step-down plan for public use. The location and size of possible food plots will be specified in the step-down plan.

Long-term, we will seek to increase wildlife diversity by reducing cropland and moving to a more natural complex as depicted in Figure 4.4 (page 44). The rate of cropland reduction will depend, primarily, on changes in land use of neighboring lands. In the near-term, we will eliminate farming from the wettest area of the Farm Unit 1 (see Objective 1.9).

Strategy:

1.8.1 Use low input, sustainable yield and integrated pest management farming practices. (RONS 00021)

1.9 Objective: Convert 200 acres of the existing Farm Unit 1 into a wetland complex that includes emergent marsh, a moist soil unit, and grasslands, when alternative farming acreage has been acquired and identified.

Strategy:

1.9.1 Construct low-level dikes to convert farmed wetland into wetland habitat. (RONS 00022)

Riverine

We are concerned about how our marsh management affects reproduction and recruitment of juvenile fish to the river system and bay. We are also concerned about the effects of sediment loads on all of the Refuge bottomland hardwoods.

1.10 Objective: To determine the effects of Refuge activities on the riverine environment and, if necessary, mitigate adverse effects.

Strategy:

1.10.1 Develop partnerships with Biological Resources Division and Water Resources Division of the USGS, universities, USFWS Alpena Fishery Resources Office and EPA to study these issues and make management recommendations.

1.11 Objective: To monitor and evaluate a diversity of Refuge habitats. (This objective applies to all habitats under Goal 1.)

Strategy:

1.11.1 Hire a full-time biological technician to monitor habitat. (RONS No. 99005)

Goal 2: Fish and Wildlife Population Management

To manage fish and wildlife populations and to monitor and study the status and response of selected species to habitat management as specified in an inventory and monitoring plan.

2.1 Objective: To estimate use of the Refuge by selected bird species during the migration and breeding seasons.

Strategies:

2.1.1 Revise and implement the Wildlife Inventory Plan by 2002.

2.1.2 Monitor selected species of wetland, grassland, and forest interior birds.

2.1.3 Continue to monitor waterfowl.

2.1.4 Continue the Monitoring Avian Productivity and Survivorship (MAPS) activities primarily through Refuge volunteers.

2.2 Objective: To monitor diversity and population trends in amphibians and deer.

Strategies:

2.2.1 Continue annual spring breeding frog and toad survey.

2.2.2 Continue to assess deer sex ratio and aerial winter count.

2.3 Objective: To monitor diversity and population trends of fish and mussel species and abundance of juvenile fish in rivers and wetlands.

Strategies:

2.3.1 Study Refuge impact on juvenile lake sturgeon populations. (RONS No. 00013)

2.3.2 Write grant requests to support fish and mussel monitoring work. (RONS No. 00013)

2.3.3 Write grant requests to analyze fish abundance of juvenile fish populations in managed, breached, and natural wetlands. (RONS No. 00013)

2.3.4 Develop fisheries management plan in cooperation with the Alpena Fishery Resources Office.

2.4 Objective: To monitor presence and location of invasive fish and mussel species every 5 years.

Strategies:

2.4.1 Continue partnership with Alpena Fishery Resources Office, Michigan Sea Grant, MUCC and other state and local conservation groups.

2.4.2 Continue monitoring and survey work.

2.5 Objective: To fulfill partnership responsibilities for monitoring wildlife populations regionally and nationally. (See fish and wildlife monitoring section earlier in this chapter.)

Strategies:

2.5.1 Recruit volunteers in support of effort.

2.5.2 Add one full-time Biological Technician to staff. (RONS No. 99005)

Photo by Kim LeBlanc

2.6 Objective: To determine the effect of deer browsing on forest composition and regeneration.

Strategy:

2.6.1 Conduct a deer browse survey every 2 years over a period of 14 years. Details of the survey will be specified in the forest management plan.

2.7 Objective: To maintain the deer population at a maximum of 30 deer per square mile.

Strategy:

2.7.1 Continue current hunting program including nonambulatory, shotgun, muzzleloader, and archery hunts.

2.8 Objective: To meet agreement obligations and fulfill partnership responsibilities with the State of Michigan in controlling resident goose populations.

Strategy:

2.8.1 Carry out the activities of the hunt plan, which details the operation of the goose hunt.

2.9 Objective: To control nuisance wildlife species within the guidelines of the Integrated Pest Management Plan.

Strategy:

2.9.1 Review and revise Integrated Pest Management Plan by 2001.

Goal 3: Public Use

To encourage an appreciation of Shiawassee National Wildlife Refuge, its fish and wildlife resources, and its management activities through quality recreational and educational programs. Public Use facilities are shown in Figure 4.6.

The Refuge will facilitate hunting, fishing, wildlife observation and photography, environmental education and interpretation as wildlife-dependent recreational uses. The following objectives better specify how these uses will be facilitated.

Hunting

3.1 Objective: Continue hunting program at current levels of opportunity.

Strategy:

3.1.1 Maintain coordination and cooperation with Michigan Department of Natural Resources and private groups.

Fishing

3.2 Objective: Provide four stream bank fishing sites plus one boat landing in designated areas within the Refuge.

Strategies:

3.2.1 Develop sites at areas along the Cass River off of Highway M-13, along the Tittabawassee River off of the Woodland Trail, along the Tittabawassee River off the trails at Green Point Environmental Learning Center, and along the Spaulding Drain. The Cass River site will include an accessible fishing dock/platform. Site development will require rip-rap reinforcement and steps. (RONS No. 00010)

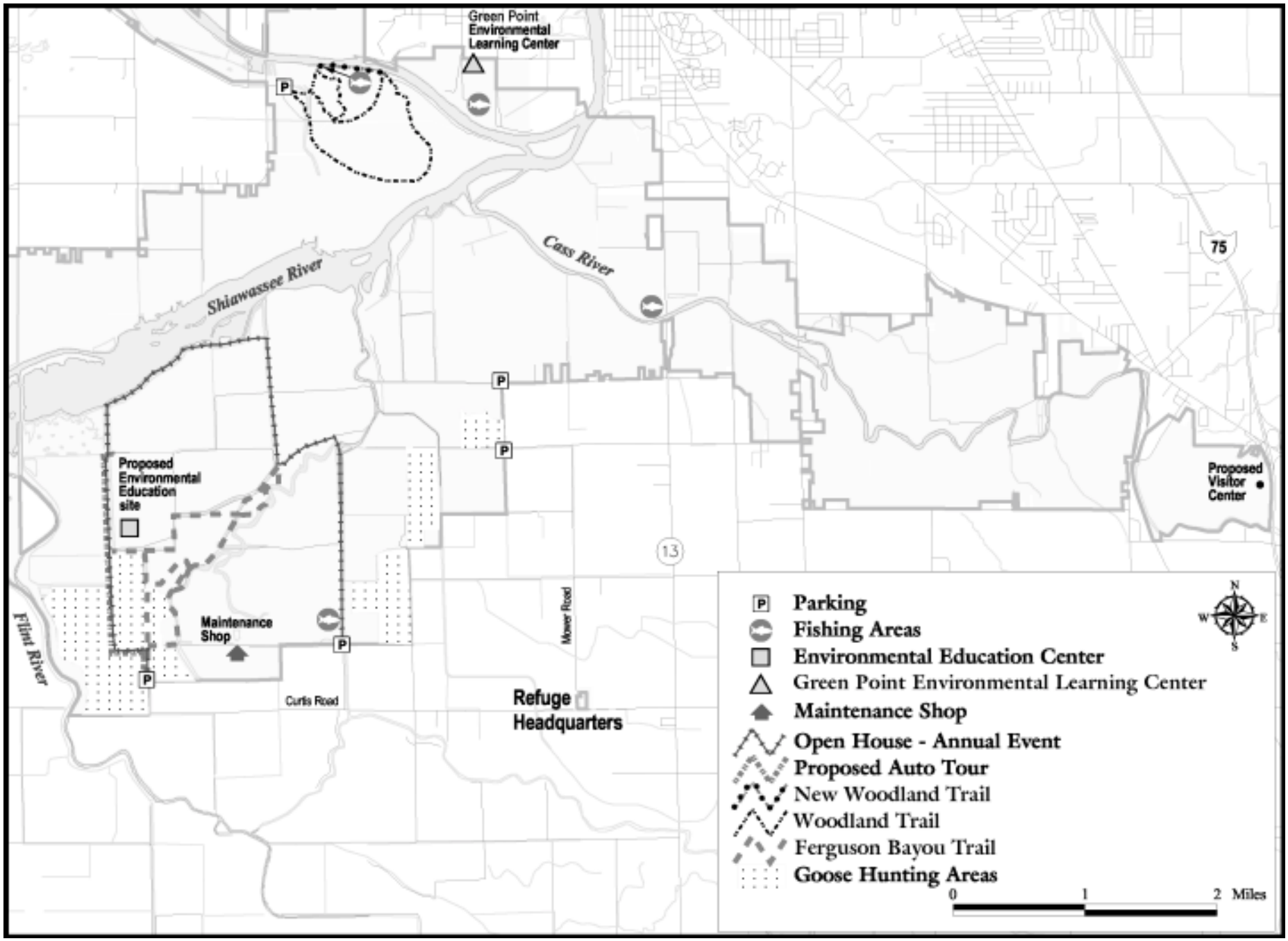
3.2.2 Amend the Refuge Sport Fishing Plan and Federal Register Refuge Specific regulations to allow bank fishing on the Refuge.

3.2.3 Work in partnership with Thomas Township to acquire land for boat access to the Tittabawassee River and construction of an accessible boat landing and parking lot. (RONS No. 00018)

Wildlife Observation and Photography

3.3 Objective: Provide at least 10 miles of hiking, bicycling, and cross country skiing trails, open year-round except during short periods in the fall, and at

Figure 4.6 Public Use Facilities



least 1 mile of auto tour trail open 6 months of the year (April to September) for the purpose of observing, studying, and photographing wildlife.

Strategies:

3.3.1 Establish a two-way auto tour route from the Curtis Road parking lot to the beginning of the high dike. Design and install gates, parking lot, observation area, and interpretive/guide signs. (RONS No. 97018)

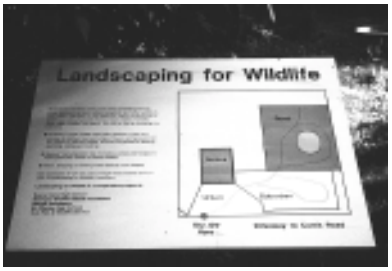


Photo by Steve Lewis

3.3.2 Expand and enhance Refuge trail system by incorporating interpretive and guide signs, benches, and upgrading the trail surfaces to meet U.S. Fish and Wildlife Service standards. Design and develop new trails along the Tittabawassee River at the Woodland Trail (Stroebel Road) and along the Cass River (off of M-13). Provide accessible toilet facilities along the trails. (RONS No. 00007)

Environmental Education

3.4 Objective: Present on-site environmental education program to 5,000 people per year by 2004, with a 2 percent annual growth rate, through contacts with community organizations, churches, and schools.

Strategies:

3.4.1 Work with partners to pay for bus transportation.

3.4.2 Increase promotion of environmental education programs through personal visits, mailings, and telephone. (RONS No. 000014)

3.4.3 By the year 2004, enhance and upgrade facilities at the Green Point Environmental Learning Center using General Motors settlement money and partnerships. (RONS No. 97003)

3.4.4 Add two permanent park rangers to the Refuge staff to work at Green Point Environmental Learning Center to develop outreach programs for schools and the general public, as well as to develop interpretive displays, signs, and brochures. (RONS No. 97003)

3.4.5 Develop an internship program that will augment the staffing by one full-time equivalent during the year. (RONS 00023)

3.4.6 Develop a facility that can house interns, volunteers, or Student Conservation Association workers by the spring of the year 2000 and submit a RONS project for additional expanded housing by 2002.

3.4.7 Reestablish an environmental education site at the Refuge to include picnic tables, toilets, a shelter, and space for bus parking by the year 2003. (RONS No. 00008)

3.5 Objective: Present off-site environmental education programs to 3,000 people per year by 2004, with a 2 percent annual increase.

Strategies:

3.5.1 Acquire a vehicle for environmental education staff. (RONS No. 00004)

3.5.2 Increase promotion of environmental education program through personal visits, mailings, and telephone. (RONS No. 00014)

3.6 Objective: Establish 500 environmental education contacts per year with educators, including attendance at on-site activities, using Refuge materials and services, and having their students attend a program presented by the Refuge.

Photo by Myles Willard

Strategies:

3.6.1 Increase promotion of environmental education program through personal visits, mailings, and telephone. (RONS No. 00014)

3.6.2 Offer an environmental education day for educators.

3.6.3 Establish partnerships with support groups to assist with environmental education.

3.6.4 Expand services to become an environmental education resource center that would include environmental education references, sample curriculum, and video tapes, for example. (RONS No. 98006)

Interpretation

3.7 Objective: The level of knowledge about and the positive attitude toward the Refuge will increase among visitors throughout the next 15 years.

Strategies:

3.7.1 By 2001, develop interpretive themes for the Refuge that communicate the activities of the staff and the ecological importance of the Refuge.

3.7.2 Incorporate the interpretive themes of the Refuge in all interpretive media, including brochures, signs, and programs (ongoing). Complete an interpretive trail at Curtis Road by 2002.

3.7.3 Expand interpretive programs to a new audience by offering guided interpretive trips to horseback riders in a manner that will not conflict with other users.

3.7.4 By 2001, determine the baseline of knowledge and attitudes among visitors.

Goal 4: Outreach

To improve public stewardship of Shiawassee National Wildlife Refuge and natural resources by increasing the public's understanding, positive attitude, and involvement.

4.1 Objective: Make an additional 200,000 people each year aware of the Refuge's fish, wildlife, and public use resources and its role in the Great Lakes Ecosystem using a consistent theme throughout the Refuge's facilities.

Strategies:

4.1.1 Work with Great Lakes Discovery Center Committee to plan and construct the Center, trails and other facilities.

4.1.2 Purchase and operate a travelers' information radio station to provide travelers information on the Refuge and the Great Lakes ecosystem. (RONS No. 97021)

4.1.3 Evaluate current Refuge theme and messages to determine if they are consistent with goals and objectives; modify if needed. Use this theme in brochures, interpretive signage, and other communications with the public.

4.1.4 Establish partnerships with support groups to assist with outreach events. Work with partners to participate in at least two outreach events each year that feature Refuge resources (e.g. International Migratory Bird Day, National Wildlife Refuge Week, National Fishing Week, Earth Day, etc.).

4.1.5 Develop a videotape of the Great Lakes Ecosystem. (RONS No. 97022)

4.2 Objective: Support and foster activities of the Friends of the Shiawassee National Wildlife Refuge.

Strategies:

4.2.1 Provide a meeting area and office space.

4.2.2 Provide a liaison between the Refuge and the Friends group.

4.2.3 Publically recognize and award the Friends group.

Goal 5: Protection

To protect the biological and cultural integrity of Refuge resources, the safety of visitors, and the health and safety of the Refuge staff.

5.1 Objective: Eliminate disturbance to fish, wildlife, habitat, and Refuge visitors caused by airboats, hydroplanes, personal watercraft (i.e. craft propelled by jet of water), and water skiers on rivers and tributaries within Refuge boundaries.

Strategies:

5.1.1 Work with Regional Office and Field Solicitor to establish surface water use controls and regulations on the rivers and tributaries within Refuge boundaries in order to protect Refuge resources.

5.1.2 Cooperate with partners (e.g. State, County, MUCC) to solve the disturbance and safety issues related to these craft.

5.2 Objective: Protect the cultural, historic, and prehistoric resources of lands owned and managed by the Refuge.

Strategies:

5.2.1 Establish a plan to fulfill requirements of Section 14 of the Archaeological Resources Protection Act for surveying lands to identify archeological resources; and Section 110(a)(2) of the National Historic Preservation Act for a preservation program. Due to deeply buried sites on Shiawassee National Wildlife Refuge, the plan needs a geomorphological component. Submit a RONS project to contract for the survey, estimated $100,000. (There is no time limit on meeting the mandated requirements.) (RONS No. 00003)

5.2.2 Permit cultural resources studies in the public interest. Work performed under an Archaeological Resources Protection Act permit may be subject to management restrictions but is compatible with the purposes for which the Refuge was established. Requests for archeological permits are forwarded to the Regional Director.

5.3 Objective: On the average, provide 40 hours per week of field law enforcement that includes weekends and evenings.

Strategies:

5.3.1 Add one full-time Refuge officer to the staff. (RONS No. 98002)

5.3.2 Maintain at least one collateral duty Refuge officer.

5.3.3 Purchase a law enforcement vehicle and construct a facility to house equipment and vehicle. (RONS No. 98001)

5.3.4 Add a seasonal law enforcement officer. (RONS No. 00006)

5.4 Objective: A safe and sanitary work environment for Refuge staff.

Strategy:

5.4.1 Install a water treatment system at the Refuge maintenance facility. (RONS No. 00011)

Goal 6: Private Lands

Through voluntary partnerships with private landowners, corporations, and conservation groups, restore and enhance wetland and grassland habitats and improve water quality within the Refuge watershed and Private Lands Coordination Area to benefit fish and wildlife in a manner that is compatible with a healthy ecosystem.

6.1 Objective: Annually restore 300 acres of wetlands and grasslands and 1 mile of stream and riparian corridor habitat for waterfowl, shore and water birds, and other migratory species within the 22-county Private Lands Coordination Area through the Partners For Fish and Wildlife Program.

Photo by Myles Willard

Strategies:

6.1.1 Increase the Partners for Fish and Wildlife staff from one existing full-time biologist to two full-time biologists to better handle the existing and future private lands restoration workload. (RONS No. 00009)

6.1.2 Develop and maintain partnerships with 50 percent of the Soil and Water Conservation Districts in the 22-county Private Lands Coordination Area and locally sponsored sub-watershed projects to restore wetlands, grasslands, riparian and instream fish habitat for Service trust resources.

6.1.3 Continue partnerships with participating Soil and Water Conservation Districts, Local Pheasants Forever chapters, Michigan Wildlife Habitat Foundation, Michigan Duck Hunters Association, and other cooperating private conservation organizations, the Great Lakes Regional Office of Ducks Unlimited, Inc., Michigan DNR, Natural Resources Conservation Service and the Service's State Coordinator's Office.

6.2 Objective: By 2015, reduce sediment loads (as measured by the USDA) 10 percent within the watershed of the Refuge by use of filter strips and other conservation practices sponsored by the USDA within the Saginaw Bay Watershed.

Strategies:

6.2.1 In partnership with USDA's Natural Resource Conservation Service and Farm Service Agency, Conservation Reserve Program, Wetland Reserve Program, Wildlife Habitat Incentive Program and Environmental Quality Incentive Program, encourage farmers to use practices that improve water quality and reduce erosion and sedimentation levels on farm lands, including the practice of Integrated Crop Management and reducing the use of harmful herbicides and insecticides. Implement the voluntary projects fully using the programs of the partners, Michigan DNR, EPA's joint 319 Small Watershed Projects program, the Service's Private Lands Challenge Grant program, the Clean Water Initiative, and Instream Fish Habitat grant programs.

6.2.2 Provide technical assistance to USDA for the CRP, WRP, WHIP, EQIP and other Farm Bill programs to promote the use of environmentally sensitive farm practices.

6.2.3 Work with State, Federal and Local agencies and private conservation organizations to support and promote the 22-county Saginaw Bay Watershed through active involvement in the Saginaw Bay Resource, Conservation and Development Council, Saginaw Bay Watershed Initiative Network, the North American Waterfowl Management Plan and other conservation organizations and granting institutions. These groups provide long-term program guidance and on-the-ground projects within the Saginaw Bay Watershed to restore fish and wildlife habitat and improve water quality in the watershed.

6.2.4 Assist the Michigan DNR and the Michigan Habitat Partners group in the development and distribution of a Wildlife Habitat Manual for private land owners. The manual will be distributed statewide and consist of 70 chapters, each four pages long, describing desirable land and animal management practices.

6.2.5 Promote the restoration of wetlands, grasslands and filter strips within the Refuge watershed through the NRCS, Wetland Reserve Program and Farm Service Agencies, CRP, WHIP, EQIP and farm debt retirement programs.

Goal 7: Conservation Easements

Manage the 113 Conservation Easements in the Shiawassee Fish and Wildlife Management District to improve wildlife habitat for migratory birds and other fish and wildlife species.

7.1 Objective: Meet Service policy guidelines ("Administration and Enforcement Procedures for Conservation Easement") for 54 easements by 2005, for all easements by 2010.

Strategies:

7.1.1 Complete legal surveys on 50 percent (54 tracts) of all Conservation Easements by 2005 through contracted services. Complete contracted surveys on the remaining tracts by 2010. (RONS No. 00005)

7.1.2 Conduct annual inspections of all Conservation Easements.

7.1.3 Develop Land Use Plans for 50 percent (54 tracts) of the Conservation Easements and restore grassland and wetland habitats on 25 percent of these tracts by 2005.

7.1.4 Hire a permanent 6-month law enforcement officer to conduct annual inspections, develop land use plans, and restore wetland and grassland habitat projects. (RONS No. 00006)

Mosquito Control

Since our Environmental Assessment for the additions to the Refuge was written in 1996, the Refuge System Improvement Act has passed, and that Act and the resulting policy have caused us to re-examine our activities on the Refuge. In addition, in the summer of 1999 Region 3 closely examined the mosquito control policy at Minnesota Valley National Wildlife Refuge, a refuge within the Minneapolis-St. Paul metropolitan area.

Photo by Ed DeVries

Since 1988, Minnesota Valley National Wildlife Refuge has prohibited treatment of its lands for mosquitoes except in the case of a health emergency. The policy was implemented at Minnesota Valley after the Defenders of Wildlife and other environmental organizations filed a suit against the Service for allowing control of mosquitoes on Refuge lands. An out-of-court settlement was reached after the Service agreed to conduct an environmental review of its program. Following the completion of an environmental assessment and because of potential negative environmental effects, the Service adopted a policy where treatment on Minnesota Valley National Wildlife Refuge could only occur in the case of a human health emergency. Since the policy was adopted, there has not been a human health emergency associated with mosquitoes on the Refuge.

The Improvement Act made it clear that wildlife are first on refuges.

The Improvement Act states that "the Secretary shall not ... renew or extend an existing use of a refuge, unless the Secretary has determined that the use is a compatible use and that the use is not inconsistent with public safety. The Secretary may make the determinations referred to in this paragraph for a refuge concurrently with development of a conservation plan ..."

Based on the requirements of the Improvement Act and the experience and evaluation of the program at Minnesota Valley National Wildlife Refuge, Region 3 has decided to prohibit treatment of refuge lands for mosquitoes except in the event of an emergency when there is a real and imminent threat to human health.

The Improvement Act says that the Secretary shall not extend a use unless the use is not inconsistent with public safety. We think that eliminating the current mosquito control program is not inconsistent with public safety.

We think the threat of disease is very low. There are three different types of mosquito-borne viruses in Michigan that cause encephalitis in people. All are very rare. Eastern equine encephalitis occurs in counties of southern Lower Michigan. There have been seven human cases in Michigan in the last 20 years. St. Louis encephalitis primarily occurs in the southern United States. The only recorded outbreak in Michigan occurred in 1975, when 93 human cases and three deaths occurred primarily in the metropolitan area of southeastern Lower Michigan. This outbreak was part of a larger epidemic that covered most of the eastern United States. California encephalitis (La Crosse) is very

rare in Michigan. Two documented cases have been reported in Michigan since 1980. The mosquito responsible for transmitting the virus is a tree hole and tire-breeding species. The habitat for this mosquito is upland, mature deciduous forest and settings where discarded tires are allowed to accumulate and collect water (Walker, 2000).

Policy

Therefore, the policy of Region 3, U.S. Fish and Wildlife Service is to prohibit treatment of Shiawassee National Wildlife Refuge lands for mosquitoes except in the case of an emergency when there is a real and imminent threat to human health. The Refuge will continue to cooperate with the Saginaw County Mosquito Abatement Commission in the monitoring of mosquito populations on Refuge lands and in the removal of tires or other debris that serve as artificial breeding sites.

Determination of Human Health Emergency

For purposes of treatment of refuge lands for disease-carrying mosquitoes, a human health emergency will be determined by the Regional Director of the U.S. Fish and Wildlife Service in consultation with the U.S. Center for Disease Control, the Michigan Department of Community Health and other recognized health care professionals.

Responsibility for Prescription of Treatment of Refuge Lands

Once the Regional Director has determined the existence of a human health emergency, he or she will prescribe, in consultation with recognized biologists and entomologists, the type and duration of treatment for mosquitoes on refuge lands.

Implementation of the Policy

Prior to the mosquito season, the refuge manager will identify biologists and entomologists that have expertise in mosquitoes and agree to consult with the refuge during possible human health emergencies. We anticipate that these experts will come from universities and state government agencies within Michigan.

Chapter 5: Plan Implementation

Personnel Needs

Currently the staff of Shiawassee National Wildlife Refuge consists of 10 positions: refuge manager, two refuge operations specialists, administrative technician, wildlife biologist, biological science technician, two park rangers, engineering equipment operator, and tractor operator. The park rangers are stationed at Green Point Environmental Learning Center.

As the Refuge activities have expanded over recent years and more visitors have come to the Refuge office seeking information, it has become difficult to efficiently run the office and serve the public well. To meet the needs of the office and the public, our plan is to change the administrative technician position to an administrative officer position and to hire a clerk receptionist. The added position is reflected in Table 4 and Figures 5.1 and 5.2. The other new positions in Figure 5.2 relate to the following objectives: 1.5.4, 1.7.1, 1.11.1, 2.5.2, 3.4.4, 5.3.1, 5.3.4, 6.1.1, 7.1.4.

Figure 5.1: Present Staffing Chart

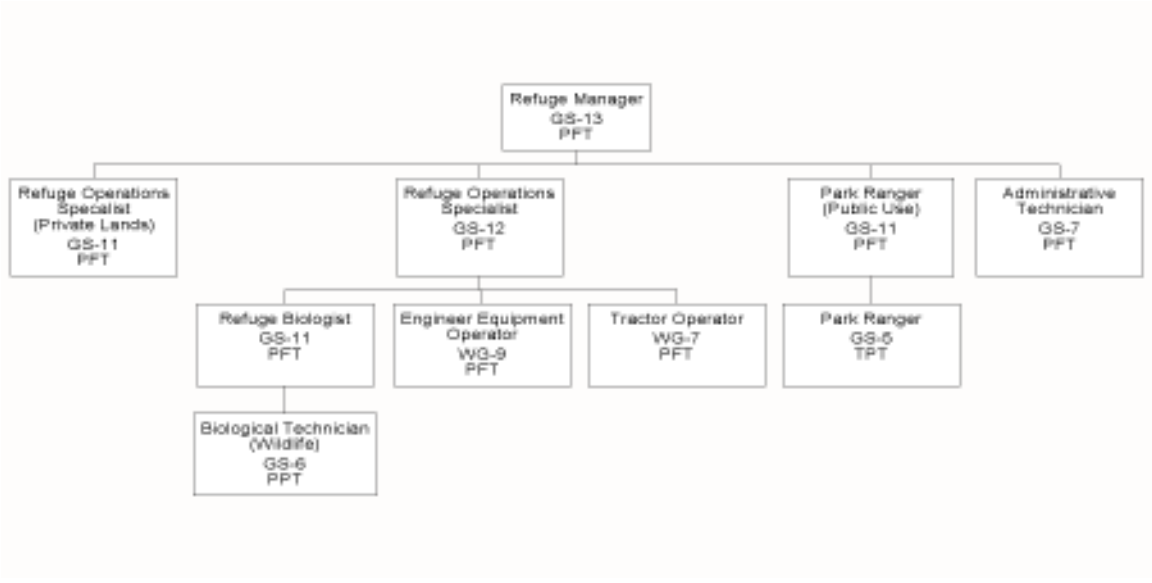


Figure 5.2: Proposed Organizational Chart

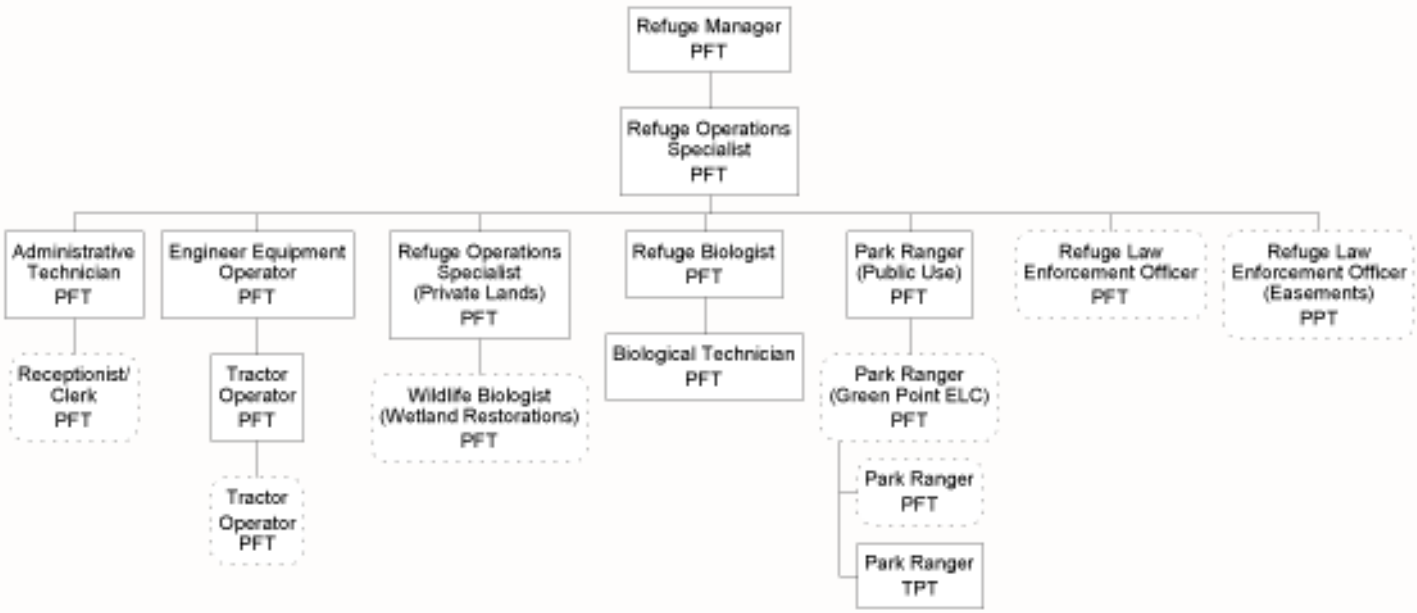


Table 4: Additional Staff Needs

RONS Project No.	Strategy	Position	FTEs
00014	3.4.2	Receptionist	1.0
00015	1.7.1, 1.5.4	Seasonal Tractor Operator	0.5
97003	3.4.4	Park Rangers (Two permanent)	2.0
98002	5.3.1	Refuge Law Enforcement Officer	1.0
00006	7.1.4	Refuge Law Enforcement Officer	0.5
		TOTAL	**5.0**

Funding

Currently, a backlog of maintenance needs exists. Under current conditions the needs, which are recorded in the Maintenance Management System (MMS), total $3,195,000 (See Appendix C). These needs, the largest of which are dike, ditch, and road maintenance, will continue under this plan.

The Refuge Operating Needs (RONS) projects identified in this plan describe new projects and total $6,576,000 (See Appendix C). These projects are in addition to the base operating budget of the Refuge, which was approximately $500,000 in fiscal year 1999. The projects are prioritized and will be implemented as funding becomes available.

Step-down Management Plans

Existing Step-Down plans that only need a slight modification to implement the direction of the CCP include the following:

Plan	Completion Date by December of:
Water Management	2006
Hunting	2002
Trapping	2002
Cropland Management	2006
Fire Management	2008
Integrated Pest Management	2003

The draft list of Step-Down Management Plans necessary to implement the direction of the CCP include:

Plan	Completion Date by December of:
Inventory and Monitoring	2002
Public Use	2004
Environmental Education and Interpretation	2005

Plan	Completion Date by December of:
Fishing	2003
Forest Management	2007
Law Enforcement	2002
Cultural Resources Management	2003

Partnership Opportunities

We plan to maintain and foster partnerships with the Shiawassee Flats Advisory Council, The Friends of Shiawassee National Wildlife Refuge, The Great Lakes Basin Ecosystem Team, Saginaw Bay Watershed Initiative Network (WIN), the City of Saginaw, and local high schools.

Within the Private Lands Program, the Refuge maintains partnerships with 14 Soil and Water Conservation Districts, local Pheasants Forever chapters, Michigan Wildlife Habitat Foundation, Michigan Duck Hunters Association, Great Lakes Regional Office of Ducks Unlimited, Inc., Michigan DNR, USDA Natural Resources Conservation Service, Saginaw Bay WIN, and the Service's State Coordinator's Office.

We will seek to develop partnerships with additional public and private groups as opportunities arise.

Monitoring and Evaluation

Monitoring is critical to successful implementation of this plan. Monitoring is necessary to evaluate the progress toward objectives and to determine if conditions are changing.

Accomplishment of the objectives described in this CCP will be monitored annually by the Refuge Manager's supervisor. Successful performance will be tied to the accomplishment of objectives that are scheduled for that year. The public will be informed about the activities of the Refuge staff through an "Annual Report" that will be mailed to all persons on the Refuge mailing list, published on the Refuge's Web site, and its availability will be announced through news releases to the media. The annual report will be published each year in February.

The techniques and details for monitoring related to specific objectives will be specified in the Inventory and Monitoring Step Down Plan.

Substantial changes are likely to occur within the Service and the Saginaw community during the next 15 years. The Plan and its objectives will be examined at least every 5 years to determine if any modifications are necessary to meet the changing conditions.

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Appendix D: Compatibility Determinations
Appendix E: Species Lists
Appendix F: Compliance Requirements
Appendix G: Bibliography
Appendix H: Mailing List
Appendix I: List of Preparers
Appendix J: Summary and Disposition on Comments Received on the Draft CCP

Appendix A: Environmental Assessment

Finding of No Significant Impact

Environmental Assessment and Comprehensive Conservation Plan for the Shiawassee National Wildlife Refuge, Michigan

An Environmental Assessment (EA) has been prepared to identify management strategies to meet the conservation goals of the Shiawassee National Wildlife Refuge (Shiawassee Refuge). The EA examined the environmental consequences that each management alternative could have on the quality of the physical, biological, and human environment, as required by the National Environmental Policy Act of 1969 (NEPA). The EA presented and evaluated four alternatives for managing fish, wildlife and plant habitats, as well as visitor services, on the Shiawassee Refuge over the course of the next 15 years:

Alternative A. No Action (Current Management). The No Action alternative encouraged existing, or status quo, refuge management practices. Land use patterns and visitor services would remain at current levels.

Alternative B. Historical Habitats. This alternative favored a return to pre-settlement habitat conditions. The strategy would allow natural events to occur. Levees would not be maintained Visitor use would likely decrease due to less accessibility to flooded areas.

Alternative C. Expanded Management (Preferred). Management would focus on a balance of conditions that could enhance diversity in areas such as public use, habitat, and fish and wildlife populations. The current mix of habitats would be altered by the reduction in cropland and increased diversity of forests through selective cutting. Visitor services and use would increase.

Alternative D. Overall Intensive Management. Under this alternative, management would focus on aggressive management of current conditions such as greatly increased public use and intense fish and wildlife habitat manipulations.

The alternative selected for implementation is ***Alternative C***. The strategies presented in the Comprehensive Conservation Plan (CCP) were developed as a direct result of the selection of this alternative. Forest management, as well as carefully timed water level adjustments in the impoundments, would benefit a variety of fish and wildlife plant species identified as Resource Conservation Priority species by the Service. Habitats would be managed for nesting and migrating songbirds, waterfowl and shorebirds. Visitors to the refuge will also benefit as a new auto route, expanded environmental education program, and a Great Lakes Discovery Center are all proposed within the CCP.

For reasons presented above and below, and based on an evaluation of the information contained in the Environmental Assessment, we have determined that the action of adopting Alternative C as the management alternative for the Shiawassee Refuge CCP is not a major federal action

which would significantly affect the quality of the human environment, within the meaning of Section 102 (2)(c) of the National Environmental Policy Act of 1969.

Additional Reasons:

1. Future management actions will have a neutral or positive impact on the local economy.
2. A cultural resource inventory completed prior to this CCP included recommendations for the protection of cultural, archaeological and historical resources.
3. This action will not have an adverse impact on threatened or endangered species.

Supporting Refcrences:

Environmental Assessment
Comprehensive Conservation Plan

Regional Director

9/19/01
Date

Great Lakes - Big Rivers Region
Bishop Henry Whipple Federal Building
Fort Snelling, MN 55111-4056

Table of Contents

Appendix A: Environmental Assessment Shiawassee National Wildlife Refuge Comprehensive Conservation Plan

July 2001

Abstract

The U.S. Fish and Wildlife Service is proposing management direction for the next 15 years for the Shiawassee National Wildlife Refuge (Refuge) in Saginaw County, Michigan. This Environmental Assessment considers the biological, environmental and socioeconomic effects that implementing the management direction will have on the most significant issues and concerns identified during the planning process. The preferred management direction is described in detail in a Comprehensive Conservation Plan (CCP).

The purpose of the Plan is to:

- Provide partners and local communities with a clear statement of the desired condition of the Refuge in the next 15 years.
- Ensure that management of the Refuge reflects the policies and goals of the National Wildlife Refuge System.
- Ensure that Refuge management is consistent with federal, state, county, and partner plans and studies.
- Provide Refuge staff with guidance and priorities for budget requests and for the consistent development, operation, and management of the Refuge over the next 15 years.

Responsible Agency and Official:

William Hartwig, Regional Director
U. S. Fish and Wildlife Service
Henry Whipple Federal Building
1 Federal Drive
Fort Snelling, Minnesota 55111-4056

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Chapter 1: Purpose and Need for the Proposed Action

Purpose and Need for Action

The purpose of the proposed action is to specify a management direction for Shiawassee National Wildlife Refuge for the next 15 years. This management direction will be described in detail through a set of goals, objectives, and strategies in a Comprehensive Conservation Plan.

The action is needed because adequate long-term management direction does not exist for Shiawassee National Wildlife Refuge. Management is now loosely guided by general policies, short-term plans, and a master plan that is more than 20 years old. Also, the action is needed to address current management issues, which are discussed below, and to satisfy the legislative mandates of the National Wildlife System Improvement Act of 1997, which requires the preparation of a Comprehensive Conservation Plan for all national wildlife refuges.

We prepared this Environmental Assessment (EA) using guidelines of the National Environmental Policy Act of 1969. The Act requires us to examine the effects of proposed actions on the natural and human environment. In the following sections we describe four alternatives for future Refuge management, the environmental consequences of each alternative, and our preferred management direction. We designed each alternative as a reasonable mix of fish and wildlife habitat prescriptions and wildlife-dependent recreational opportunities, and then we identified our preferred alternative based on their environmental consequences and their ability to achieve the Refuge's purpose.

Background

The Shiawassee National Wildlife Refuge (Refuge) was established in 1953 and includes 9,706 acres. The Refuge is located within Saginaw County, Michigan and is surrounded by both urban and agricultural areas. Shiawassee National Wildlife Refuge manages a variety of habitats that provide resting, foraging, and nesting opportunities for nearly 300 species of resident and migratory birds. The major habitat types include wetlands (3,771 acres), forests (4,225 acres), agricultural lands (1,180 acres), and grasslands (580 acres). This diversity of habitats also supports an abundance of plant, mammal, reptile, amphibian, and fish species.

The management techniques currently used on the Refuge include control of water levels in moist soil units and pools, biological and chemical control of invasive plant species, prescribed burning, mowing, and hunting of white-tail deer and Canada geese.

In 1995, the U.S. Fish and Wildlife Service considered alternative ways to better protect the Refuge resources at Shiawassee NWR. After evaluating the alternatives, the Service decided to pursue the addition of approximately 7,500 acres to the existing Refuge (Shiawassee National Wildlife Refuge Additions Final Environmental Assessment, 1995) The additions will be primarily along the Tittabawassee and Cass River corridors. These waterways are two of the four rivers that converge on the Refuge and make up Michigan's largest watershed, and their environmental integrity is vital to the health of the Refuge's core.

In 1997, the U.S. Fish and Wildlife Service began preparing a Comprehensive Conservation Plan for Shiawassee National Wildlife Refuge. The CCP outlines the management of wildlife habitat and development of public use facilities and programs at the Refuge for the next 15 years. The plan provides a comprehensive framework for future management and identifies management strategies as well as locations and priorities for habitat and public use development. Step-down management plans will be developed to provide further detailed guidance for inventory and monitoring, public use, environmental education and interpretation, fishing, forest management, law enforcement, and cultural resources management.

Decision Framework

The Regional Director for the Great Lakes-Big Rivers Region of the U. S. Fish and Wildlife Service will use the Environmental Assessment to select one of four alternatives and determine whether the alternative selected will have significant environmental impacts requiring preparation of an environmental impact statement. Specifically, analysis and findings described in this EA will help the Regional Director decide whether to continue with current management at the Refuge (no action) or to adopt another approach to management.

For details beyond those included in this Environmental Assessment, the reader should refer to the Comprehensive Conservation Plan for Shiawassee National Wildlife Refuge. The most relevant information in the CCP is contained in "Refuge Goals, Objectives and Strategies."

Authority, Legal Compliance, and Compatibility

The National Wildlife Refuge System includes federal lands managed primarily to provide habitat for a diversity of wildlife species. National wildlife refuges are established under many different authorities and funding sources for a variety of purposes. The purpose(s) for which a particular refuge is established are specified in the authorizing document for that refuge. These purposes guide the establishment, design, and management of the Refuge. The Refuge was established under the Migratory Bird Conservation Act and the Refuge Recreation Act "for use as an inviolate sanctuary, or any other management purpose, for migratory birds" and "for (1) incidental fish and wildlife oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered or threatened species."

Additional authority delegated by Congress, federal regulations/guidelines, executive orders and several management plans guide the operation and the management of the Refuge and provide the framework for the Fish and Wildlife Service's proposed action. The key legislation and orders that guide the Refuge are summarized in Appendix F of the CCP.

Scoping of the Issues

Scoping is the process of identifying opportunities and issues that can be used to develop and evaluate alternative approaches to management. The Fish and Wildlife Service publicly announced it was preparing a plan for the Shiawassee National Wildlife Refuge in December 1997.

Scoping involved:

- Issuing News Releases
- Conducting Sessions with Focus Groups
- Holding Public Information and Input Meetings

For additional detail on these activities see Chapter 1 of the Comprehensive Conservation Plan.

Issues and Concerns

From public involvement activities, the Service received several comments that identified issues and concerns people had related to management of the Refuge. These "scoping" issues have been considered in evaluating potential management alternatives and several have been directly integrated into the Comprehensive Conservation Plan.

This Environmental Assessment informs the public of the impact the proposed action (implementing the preferred managment alternative) will have on each of the four major issue categories. All issues are described in the CCP and many of the goals and strategies contained in the CCP relate to one or more of the issue categories. The four issue categories are summarized as:

Public Use Issues

Participants in open house events and focus group meetings expressed a wide range of philosophies on public use of Shiawassee National Wildlife Refuge. Some people would like to see management of the Refuge focus on wildlife and habitat with no increase of public access and public use of the Refuge. Other people would like to see an expanded trail system and enhanced access for activities such as horseback riding, automobile tours, environmental education, hiking, hunting, fishing, boating, and bicycling.

The subject of airboats on rivers flowing through the Refuge drew a strong response from people who believe that the Refuge should provide a tranquil place to view birds. Airboat operators were described as having "disregard" for anglers and wildlife observers. Comments included concerns about safety on the river as well as the noise disturbance.

Resource Protection Issues

Meeting participants voiced many opinions about the priority of resource protection issues. Some people said that enhanced law enforcement is a critical need, and others said that reducing the amount of sediment and chemical waste that flows through the Refuge should be a priority. Control of exotic species, such as purple loosestrife, round goby and zebra mussel, as well as invasive species such as phragmites, were cited as a protection issues. Concern was also expressed about mosquito control. Prioritizing land acquisition is another expansion issue facing Shiawassee National Wildlife Refuge, according to open house and focus group participants.

Maintenance Issues

Dike maintenance was the primary maintenance issue that emerged from the public involvement process. The need to maintain dikes was described as a top priority, particularly for dikes damaged by burrowing muskrats and, in

moist soil units, wave action. Recognizing the role the Refuge plays in relieving flood pressure, people recommended conserving some areas of the Refuge as flood retention areas.

General Issues

Some people said that the cultural diversity efforts at the Refuge are failing to reach targeted communities. Others suggested that monitoring of the Partners for Wildlife habitat restoration efforts is needed to evaluate what has been accomplished so far. Comments on revenue issues included statements that current staffing at Shiawassee National Wildlife Refuge needs more funding. Other participants questioned the U.S. Fish and Wildlife Service's plans to expand the Refuge when its ability to manage or maintain the existing wildlife Refuge is already a challenge.

Chapter 2: Alternatives for Management

Introduction

Four proposed management alternatives were developed during the course of planning the comprehensive conservation plan and complementary environmental assessment. During the planning process, the Service planning team identified Alternative C, Expanded Management, as the preferred alternative. The Comprehensive Conservation Plan was developed as a result of selecting Alternative C.

The land use patterns for all alternatives are summarized in Table 1. These alternatives are discussed within this chapter and summarized in Table 2 (page 96). Chapter 4 evaluates the alternatives based on issues raised during the planning process.

Land Exchange

The Refuge has sought to exchange certain lands with the State of Michigan for several years. The intention is to pursue the land exchange to better our management and acquire additional habitat for wildlife under each alternative. The exchange would transfer the area in and around Pool 4 to the State of Michigan. In exchange the Refuge would acquire land of equivalent value on the east side of the Refuge near Highway 13. Figure 4.5 in the CCP depicts the lands involved in the exchange.

Table 1: Land Use Patterns, Shiawassee National Wildlife Refuge

Comparison of Alternatives by Acreage

	Alternative A	Alternative B	Alternative C	Alternative D
Wetlands	3,479	3,979	3,613	3,613
Forests	3,445	3,945	3,518	3,518
Grasslands	580	1,010	1,803	1,803
Administrative	50	50	50	50
Croplands	1,430			

Mosquito Control

The Refuge System Improvement Act of 1997 and the resulting policy have caused a re-examination of mosquito control on the Refuge. The Improvement Act states that "the Secretary shall not ... renew or extend an existing use of a refuge, unless the Secretary has determined that the use is a compatible use and that the use is not inconsistent with public safety. The Secretary may make the determinations referred to in this paragraph for a refuge concurrently with development of a conservation plan ..." Based on the requirements of the Improvement Act and the experience and evaluation of the program at Minnesota Valley National Wildlife Refuge that prohibits mosquito control, Region 3 has decided to prohibit treatment of refuge lands for mosquitoes except in the event of an emergency when there is a real and imminent threat to human health. Therefore, the policy of Region 3, U.S. Fish and Wildlife Service is to prohibit treatment of Shiawassee National Wildlife Refuge lands for mosquitoes except in the case of an emergency when there is a real and imminent threat to human health. With the exception of the no action alternative, the policy of prohibiting mosquito control is followed under each alternative.

Formulations of Alternatives

The four alternatives that were developed for this Environmental Assessment range from "No Action" to "Overall Intensive Management." All of the four alternatives would serve the primary purpose for which the Refuge was established, but the end results would vary. Refuge and Service goals and objectives play an important role in the variances that would result from implementation of any one of the alternatives.

They include:
Alternative A, No Action: Management practices continue in this alternative;

Alternative B, Historical: Under this alternative, management would focus on pre-settlement conditions;

Alternative C, Expanded Management (Preferred): Management would focus on a balance of conditions that could enhance diversity in areas such as public use, habitat, and fish and wildlife populations;

Alternative D, Overall Intensive Management: Under this alternative, management would focus on aggressive management of current conditions such as greatly increased public use and intense fish and wildlife habitat manipulations.

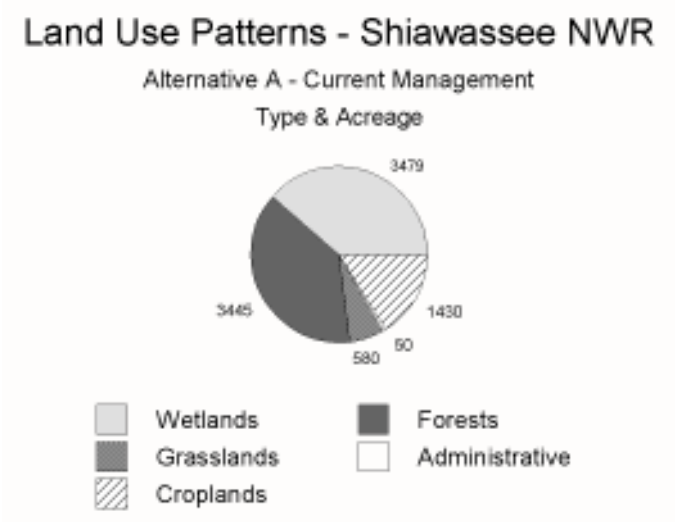
Descriptions of Alternatives

Alternative A, No Action

Present management practices continue if this Alternative is selected.

The No Action alternative is a status quo alternative where current conditions and trends continue. It also serves as the baseline to compare and contrast all other alternatives.

Figure 1



Wildlife Populations: Shiawassee is a significant concentration area for waterfowl during spring and fall migrations. Canada geese, tundra swans, dabbling ducks such as mallard, teal, and wood ducks, and diving ducks such as mergansers, canvasback, and buffleheads all benefit from current management practices.

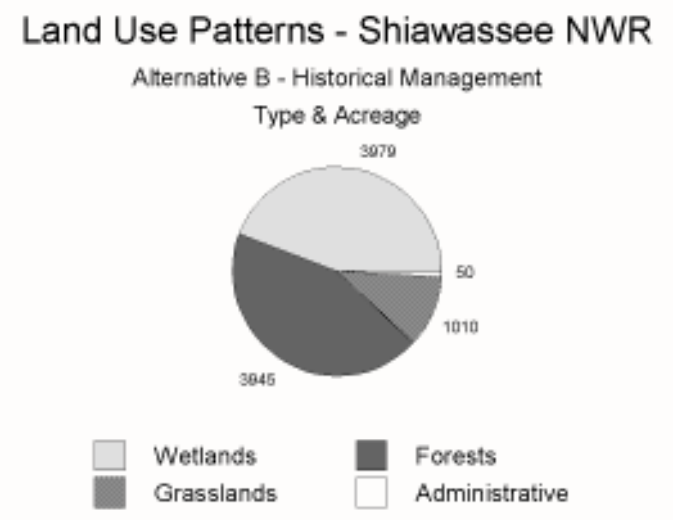
The Refuge is also managed to support a federally-listed threatened species.

Habitat Manipulations: Current land use patterns would continue as shown in Figure 1. Present habitat diversity supports songbirds in addition to migratory birds, deer, furbearers, reptiles, amphibians, and insects.

Farming, used as a wildlife management tool, would also remain at current conditions.

Public Use: Public use and access would be maintained at current levels (70,000 visits) and would include hiking, biking, and skiing on established nature trails and participating in controlled goose and deer hunts. Environmental education efforts would remain constant at present levels.

Figure 2



Alternative B – Historical

Management practices would change to allow the Refuge to revert to pre-settlement conditions.

Under this alternative the Refuge would drastically alter management practices. Levees would be broken and farming operations would cease. Natural events such as drought, flooding, fire, and plant succession would be allowed to occur.

Farming would decrease in the short-term and be abolished in the long-term as dikes and levees are removed and more natural ecosystems are established. Croplands would be converted into forests, wetlands, and prairies. Distribution and acreage of habitat types under Alternative B are shown in Figure 2.

Public use activities would be allowed to continue, including hunting and environmental education programs.

Alternative C – Expanded Management (Preferred)

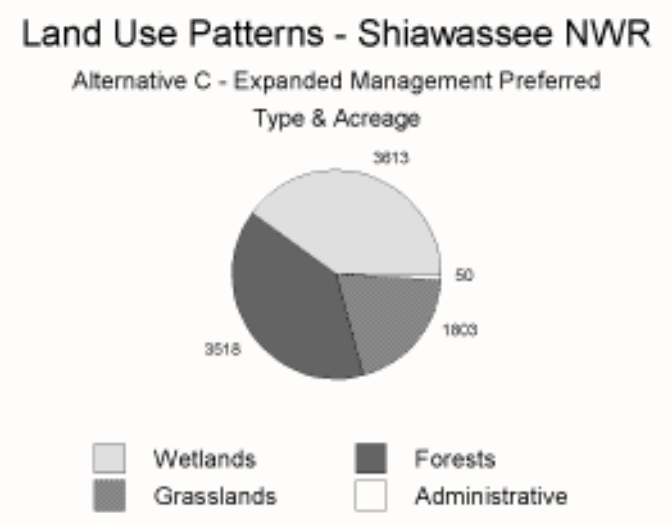
Management activities overall would be expanded as defined by Refuge goals, objectives, and strategies developed in Chapter 4 of the CCP.

Many present management techniques would remain under this alternative to allow for restoration and maintenance of marshes, moist soil units, grasslands, and floodplain forests at more intensive levels than current conditions. Management activities would help accomplish goals and objectives of the Great Lakes Ecosystem.

Distribution and acreage of habitat types under Alternative C are shown in Figure 3.

Fish and wildlife populations would be managed using sound biological practices.

Figure 3



In the short-term, cropland acreage would be reduced by 30 percent; these 350 acres would be converted to moist soil units. In the long-term, cropland would be eliminated and converted to other habitats. Improvements in diversity of species and populations of forest interior bird species would be accomplished using selective cutting to achieve a multilayer forest and maintaining multiple blocks of 100-acre tracts of bottomland hardwood forest

Public use would be further increased and enhanced through the use of wildlife-dependent quality recreational and educational programs. Opportunities for stream bank fishing would be enhanced. Current fishing opportunities exist from water access only. At least one site would include an accessible fishing/dock platform. Within Refuge boundaries, disturbance to visitors, fish and wildlife, and habitat would be minimized from activities associated with the use of airboats, hydroplanes, and personal watercraft.

The hunting program would be maintained at current levels.

Additional hiking, bicycling, and cross country ski trails would be open nearly year-round and would include an auto tour route that would be open six months of the year. Appropriate interpretive and information signing would be incorporated into all trails and auto tour routes. Increased efforts to contact and inform the public would be implemented, both on and off-site. Environmental education facilities on the Refuge would be improved to make the area more attractive and convenient for participants.

Facilities at the Green Point Environmental Learning Center would be upgraded by the use of partnerships and outside funding. The Center would become known as a resource center to provide references, sample curriculums, and other media to improve the quality of environmental education resources.

Service efforts to enhance the quality and quantity of public use and environmental education programs would include promoting the goals and objectives of the Great Lakes Ecosystem Team and partnerships to develop, maintain,

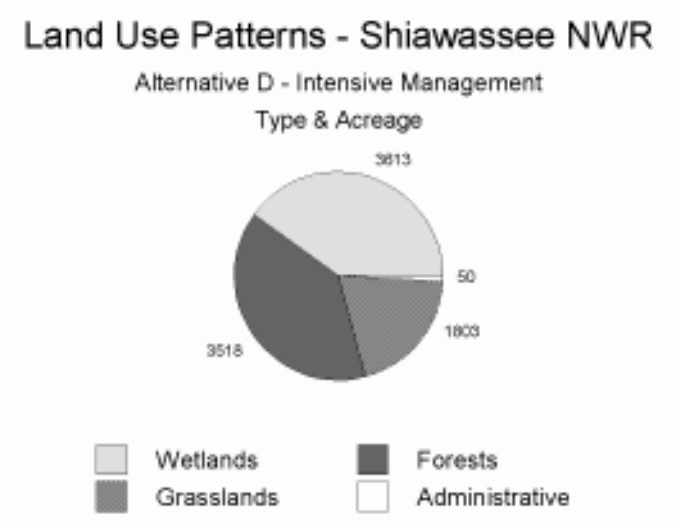
and staff Great Lakes Discovery Center. If this alternative is chosen and the planning of the Great Lakes Discovery Center proceeds, an environmental assessment will be completed for the Center as plans become more certain.

Current partnerships with Refuge support groups such as the Friends of The Shiawassee National Wildlife Refuge would be enhanced to provide additional outreach events that promote Refuge resources and to publicly recognize such groups.

Alternative D – Overall Intensive Management

Management would be focused on aggressive management of current conditions such as greatly increased public use and intense fish and wildlife habitat manipulations.

Figure 4



This alternative would be similar to Alternative C but would be at a higher level of intensity. The conditions of implementing this alternative would be contingent upon unlimited funding and staffing. Because funding would not be restrictive, full potential of the Refuge could be realized. Alternative D would result in the ideal or highest use of the natural resources of the Refuge for the benefit of fish and wildlife and their habitats and associated wildlife-dependent recreation.

Land use patterns are depicted in Figure 4.

Other Alternatives Considered but not Further Developed

No other alternatives were considered.

Chapter 3: Affected Environment

The Refuge represents an important waterfowl concentration area and crossroads for migrating geese, ducks, and other migratory birds. The Refuge is a combination of cropland, wetlands, bottomland hardwood forest, and scattered grasslands. Historically, the area was forested bottomland with scattered marshes. The Refuge lies in the floodplain of the Tittabawassee, Shiawassee, Flint and Cass rivers. Flooding occurs almost every year. Because they are continually eroded by flooding and wave action, Refuge dikes require frequent repair to the slopes.

Vegetation

Water and the effects of water dominate the ecological processes on the Refuge. A variety of vegetative communities that are associated with large rivers and their floodplains are found within the authorized boundaries of the

Refuge. These communities include some of the last remaining bottomland hardwood forests in Saginaw County. Another dominant community type is emergent marsh habitat. A shrub and grass habitat type is often found along the edges of the marsh community. There are also areas of open land vegetation, which includes the grasslands and croplands. The croplands are usually farmed for corn, winter wheat, soybeans or barley. The grasslands are usually abandoned farmlands that are seasonally flooded and are reverting to open field habitats. Upland forest is another vegetation cover type found on slightly higher elevations and in drier soil conditions.

Birds

The Refuge's array of habitats satisfy the requirements of diverse birds. More than 260 species of birds use the Shiawassee Flats area. The Tittabawassee, Shiawassee, Flint and Cass River bottoms are important stopover habitats for migrating waterfowl. Portions of the waterfowl flights from both the Mississippi and Atlantic flyways use this area each spring and fall. Two notable species that are common on the Refuge in the fall, winter, and early spring are the American black duck and Canada geese from the Southern James Bay Population. Refuge wetlands provide food, nesting, and roosting areas for more than 40 species of shore and wading birds. The bottomland forests in the Refuge are important habitats for many neo-tropical migrants and other songbirds. Refuge grasslands provide food, nesting, and cover for more than 20 species of passerines. The Refuge supports at least 15 species of raptors on a seasonal or permanent basis.

Mammals

More than 30 mammals have been recorded in or near the Refuge. White-tailed deer are abundant in the area because of the mix of forested lands, wetlands, shrubs, croplands, and grasslands.

Reptiles and Amphibians

Surveys have recorded 18 species of reptiles and amphibians on the Refuge and its expansion area.

Threatened and Endangered Species

The bald eagle is the only federally-listed threatened animal species that regularly uses Shiawassee National Wildlife Refuge.

Fish

The Refuge's sloughs, rivers, and marshes support more than 70 species of forage and game fish. Because of the Refuge's location at the junction of all the major tributaries forming the Saginaw River and its connection with Saginaw Bay, its wetland habitats are integral for life stages to many of the fish using the bay. These habitats are critical, particularly as spawning and nursery areas. With diminishing wetland resources the Refuge has a unique role in protecting fish habitat and valuable fish resources.

Land Use

The area within the authorized boundary of the Refuge totals 16,600 acres. Portions of the Refuge are adjacent to the Saginaw metropolitan area, with residential developments bordering several sections of the Refuge. Overall

trends in the Saginaw area are toward continued development and movement from urban to rural areas. Agriculture lands are being altered by urban sprawl and development.

Mosquito Control

The Saginaw County Mosquito Abatement Commission controls nuisance and disease vectoring mosquitoes in Saginaw County. The Commission's activities include disease and mosquito surveillance, killing mosquito larvae and adults, reducing sources, and public education. The Commission carries out operations on approximately 4,000 acres of land within the authorized boundaries of the Refuge.

Contaminants

Principal contaminants present within the authorized boundaries of the Refuge include those associated with point and nonpoint sources from industrial, municipal, and agricultural operations.

Cultural Resources

Shiawassee National Wildlife Refuge has 31 reported archeological sites on Refuge land. The land on which Shiawassee National Wildlife Refuge is located appears to have been empty of human occupation during the late prehistoric and proto-historic periods, although hunting parties from several tribes traversed it. Thus, determining an association between prehistoric cultures that created the archeological sites and modern Indian tribes is problematic. The Refuge Manager considers potential impacts of management activities on historic properties, archeological sites, traditional cultural properties, sacred sites, human remains and cultural materials.

Public Use

Public use at Shiawassee National Wildlife Refuge has grown steadily over the last decade. Approximately 70,000 refuge visits occur each year. In 1998, hunting, fishing, and trapping accounted for 6 percent of the total visitation. Hiking, bicycling, cross country skiing, wildlife observation, and photography accounted for 82 percent. Education accounted for 5 percent. The Refuge holds a managed goose hunt and a deer hunt. Fishing is not allowed from the shoreline. The Green Point Environmental Learning Center is the primary facility devoted to environmental education. People have complained about the use of airboats on rivers flowing through the Refuge. Airboat operators are described as having "disregard" for anglers and wildlife observers. Visitors to the Refuge have expressed a desire for more law enforcement presence to enhance visitor safety and enforce wildlife laws and regulations.

Pest Management

With high densities, white-tailed deer, muskrat, beaver, raccoons, and woodchucks can severely affect habitat quality or other species. Through management, the Refuge maintains acceptable densities of these species. To reduce encroachment of invasive and pest plants, the Refuge uses several management techniques – hand pulling individual plants, mowing, burning, water level manipulations, plowing, and chemical and biological applications. The Refuge has agreements with partner agencies to treat insect pests when outbreaks reach detrimental levels.

See Chapter 3 of the Comprehensive Conservation Plan for more details.

Chapter 4: Environmental Consequences

Effects Common to All Alternatives

Mosquitoes

With the reduction in mosquito control, there is the potential for more complaints about nuisance mosquitoes in the spring of the year. Depending on amount and timing of flooding in the wooded areas of the Refuge and depending on the strength and direction of winds, neighbors near the Refuge may perceive an increase in nuisance mosquitoes. However, given other sources of mosquitoes and natural variations, the change in mosquito populations in backyards may not be perceptible to the Refuge's neighbors.

Prioritize Potential Land Acquisition

Land acquisition follows the priorities set in the expansion Environmental Assessment under all alternatives.

Land Exchange

A land exchange with Michigan will add priority lands to the Refuge in exchange for lands in and around Pool 4. Wildlife benefits associated with Pool 4 are expected to continue under state management. There will be no effect on threatened and endangered species due to the exchange. Management efficiency is expected to increase as part of the exchange.

Environmental Justice

Executive Order 12898 "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" was signed by President Bill Clinton on February 11, 1994, to focus Federal attention on the environmental and human health conditions of minority and low-income populations with the goal of achieving environmental protection for all communities. The Order directed Federal agencies to develop environmental justice strategies to aid in identifying and addressing disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations. The Order is also intended to promote nondiscrimination in Federal programs substantially affecting human health and the environment, and to provide minority and low-income communities access to public information and participation in matters relating to human health or the environment.

None of the proposed management alternatives disproportionately place an adverse environmental, economic, social, or health impacts on minority or low-income populations.

Cultural and Historic Resources

Shiawassee National Wildlife Refuge has 31 reported sites on Refuge land and 42 known sites in the expansion area. Sites can include prehistoric archeological sites, historic archeological sites (Indian and Western), industrial and mining sites, farmsteads, and timbering sites. Prior to Refuge undertakings in each alternative, appropriate efforts would be made to identify known and unknown cultural resources within the area of potential effects, with avoidance of cultural resources being the preferred treatment.

Threatened and Endangered Species

Bald eagles, a federally-listed threatened species, frequently use the Refuge. Other federally-listed species that have the potential to be found locally in suitable habitats include the Indiana bat (endangered) and the eastern prairie fringed orchid (threatened), although neither of these species have been documented on the Refuge. In each alternative care would be taken to protect the nesting, feeding, and resting habitat of bald eagles. None of the alternatives propose activities that would adversely impact potential roosting and foraging habitats of the Indiana bat. None of the alternatives reduce the potential for the eastern prairie fringed orchid.

Alternative A – Current Management (No Action)

Wildlife diversity continues and includes the species listed in Appendix E of the comprehensive conservation plan. Under this alternative, segments of the public continue to feel excluded from the Refuge. These segments include persons with mobility impairments, horseback riders, and bank fishermen. Refuge visitors and neighbors continue to be disturbed by airboat noise and speed. Public perception is that illegal activities are greater than necessary because of lack of law enforcement; maintenance of Refuge facilities is inadequate. Contaminants entering the Refuge will be minimally monitored. Exotic species will be controlled according to an Integrated Pest Management Plan. Dikes are maintained with occasional delays in repairing them. The Refuge serves as floodwater storage when consistent with wetland management plans. Cultural diversity efforts continue to be focused on Buena Vista School and the University of Michigan. The activities of the Partners for Wildlife program are documented in the files. Conservation easements are inspected infrequently. Under current funding levels, public perception of needed and timely repairs continues.

Alternative B – Historical Vegetation Management

Under this alternative, crop food for resident deer and geese will be eliminated and there will be increased depredation of crops on neighboring farms. As natural succession occurs, there will be an expected increase in forest and scrub-shrub habitat. Because of increased acreage of all habitat types, higher populations of existing species would increase. Species that require larger blocks would be provided higher quality habitat. Habitat for fish spawning would increase dramatically. Public use would likely decrease due to less accessibility to flooded areas. By demonstration, the public may develop greater appreciation for the historical landscape and the changes that have occurred through lumbering and agriculture. Public perception of access, airboat noise, and need for law enforcement would continue as in Alternative A. Contaminants entering the Refuge will be minimally monitored. Because less funds will go to dike maintenance, other facilities may be better maintained and the public will perceive improved maintenance of the remaining facilities. The Refuge will serve as a greater reservoir of floodwater during floods, reducing flooding pressure to some extent for surrounding communities and agricultural lands. Cooperative farmers would lose acreage, and they would either lose income or need to find alternative land to farm. Cultural diversity efforts continue to be focused on Buena Vista School

and the University of Michigan. The activities of the Partners for Wildlife program are documented in the files. Conservation easements are inspected infrequently.

Alternative C –Expanded Management (Preferred)

Under this alternative, existing wildlife diversity and abundance is enhanced, particularly for forest interior species. Deposition of silt on the Refuge is reduced. Monitoring and inventory activities are focused on evaluating progress toward objectives, and the role of the Refuge in fish spawning is better understood. Increased monitoring leads to control of exotic species at more specific levels. Dikes and facilities are maintained at the current standards. Public appreciation for the Refuge increases because of increased access for wildlife observation and additional environmental education and interpretive programs. Higher quality experiences occur on the Refuge because disturbance from airboats is reduced. Refuge visitors and neighbors perceive increased safety and compliance with regulations because of increased visibility of law enforcement officers. The Refuge serves as floodwater storage when consistent with wetland management plans. Cultural diversity efforts are expanded through increased contacts. The activities of the Partners for Wildlife program are documented in GIS and charted annually. Conservation easements are inspected according to Service standards. Under increased funding, expanded facilities are better maintained. The public reports improved maintenance, but still sees need for improvement.

Alternative D–Intensive Management

Under this alternative, the enhancements of alternative C are increased further. Public appreciation and perception of the Refuge and its resources are maximized. Monitoring is intensified, because increased use would mean potential for increased impacts and the effects would need to be closely monitored. Under this alternative, existing wildlife diversity and abundance are enhanced, particularly for forest interior species. Deposition of silt on the Refuge is reduced. Monitoring and inventory activities are focused on evaluating progress toward objectives, and the role of the Refuge in fish spawning is better understood. Increased monitoring leads to control of exotic species at lower levels. Dikes and facilities are maintained at high standards. Public appreciation for the Refuge increases because of increased access for wildlife observation and additional environmental education and interpretive programs. Higher quality experiences occur on the Refuge because disturbance from airboats is reduced. Refuge visitors and neighbors perceive increased safety and compliance with regulations because of increased visibility of law enforcement officers. The Refuge serves as floodwater storage when consistent with wetland management plans. Cultural diversity efforts are expanded through greatly increased contacts. The activities of the Partners for Wildlife program are documented in GIS and charted annually. Conservation easements are inspected according to Service standards. Because this alternative requires increased funding and the probability of increased funding is low, the likelihood of achieving full success under this alternative is low.

Chapter 5

During initial planning, Refuge staff asked Refuge neighbors, organizations, local government units, schools, and interested citizens to share their thoughts in a series of open houses and focus groups. Forty-two people attended open houses at Bridgeport Township, Thomas Township, and at the Green Point Environmental Learning Center. Another 25 people participated in focus groups representing environmental education, cooperative farming, hunting and fishing, and wildlife observation/photography use of the Shiawassee National Wildlife Refuge. Service staff accepted oral and written comments at each open house and written comments were received in the mail after each open house. Refuge staff also consulted with local agency representatives and individuals during scoping. A draft environmental assessment and comprehensive conservation plan were sent to officials, agencies, organizations, and individuals seeking comment and input.

Chapter 6

The individuals who were primarily responsible for writing and editing the EA include:

Douglas G. Spencer, *Refuge Manager, Shiawassee National Wildlife Refuge*
Mr. Spencer provided overall direction, supervision, and coordination with agencies and the public. He assisted in writing and editing.

John H. Schomaker, *Refuge Planning Specialist, Region 3*
Mr. Schomaker provided coordination and served as co-author.

Judy McClendon, *Project Leader, Southern Missouri Ascertainment Office, Region 3*
Ms. McClendon wrote the initial draft of the environmental assessment.

Jane Hodgins, *Technical Writer/Editor, Region 3*
Ms. Hodgins served as primary editor.

Chapter 7

List of Agencies and Persons Consulted; see Appendix H.

Chapter 8

Literature Cited; see Appendix G.

Table 2: Summary of Actions Proposed Under Management Alternatives

Topic	Alternative A Current Mgmt. (No Action)	Alternative B Historical Vegetation Mgmt.	Alternative C Expanded Mgmt. (Preferred)	Alternative D Intensive Mgmt.
Habitat	Current mix of habitat would continue.	Habitat would be allowed to revert to the presettlement vegetation pattern. Croplands would be eliminated. Acreage of wetlands, forests and grasslands would increase, with greatest percentage increase in grassland.	The current mix of habitat would be altered in the short-term by changing 350 acres of cropland to moist soil management. Selective cutting within forests would increase the diversity of forests.	Same as Alternative C with increased intensive management of forest, wetland and grasslands.
Public Use	Access would consist of two hiking trails, an annual auto tour, deer and goosemain hunts. Bank fishing would be prohibited. Environmental education and interpretive programs would be offered at Green Point Learning Center.	Public use activities would continue as in Alt. A. Access might be more limited in the body of the Refuge as dikes would not be maintained and some trail and tour routes would disappear. Environmental education and interpretation would be the same as Alt. A.	In addition to access detailed in Alt. A, one trail would be developed along the Tittabawassee River, three bank fishing areas would be provided, an auto tour route would be open 6 months of the year, and expanded education and interpretive programs would be offered along with education resources.	Same as Alt. C with additional opportunities for environmental education and interpretive programs, enhanced wildlife viewing opportunities and more auto tour opportunities.
Resource Protection	The current level of activities in law enforcement, control of exotics, and environmental monitoring would continue.	Same as Alt. A.	Law enforcement patrols would be increased, activities off the Refuge would target reducing silt deposition on the Refuge, exotics would be controlled at the current level, and environmental monitoring would increase to measure effects of management.	Same as Alt. C, with expanded activities in the control of exotics and monitoring.
Maintenance	Dike maintenance would continue as done presently.	Dikes would be maintained only to protect Refuge buildings and and to support trails and service roads.	Dike maintenance would continue as done presently.	Dikes would be maintained to a higher standard than they are at present.
General	Refuge funding would continue as in past with historical rate of increase. Cultural diversity efforts would continue at present levels and private land activities would occur as at present.	Same as Alt. A.	Funding and staff requests for Refuge would increase. Cultural diversity efforts would be increased proportionately to increased activity in env. education. Private land activities would be documented in GIS and monitored more than in Alt. A.	Funding and staff requests would exceed those of Alt. C. There would be greater efforts toward cultural diversity and private land monitoring than in Alt. C.

Table 3: Summary of Consequences Under Alternatives

Issues, Concerns & Opportunities	Alternative A Current Mgmt. (No Action)	Alternative B Historical Vegetation Mgmt.	Alternative C Expanded Mgmt. (Preferred)	Alternative D Intensive Mgmt.
Public Use				
Amount of public access to the refuge.	The refuge is primarily managed for wildlife, with wildlife-dependent public use allowed if determined compatible.	Public use would likely decrease due to less accessibility to flooded areas.	Public use/access would increase with more emphasis on expansion of interpretive and educational programs. Auto tour and horseback riding opportunities are increased from Alt. A.	Same or slightly higher than in Alt. C.
Airboat use affects wildlife and public use on the refuge.	Airboat use continues as present.	Same as in Alt. A.	Airboat use is controlled within authority determined by the Solicitor and in cooperation with other governmental entities.	Same as Alt. C.
Resource Protection Issues				
Enhanced law enforcement is needed.	Currently there are three collateral duty officers on the staff.	Same as in Alt. A.	Refuge visitors and neighbors see law enforcement officers more often. A full-time LE officer would be hired.	Same or slightly higher than Alt. C.
Sediment and chemical waste entering the refuge.	Current monitoring would not change.	Same as Alt. A.	Silt deposition reduced by 10 percent by the end of 15 years. Chemical monitoring as in Alt. A.	Silt deposition less than in Alt. C and chemical monitoring increased over other alternatives.
Control of exotic species.	Exotic species controlled according to Intgrated Pest Management Plan.	Same as Alt. A.	Quantitative monitoring increased over Alt. A and control instituted at more specific levels.	Invasion of species limited to lower limits than other alternatives.
Maintenance Issues				
Maintenance and repair of dikes.	Dikes are maintained with occasional delays in repairing in a timely manner.	Dikes are not maintained.	All dikes are maintained to current standards.	Dikes are maintained at a higher standared than in Alt. A.
Conserve areas of the refuge for floodwater storage.	Refuge serves as floodwater storage when consistent with wetland management plan.	Entire refuge, outside of building areas, would serve as natural floodplain.	Same as Alt. A.	Same as Alt. A

Table 3 Continued: Summary of Consequences Under Alternatives

Issues, Concerns & Opportunities	**Alternative A** Current Mgmt. (No Action)	**Alternative B** Historical Vegetation Mgmt.	**Alternative C** Expanded Mgmt. (Preferred)	**Alternative D** Intensive Mgmt.
General Issues				
Cultural diversity efforts fail to reach targeted communities.	Cultural diversity efforts continue to be focused on activities with the University of Michigan.	Same as Alt. A.	Greater numbers of culturally diverse populations are contacted and increased opportunities provided than in Alt. A.	Same as Alt. C with added contacts and opportunities.
Monitoring of Partners for Wildlife habitat restoration.	Activities are documented and maintained in files.	Same as Alt. A.	Activities are documented within GIS and charted annually.	Same as Alt. C.
Conservation Easements	Current limited activities continue.	Same as Alt. A.	Management meets Service standards.	Same as Alt. C.
Refuge funding of operations and maintenance.	Current level continues with public perception of situations that need attention and some maintenance completed with time delays.	Due to reduced needs of dike maintenance and redirected effort, other facilities are better maintained.	Due to RONS projects tied to the CCP, increased funding leads to expanded facilities and better maintenance than Alt. A. Public reports improved maintenance, but still sees needs.	Through optimized funding, public perception of a well maintained refuge.

Appendix B: Glossary

Appendix B: Glossary

Alternative	A set of objectives and strategies needed to achieve refuge goals and the desired future condition.
Biological Diversity	The variety of life forms and its processes, including the variety of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur.
Compatible Use	A wildlife-dependent recreational use, or any other use on a refuge that will not materially interfere with or detract from the fulfillment of the mission of the Service or the purposes of the refuge.
Comprehensive Conservation Plan	A document that describes the desired future conditions of the refuge, and specifies management actions to achieve refuge goals and the mission of the National Wildlife Refuge System.
Ecosystem	A dynamic and interrelated complex of plant and animal communities and their associated non-living environment.
Ecosystem Approach	A strategy or plan to protect and restore the natural function, structure, and species composition of an ecosystem, recognizing that all components are interrelated.
Ecosystem Management	Management of an ecosystem that includes all ecological, social and economic components that make up the whole of the system.
Endangered Species	Any species of plant or animal defined through the Endangered Species Act as being in danger of extinction throughout all or a significant portion of its range, and published in the Federal Register.
Environmental Assessment	A systematic analysis to determine if proposed actions would result in a significant effect on the quality of the environment.
Extirpation	The local extinction of a species that is no longer found in a locality or country, but exists elsewhere in the world.

Goals	Descriptive statements of desired future conditions.
Interjurisdictional Fish	Fish that occur in waters under the jurisdiction of one or more states, for which there is an interstate fishery management plan or which migrates between the waters under the jurisdiction of two or more states bordering on the Great Lakes.
Issue	Any unsettled matter that requires a management decision. For example, a resource management problem, concern, a threat to natural resources, a conflict in uses, or in the presence of an undesirable resource condition.
National Wildlife Refuge System	All lands, waters, and interests therein administered by the U.S. Fish and Wildlife Service as wildlife refuges, wildlife ranges, wildlife management areas, waterfowl production areas, and other areas for the protection and conservation of fish, wildlife and plant resources.
Objectives	Actions to be accomplished to achieve a desired outcome.
Offset Levee	A levee set back from the original alignment of an existing levee (typically 3 feet to 5 feet setback).
Preferred Alternative	The Service's selected alternative identified in the Draft Comprehensive Conservation Plan.
Scoping	A process for determining the scope of issues to be addressed by a comprehensive conservation plan and for identifying the significant issues. Involved in the scoping process are federal, state and local agencies; private organizations; and individuals.
Species	A distinctive kind of plant or animal having distinguishable characteristics, and that can interbreed and produce young. A category of biological classification.
Strategies	A general approach or specific actions to achieve objectives.
Wildlife-dependent Recreational Use	A use of refuge that involves hunting, fishing, wildlife observation and photography, or environmental education and interpretation, as identified in the National Wildlife Refuge System Improvement Act of 1997.

Threatened Species	Those plant or animal species likely to become endangered species throughout all of or a significant portion of their range within the foreseeable future. A plant or animal identified and defined in accordance with the 1973 Endangered Species Act and published in the Federal Register.
Vegetation	Plants in general, or the sum total of the plant life in an area.
Vegetation Type	A category of land based on potential or existing dominant plan species of a particular area.
Watershed	The entire land area that collects and drains water into a stream or stream system.
Wetland	Areas such as lakes, marshes, and streams that are inundated by surface or ground water for a long enough period of time each year to support, and that do support under natural conditions, plants and animals that require saturated or seasonally saturated soils.
Wildlife Diversity	A measure of the number of wildlife species in an area and their relative abundance.

Appendix C: RONS and MMS Lists

Appendix C: RONS AND MMS

Refuge Operation Needs System List (RONS)
Maintenance Management System (MMS)

RONS Project Cost Summary – Refuge Project Priorities

The projects are prioritized into three categories based on the likelihood and potential impact of the project.

"A" Priority Projects

RONS Project No.	Strategy No.	Project Description	First Year Need	Recurring Annual Need
99005	1.11.1 and 2.5.2	Hire a full-time biological technician to monitor habitat	$114,000	$49,000
00001/00002	1.3.1 and 1.3.2	Improve Green Tree Reservoirs	$3,100,000	–
98005	1.5.1	Purchase 3-yard wheeled loader	$111,000	$6,000
98004	1.5.1	Purchase a trailer to haul heavy equipment	$164,000	$4,000
00013	2.3.1, 2.3.2, and 2.3.3	Fund study of Refuge fish productivity and recruitment	$174,000	$49,000
00010	3.2.1	Cass River, Woodland Trail, Green Point ELC, and Spaulding Drain bank fishing sites	$264,000	$16,000
97018	3.3.1	Auto tour route	$170,000	$10,000
00014	3.4.2, 3.5.2 and 3.6.1	Hire a refuge receptionist	$100,000	$42,000
98006	3.6.4	Expand curriculum	$22,000	–
98002	5.3.1	Add and support one full-time Refuge officer	$123,000	$58,000
98001	5.3.3	Purchase a vehicle and construct a storage facility for LE-related equipment	$118,000	$3,000
00011	5.4.1	Purchase water treatment system for maintenance facility	$6,000	$1,000
00006	5.3.4, 7.1.4	Add and support a seasonal law enforcement officer	$58,000	$25,000

RONS Project No.	Strategy No.	Project Description	First Year Need	Recurring Annual Need
"B" Priority Projects				
97017	1.3.2 and 1.4.1	Convert Deutz Engine into a trailer-mounted pump	$24,000	$2,000
97023	1.5.1, 1.7.2, 1.7.3	Purchase mulcher, mowers and seed drill	$78,000	$5,000
97017	1.5.1 and 1.5.2	Improve moist soil management capabilities	$27,000	$2,000
00015	1.5.4 and 1.7.1	Add one permanent seasonal tractor operator for trail and habitat maintenance	$55,000	$22,000
97017	1.6.2	Enhance emergent marsh management	$22,000	$2,000
00022	1.9.1	Conversion of wet farmlands to wetland habitats	$70,000	–
00018	3.2.3	Construct a boat landing and fishing access on the Tittabawassee River in Thomas Township	$200,000	–
00007	3.3.2	Expand trails	$95,000	$5,000
97003	3.4.3, 3.4.4	Addition of two Park Rangers	$257,000	$127,000
00023	3.4.5	Internship program	$100,000	$42,000
00008	3.4.7	Reestablish environmental education site	$55,000	$5,000
00009	6.1.1	Additional Private Lands biologist	$133,000	$68,000
00005	7.1.1	Complete legal surveys and boundary posting of easements	$200,000	–

RONS Project No.	Strategy No.	Project Description	First Year Need	Recurring Annual Need
"C" Priority Projects				
00019	1.1.1	Reforestation of large, unfragmented blocks	$350,000	–
00020	1.2.1 and 1.2.2	Development of multilayer forest	$100,000	–
00017	1.5.2	Subdivide MSU 1 into two units	$70.000	–
00016	1.7.4	Purchase a no-till grass drill to restore grasslands	$20,000	$2.000
00021	1.8.1	Manage croplands	$20,000	–
00004	3.5.1	Purchase an environmental education vehicle	$30,000	–
97021	4.1.2	Purchase and operate a travelers' information radio station	$24,000	$2,000
97022	4.1.5	Produce video on Great Lakes Ecosystem	$22,000	–
00003	5.2.1	Archaeological survey of Refuge land	$100,000	–

Maintenance Management System (MMS) List

Project Number	Project Description	Cost	Planned Funding Year
90111	Rehabilitate severely eroded Misteguay dike. The present dike has deteriorated to a point that it could wash out in the next major flood event. If this happens, both Refuge and private farmlands will be impacted by flood debris and siltation. (Title V LWCF)	$262,500	1999
00164	Replace worn-out 1970 Dodge stake bed truck. The truck has high mileage (100,300). It is no longer reliable and contantly breaks down, requiring extensive repairs. The truck is used in maintenance activities such as hauling materials and equipment.	$65,000	1999
00165	Replace deteriorated culvert and screw gate. The culvert is rusted through in some areas and the gate no longer operates smoothly. Total replacement of both items is required. The structure was installed in 1971 and has far exceeded its life expectancy. The structure is needed to manage water levels in Pool 2 for habitat control.	$18,000	1999
99000	Base Maintenance – This funding is used for routine maintenance of equipment and facilities.	$100,000	2000
96007	Replace worn-out radios. Regional Radio Coordinator is developing system diagrams for transition to Federal Land Mobile Radio Standard narrow-band equipment. Functional communications equipment is essential to employee safety.	$21,600	2001
90115	Replace deteriorated Bartel Road pump station 1. The pump station is needed to manage water levels for habitat manipulation in several impoundments. These impoundments are critical resting and feeding areas for migratory birds along the Shiawassee River.	$34,650	2001

Project Number	Project Description	Cost	Planned Funding Year
90113	Rehabilitate eroded Spaulding drain ditch slopes on the west side. The ditch embankment is being washed out each year by flood waters. This ditch embankment protects the Refuge pool habitat from silt-laden upstream flood waters.	$450,000	2001
97171	Repair eroded dikes on Pool 1B. Extensive erosion on the dikes is threatening water management capabilities. Interior slopes need to be repaired and reshaped, and erosion protection installed. This pool adjacent to the Shiawassee River is critical habitat for migratory birds.	$475,000	2001
96005	Clean out silted Trinklein Unit drainage ditches. Silt laded flood waters have deposited materials in the Trinklein ditch. This has severely impacted the ability to provide adequate drainage. This project will require hiring a contractor to remove the silt material from within the ditch and depositing it on the embankment slopes adjacent the ditch. Drainage is vital to the water management of the Refuge to maintain habitat and to provide consistent water levels for migrating birds.	$100,000	2002
99311	Resurface deteriorated public use parking areas and access roads. These gravel parking lots and roads have a lot of use and are deteriorated due to heavy traffic during wet conditions. The lots need to be regraded and regraveled.	$90,000	2002
90103	Repair erosion on Pools 1a/1b cross dikes. High water has caused erosion on the dike slopes. The dikes need to be reshaped and fill installed in eroded areas. Slope protection will also be installed. The dikes are needed to allow separate water level management of the pools.	$105,000	2003

Project Number	Project Description	Cost	Planned Funding Year
94239	Replace worn-out International tractor. The present tractor is becoming harder to repair because of age and the ability to locate replacement parts. Replacement is recommended. The tractor is used for habitat restoration and maintenance.	$42,000	2004
92201	Repair deteriorated trails and boardwalks at Green Point ELC. Work involves replacing surface boards at Green Point, applying stone to wet areas, clearing trees and brush and providing benches and signs. The public use this area within the city limits of Saginaw.	$30,000	2004
99436	Replace worn-out 1992 Chevrolet Blazer 4x4 truck. This truck is used extensively for law enforcement.	$30,000	2005
99437	Replace worn-out Dodge D150 pick-up truck. Truck is used extensively for maintenance and the station's biological programs.	$25,000	2005
99435	Replace worn-out 1977 Dodge pickup truck. The vehicle is used extensively by the station's public use specialist at Green Point ELC.	$25,000	2005
99434	Replace worn-out 1989 Dodge Ram pickup truck. This vehicle is used extensively for maintenance projects, for public use, and wetland management.	$25,000	2005
90108	Rehabilitate deteriorated roads, including the Ferguson Bayou nature trail, Evon Road, Houlihan Road, and Spaulding Drain Road. Driving surfaces need to be regraded and regraveled.	$200,000	2005
94238	Mower is used for dike and trail maintenance. The mower deck is needed to keep trails in a usable condition. This involves the removal of unwanted tree and brush.	$18,000	2005

Project Number	Project Description	Cost	Planned Funding Year
99433	Replace 1979 dump truck. The truck is used to move heavy equipment and to haul materials to maintenance and construction sites.	$90,000	2005
90106	Repair and resurface the employee parking area. The parking area is badly eroded and has a drainage problem.	$60,585	
97170	Replace non-compliant oil storage building at the maintenance shop. The building does not meet federal and state standards for oil storage. A re-placement building is needed.	$7,000	
90116	Replace deteriorated culverts at various locations. The culverts are needed to move water through the Refuge and under roadways to prevent overtopping and erosion. This will protect structures and habitat.	$48,405	
90105	Repair erosion on Pool 4 dikes. The dikes are needed to provide water level management. Water management is needed to control woody vegetation and to enhance desirable habitat.	$309,750	
90119	Rehabilitate Houlihan Road farm drainage pump 1. The pump is needed to drain flood waters from agricultural fields. These fields provide a valuable food source for migrating birds and resident species.	$24,150	
92202	Replace worn-out Dodge W250 4x4 fire truck. The truck is used for fire suppression activities and on prescribed burns.	$34,650	
94237	Repair deficiences at the maintenance shop. Repair small items which, if left unattended, will cause bigger problems in the future. Roof replacement is the largest component of this project.	$30,000	
95429	Replace deteriorated storage building. The building is needed to store heavy equipment and materials indoors, secure from vandals and the weather.	$63,000	

Project Number	Project Description	Cost	Planned Funding Year
97167	Replace worn-out Case 580C backhoe. The present backhoe is getting beyond repair because of its age and condition.	$73,500	
90102	Rehabilitate Hart Marsh dikes. Repairs to the dikes are needed to allow continued management of the marsh. Water management is needed to control woody vegetation and to enhance desirable habitat.	$309,750	
90117	Replace deteriorated pump station in the Trinklein Unit. The pump station is needed to manage water levels for habitat management. This unit is an important resource along the Shiawassee River.	$54,495	
90118	Repair worn-out moist soil pump station 2. The pump station is needed to manage water levels for habitat management. This area along the Shiawassee River is heavily used by migratory birds.	$60,585	
92195	Replace worn-out 16-ton flat bed trailer. Loading ramps and electric breaks do not function properly. The trailer is needed to transport heavy equipment to various areas on the Refuge for maintenance projects.	$48,405	
92197	Replace worn-out JD440 tractor. The tractor is used for maintaining moist soil units and mowing trails and roadways.	$98,175	
90120	Repair Houlihan Road farm drainage pump 2. The pump is needed to drain flood waters from agricultural fields. These fields provide a valuable food resource for migrating birds and resident species.	$24,150	
97163	Repair eroded Pool 2 dike. Work will include embankment material, reshaping, and slope protection. The Pool 2 dike is needed to allow water management of a shallow pool that provides sanctuary for migratory birds along the Shiawassee River.	$147,830	

Appendix D: Compatibility Determinations

COMPATIBILITY DETERMINATION

Use: Hunting

Refuge Name: Shiawassee National Wildlife Refuge

Establishing and Acquisition Authority (ies): Established Oct. 21, 1953

Shiawassee National Wildlife Refuge was established as part of a dedicated wildlife area in the flood plain area of central Saginaw County. The area consisted of two units, the Shiawassee National Wildlife Refuge administered by the U.S. Fish and Wildlife Service and the Shiawassee River State Game Area administered by the Michigan Department of Natural Resources. Establishment of the Shiawassee Project was authorized by the Migratory Bird Conservation Commission in May of 1953.

Federal acquisition authorities used to acquire the federal portion of the dedicated wildlife area were the:

> Migratory Bird Conservation Act (16 U.S.C. , 714-714r)
> Refuge Recreation Act (16 U.S.C. , 460k-460k-4)

Funds for acquiring the Federal lands were primarily derived from Federal duck stamp sales. The state lands were acquired from Pittman-Robertson Act funds supplemented by state hunting license receipts.

Refuge Purpose(s): Shiawassee National Wildlife Refuge was established under the dual authorities listed above with the following purposes:

> ... for use as an inviolate sanctuary, or any other management purpose, for migratory birds."
>
> ... suitable for (1) incidental fish and wildlife oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered or threatened species...."

National Wildlife Refuge System Mission: The National Wildlife Refuge System mission is to administer a national network of lands and waters for the conservation, management and, where appropriate, restoration of the fish, wildlife and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

Description of Use:

What is the use? Hunting of waterfowl and deer.

Where is the use conducted? Waterfowl hunting occurs along the periphery of the Refuge with 80 percent of the core acreage undisturbed. Waterfowl hunting may occur in newly acquired lands. The core acreage will remain undisturbed. Deer hunting may occur throughout the present Refuge and may be extended to acquired lands within the approved boundaries.

When is the use conducted? The use occurs during the fall and winter.

How is the use conducted? A master hunting plan describes when, where, and how we conduct our hunts. In addition, each year annual plans are submitted, reviewed, and approved with any changes to the program. All hunting activities are planned and operated with the Refuge's primary objectives, habitat management requirements, and goals as the guiding principles. All hunting activities follow applicable state laws, except where the Refuge administers further restrictions to ensure compatibility with the Refuge's primary mission. Hunting activities can only occur in designated areas listed in the hunter's permit and under the restrictions outlined in the same permit. Completing this activity under a hunting plan and special permits allows the Refuge to accomplish its management goals and provide needed safety levels for citizens of the area without adversely affecting Refuge habitats and wildlife populations.

Availability of Resources: Funds are available for managing this activity. Approximately $18,725 of staff time is required to administer and manage this activity. We estimate that an additional $1,000 is required for overhead expenses for a total estimated cost of $19,725 to administer the program. With $13,000 to $15,000 returned to the Refuge through user fees, final cost to the Refuge to administer these programs is $3,725 to $5,725. Based on a review of the Refuge budget allocated for this management activity, there is adequate funding to ensure compatibility and to administer and manage the use.

Anticipated Impacts Of Use: Continuing this activity has shown no assessable environmental impact to the Refuge, its habitats, or wildlife species. Concerns primarily center around the possibility of impacting threatened and other sensitive non-target species through excessive disturbance. With restrictions limiting access to specific locations, by motor boats along river channels, and non-motorized vehicles in other areas, disturbance is minimized. Disturbance to wildlife is limited to occasional flushing of non-target species and the harvest of individual members of the species open to the hunting season in the periphery areas only. Restrictions to the hunting program assure that these activities have no adverse impacts on other wildlife species and little adverse impact to other public use programs. The activities follow all applicable laws, regulations and policies; including Migratory Bird Conservation Act, 50 CFR, National Wildlife Refuge System Manual, National Wildlife Refuge System goals and objectives, and Shiawassee NWR goals and objectives. These activities are compliant with the purpose of the Refuge and the National Wildlife Refuge System Mission. Operating this activity does not alter the Refuge's ability to meet habitat goals, provides for the safety of local citizens, and supports several of the primary objectives of the Refuge.

Hunting is a priority public use listed in the National Wildlife Refuge System Improvement Act. By facilitating this use on the Refuge, we will increase visitors' knowledge and appreciation of wildlife, which will lead to increased public stewardship of wildlife and their habitats at the Refuge and in general. Increased public stewardship will support and complement the

Service's actions in achieving the Refuge's purposes and the mission of the National Wildlife Refuge System. In addition, deer hunting is necessary to meet the Refuge's habitat objectives and prevent adverse impacts to other wildlife species.

Public Review And Comment: This compatibility determination was part of the Draft Shiawassee National Wildlife Refuge Comprehensive Conservation Plan and Environmental Assessment, which was announced in the Federal Register and available for public comment for 30 days.

Determination (*check one below*):

_____Use is Not Compatible

___X__ Use is Compatible With the Following Stipulations

Stipulations Necessary To Ensure Compatibility: To ensure compatibility with National Wildlife Refuge System and Shiawassee NWR goals and objectives the activity can only occur under the following stipulations:

1. Ensure waterfowl hunting is limited to a maximum of 25 percent of all Refuge acreage and located in the periphery areas along the boundary of the Refuge.
2. All other hunting activities can only occur under a limited permit system to ensure disturbance to non-target species is minimized and activities are operated in a safe manner for the area's residents.
3. Annually review all hunting activities and operations to ensure compliance with all applicable laws, regulations and policies.
4. For acquired lands, legal access must exist for the public, all safety concerns must be addressed, and habitat must be appropriate for the game to be hunted.

Justification:

Waterfowl and deer hunting are compatible uses at Shiawassee National Wildlife Refuge. This determination was made as part of the environmental assessment associated with the comprehensive conservation planning process.

Signature: Refuge Manager: s/Douglas G. Spencer August 15, 2001
(signature and date)

Concurrence: Regional Chief: s/Tom Worthington (Acting) August 27, 2001
(signature and date)

Mandatory 10- or 15-year Re-evaluation Date: 2016

COMPATIBILITY DETERMINATION

Use: Fishing

Refuge Name: Shiawassee National Wildlife Refuge

Establishing and Acquisition Authority(ies): Established on Oct. 21, 1953

Shiawassee National Wildlife Refuge was established as part of a dedicated wildlife area in the flood plain area of central Saginaw County. The area consisted of two units, the Shiawassee National Wildlife Refuge administered by the U.S. Fish and Wildlife Service and the Shiawassee River State Game Area administered by the Michigan Department of Natural Resources. Establishment of the Shiawassee Project was authorized by the Migratory Bird Conservation Commission in May of 1953.

Federal acquisition authorities used to acquire the federal portion of the dedicated wildlife area were the:

> Migratory Bird Conservation Act (16 U.S.C. , 714-714r)
> Refuge Recreation Act (16 U.S.C. , 460k-460k-4)

Funds for acquiring the Federal lands were primarily derived from Federal duck stamp sales. The state lands were acquired from Pittman-Robertson Act funds supplemented by state hunting license receipts.

Refuge Purpose(s): Shiawassee National Wildlife Refuge was established under the dual authorities listed above with the following purposes:

> ... for use as an inviolate sanctuary, or any other management purpose, for migratory birds."
>
> ... suitable for (1) incidental fish and wildlife oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered or threatened species...."

National Wildlife Refuge System Mission: The National Wildlife Refuge System mission is to administer a national network of lands and waters for the conservation, management and, where appropriate, restoration of the fish, wildlife and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

Description Of Use:

What is the use? Fishing

Where is the use conducted? Fishing is restricted to access along river channels. Most locations are limited to boat access; bank fishing along the river channels is permitted only in areas designated in the Comprehensive Conservation Plan. Fishing will be allowed on newly acquired lands that have legal public access, have historically provided public bank fishing, and can be safely fished without harm to the anglers and habitat. The Comprehensive Conservation Plan calls for establishing boat launch facilities. The boat

launches will facilitate access to the rivers of the Refuge and enhance fishing, wildlife observation, and photography opportunities.

When is the use conducted? The use occurs throughout the year according to State regulations.

How is the use conducted? A step-down fishing plan and the Refuge's Comprehensive Conservation Plan describe when, where, and how fishing is conducted. All fishing activities are planned and operated with the Refuge's primary objectives, habitat management requirements, and goals as the guiding principles. All fishing activities follow applicable state laws, except where the Refuge administers further restrictions to ensure compatibility with the Refuge's primary mission. Fishing is restricted to areas along river channels. Most locations are limited to boat access; bank fishing along the river channels is permitted only in areas designated in the Comprehensive Conservation Plan. Fishing under the above restrictions allows the Refuge to accomplish its management goals and provide for the safety of visitors.

Availability of Resources: Approximately $700 of staff time is required to administer and manage this activity. Overhead expenses associated with bank fishing are estimated to be $10,000 for a total estimated cost of $10,700. Overhead expenses associated with the development of boat launch facilities are estimated to be $250,000. Based on a review of the Refuge budget allocated for these activities, there is currently not enough funding to ensure compatibility and to administer and manage the use. This activity will only be permitted after funding sources have been identified to cover the overhead cost for the program.

Anticipated Impacts Of The Use: Fishing has shown no assessable environmental impact to the Refuge, its habitats, or wildlife species. Concerns primarily center around the possibility of impacting threatened and other sensitive non-target species through excessive disturbance. With restrictions limiting access to specific locations such as motor boats along river channels and walk-in trails to specific bank fishing sites in other areas, disturbance is minimized. Disturbance to wildlife is limited to occasional flushing of non-target species and the harvest of individual members of the species open to the recreational fishing. Restrictions on the size and operation of the boat launch facilities will assure minimal impacts on aesthetics on the river and disturbance to wildlife and other public use activities. Harvests are regulated to take only surplus specimens, thus assuring viable, healthy populations within management and habitat guidelines. Restrictions to the fishing program assure that these activities have no adverse impacts on other wildlife species and little adverse impact on other public use programs. The activities follow all applicable laws, regulations and policies; including Migratory Bird Conservation Act, 50 CFR, National Wildlife Refuge System Manual, National Wildlife Refuge System goals and objectives, and Shiawassee NWR goals and objectives. These activities are compliant with the purpose of the Refuge and the National Wildlife Refuge System Mission. Operating this activity does not alter the Refuge's ability to meet habitat goals and it helps support several of the primary objectives of the Refuge.

Fishing is a priority public use listed in the National Wildlife Refuge System Improvement Act. By facilitating this use on the Refuge, we will increase visitors' knowledge and appreciation of fish and wildlife, which will lead to increased public stewardship of fish and wildlife and their habitats at the Refuge and in general. Increased public stewardship will support and complement the Service's actions in achieving the Refuge's purposes and the mission of the National Wildlife Refuge System.

Public Review And Comment: This compatibility determination was part of the Draft Shiawassee National Wildlife Refuge Comprehensive Conservation Plan and Environmental Assessment, which was announced in the Federal Register and available for public comment for 30 days.

Determination (*Check one below*):

_____Use is Not Compatible

__X__Use is Compatible With the Following Stipulations

Stipulations Necessary To Ensure Compatibility: To ensure compatibility with National Wildlife Refuge System and Shiawassee NWR goals and objectives fishing can only occur under the following stipulations:

1. Fishing is permitted only in designated locations using specific routes for access, which will ensure minimal disturbance to wildlife and minimal impacts to their habitats.
2. All fishing activities and boat launch facilities are operated under state laws unless we place further restrictions on the activities to ensure compliance with all applicable laws, regulations and policies.
3. Boat launch facilities can only be constructed in designated locations using specific designs that follow Federal and state engineering plans.

Justification:

Fishing is a compatible use at Shiawassee National Wildlife Refuge. This determination was made as part of the environmental assessment associated with the comprehensive conservation planning process.

Signature: Refuge Manager: s/Douglas G. Spencer August 15, 2001
(signature and date)

Concurrence: Refuge Chief: s/Tom Worthington (Acting) August 27, 2001
(signature and date)

Mandatory 10- or 15-year Re-evaluation Date: 2016

COMPATIBILITY DETERMINATION

Use: Wildlife Observation and Photography

Refuge Name: Shiawassee National Wildlife Refuge

Establishing and Acquisition Authority(ies): Established on Oct. 21, 1953

Shiawassee National Wildlife Refuge was established as part of a dedicated wildlife area in the flood plain area of central Saginaw County. The area consisted of two units, the Shiawassee National Wildlife Refuge administered by the U.S. Fish and Wildlife Service and the Shiawassee River State Game Area administered by the Michigan Department of Natural Resources. Establishment of the Shiawassee Project was authorized by the Migratory Bird Conservation Commission in May of 1953.

Federal acquisition authorities used to acquire the federal portion of the dedicated wildlife area were the:

> Migratory Bird Conservation Act (16 U.S.C. , 714-714r)
> Refuge Recreation Act (16 U.S.C. , 460k-460k-4)

Funds for acquiring the Federal lands were primarily derived from Federal duck stamp sales. The state lands were acquired from Pittman-Robertson Act funds supplemented by state hunting license receipts.

Refuge Purpose(s): Shiawassee National Wildlife Refuge was established under the dual authorities listed above with the following purposes:

> ... for use as an inviolate sanctuary, or any other management purpose, for migratory birds."
>
> ... suitable for (1) incidental fish and wildlife oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered or threatened species...."

National Wildlife Refuge System Mission: The National Wildlife Refuge System mission is to administer a national network of lands and waters for the conservation, management and, where appropriate, restoration of the fish, wildlife and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

Description of Use:

What is the use? Wildlife observation and photography

Where is the use conducted? Currently, wildlife observation and photography occurs along and near trails of the Refuge and at observation towers and decks. One September weekend a year an auto tour route is opened to the public. The CCP calls for extending the Woodland Trail along the Tittabawassee River and developing a new trail along the Cass River. The CCP also call for developing an auto tour route along existing Refuge roads.

The proposed Great Lakes Discovery Center in Bridgeport will also provide additional trails and auto tour.

When is the use conducted? The use occurs year-round and is dependent on access.

How is the use conducted? Access for wildlife observation and photography is gained through hiking, bicycling, and cross-country skiing on designated trails and by automobile on a designated tour route. Bicyclers are encouraged not to ride their bicycles on the trails at Green Point Environmental Learning Center due to potential conflicts with educational activities. The new auto tour route will be open during designated hours from late spring through summer, depending on wildlife use and road conditions.

Availability of Resources: Based on a review of the Refuge budget allocated for this activity, there is adequate funding to ensure compatibility and to administer and manage the use at its current level. Approximately $2,500 of staff time and $500 of overhead is required to administer this use. Expanding the trail system has been submitted for funding within the Refuge Operating Needs System–$95,000 for development and $8,000 for annual maintenance. Establishing the auto tour route has been submitted for funding within the Refuge Operating Needs System–$170,000 for development and $10,000 for annual maintenance. We anticipate that $1,300 of additional staff time and $500 of additional overhead will be required to manage the expanded trails and auto tour.

Anticipated Impacts of Use: Anticipated impacts from visitors engaged in wildlife observation and photography are minor damage to vegetation, littering, increased maintenance activity, potential conflicts with other visitors, and minor disturbances to wildlife. Because visitors are limited to designated trail access and time limitations may be imposed, wildlife observation and photography has only minor impacts on wildlife and does not detract from the primary purposes of the Refuge. All other potential impacts are considered minor.

Wildlife observation and photography are priority public uses listed in the National Wildlife Refuge System Improvement Act. By facilitating these uses on the Refuge, we will increase visitors' knowledge and appreciation of fish and wildlife, which will lead to increased public stewardship of wildlife and their habitats at the Refuge and in general. Increased public stewardship will support and complement the Service's actions in achieving the Refuge's purposes and the mission of the National Wildlife Refuge System.

Public Review And Comment: This compatibility determination was part of the Draft Shiawassee National Wildlife Refuge Comprehensive Conservation Plan and Environmental Assessment, which was announced in the Federal Register and available for public comment for 30 days.

Determination (*Check one below*):

_____Use is Not Compatible

__X__ Use is Compatible With the Following Stipulations

Stipulations Necessary To Ensure Compatibility:

Public access for wildlife observation and photography will be limited to designated areas and with time restrictions to assure minimal disturbance to wildlife and minimal conflict between user groups. Wildlife observation and photography activities will be reviewed annually to ensure this compatibility determination still applies.

Justification:

Wildlife observation and photography is a compatible use at Shiawassee National Wildlife Refuge. This determination was made as part of the environmental assessment associated with the comprehensive conservation planning process.

Signature: Refuge Manager: s/Douglas G. Spencer August 15, 2001
(signature and date)

Concurrence: Regional Chief: s/Tom Worthington (Acting) August 27, 2001
(signature and date)

Mandatory 10- or 15-year Re-evaluation Date: 2016

COMPATIBILITY DETERMINATION

Use: Environmental Education and Interpretation

Refuge Name: Shiawassee National Wildlife Refuge

Establishing and Acquisition Authority(ies): Established on Oct. 21, 1953

Shiawassee National Wildlife Refuge was established as part of a dedicated wildlife area in the flood plain area of central Saginaw County. The area consisted of two units, the Shiawassee National Wildlife Refuge administered by the U.S. Fish and Wildlife Service and the Shiawassee River State Game Area administered by the Michigan Department of Natural Resources. Establishment of the Shiawassee Project was authorized by the Migratory Bird Conservation Commission in May of 1953.

Federal acquisition authorities used to acquire the federal portion of the dedicated wildlife area were the:

> Migratory Bird Conservation Act (16 U.S.C. , 714-714r)
> Refuge Recreation Act (16 U.S.C. , 460k-460k-4)

Funds for acquiring the Federal lands were primarily derived from Federal duck stamp sales. The state lands were acquired from Pittman-Robertson Act funds supplemented by state hunting license receipts.

Refuge Purpose(s): Shiawassee National Wildlife Refuge was established under the dual authorities listed above with the following purposes:

> ... for use as an inviolate sanctuary, or any other management purpose, for migratory birds."
>
> ... suitable for (1) incidental fish and wildlife oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered or threatened species...."

National Wildlife Refuge System Mission: The National Wildlife Refuge System mission is to administer a national network of lands and waters for the conservation, management and, where appropriate, restoration of the fish, wildlife and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

Description of Use:

What is the use? Environmental education consists of activities conducted by Refuge staff, volunteers, and teachers. Interpretation occurs in less formal activities with Refuge staff and volunteers or through exhibits, signs, and brochures.

Where is the use conducted? Currently, environmental education and interpretation are conducted at the Green Point Environmental Learning Center and along and near trails of the Refuge. The CCP calls for establishing an

environmental education site nearer the core of the Refuge. The facilities at the site will consist of restrooms, shelter, and picnic tables. These facilities will permit school groups to maximize their time at the Refuge in environmental education activities during a limited school day. The proposed Great Lakes Discovery Center in Bridgeport will also provide additional facilities for environmental education and interpretation. The remainder of the Refuge serves as a sanctuary for wildlife.

When is the use conducted? The use occurs year-round with peak use in the spring and fall for environmental education.

How is the use conducted? Environmental education activities on the Refuge are led by Refuge staff, volunteers, or teachers, who have been oriented to appropriate use on the Refuge. Students are guided through their activities with adult supervision. Interpretive programs are led by Refuge staff and volunteers. Interpretive materials are developed and placed by Refuge staff.

Availability of Resources: Based on a review of the Refuge budget allocated for this activity, there is adequate funding to ensure compatibility and to administer and manage the use at its current level. Approximately $34,000 of staff time and $6,000 of overhead is required to administer this use. Reestablishing the environmental education site in the core of the Refuge has been submitted for funding within the Refuge Operating Needs System--$55,000 for development and $5,000 for annual maintenance. Expanding environmental education and interpretation at Green Point Environmental Learning Center will cost approximately $520,000, which will be covered by the Natural Resource Damage Assessment award as outlined in the CCP.

Anticipated Impacts of Use: Anticipated impacts from environmental education and interpretation are minor damage to vegetation, littering, possible conflict with other users, and increased maintenance activity. Minor disturbances to wildlife were considered during planning. Space and time limitations placed on environmental education and interpretation assure that this activity has only minor impacts on wildlife and does not detract from the primary purposes of the Refuge.

Environmental education is a priority public use listed in the National Wildlife Refuge System Improvement Act. By facilitating environmental education on the Refuge, we will increase knowledge and appreciation of fish and wildlife among program participants, which will lead to increased public stewardship of wildlife and their habitats at the Refuge and in general. Increased public stewardship will support and complement the Service's actions in achieving the Refuge's purposes and the mission of the National Wildlife Refuge System.

Public Review And Comment: This compatibility determination was part of the Draft Shiawassee National Wildlife Refuge Comprehensive Conservation Plan and Environmental Assessment, which was announced in the Federal Register and available for public comment for 30 days.

Determination (*check one below*):

_____Use is Not Compatible

__X__ Use is Compatible With the Following Stipulations

Stipulations Necessary To Ensure Compatibility:

Environmental education will only occur in developed areas designated by the CCP or under the guidance of a Refuge staff member, volunteer, or trained teacher to assure minimal disturbance to wildlife, minimal vegetation damage, and minimal conflict between user groups. Environmental education activities will be reviewed annually to ensure this compatibility determination still applies.

Justification:

Environmental education is a compatible use at Shiawassee National Wildlife Refuge. This determination was made as part of the environmental assessment associated with the comprehensive conservation planning process.

Signature: Refuge Manager: s/Douglas G. Spencer August 15, 2001
(signature and date)

Concurrence: Regional Chief: s/Tom Worthington (Acting) August 27, 2001
(signature and date)

Mandatory 10- or 15-year Re-evaluation Date: 2016

COMPATIBILITY DETERMINATION

Use: Permitted Archeological Investigations

Refuge Name: Shiawassee National Wildlife Refuge

Establishing and Acquisition Authority(ies): Established on Oct. 21, 1953

Shiawassee National Wildlife Refuge was established as part of a dedicated wildlife area in the flood plain area of central Saginaw County. The area consisted of two units, the Shiawassee National Wildlife Refuge administered by the U.S. Fish and Wildlife Service and the Shiawassee River State Game Area administered by the Michigan Department of Natural Resources. Establishment of the Shiawassee Project was authorized by the Migratory Bird Conservation Commission in May of 1953.

Federal acquisition authorities used to acquire the federal portion of the dedicated wildlife area were the:

> Migratory Bird Conservation Act (16 U.S.C. , 714-714r)
> Refuge Recreation Act (16 U.S.C. , 460k-460k-4)

Funds for acquiring the Federal lands were primarily derived from Federal duck stamp sales. The state lands were acquired from Pittman-Robertson Act funds supplemented by state hunting license receipts.

Refuge Purpose(s): Shiawassee National Wildlife Refuge was established under the dual authorities listed above with the following purposes:

> ... for use as an inviolate sanctuary, or any other management purpose, for migratory birds."
>
> ... suitable for (1) incidental fish and wildlife oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered or threatened species...."

National Wildlife Refuge System Mission: The National Wildlife Refuge System mission is to administer a national network of lands and waters for the conservation, management and, where appropriate, restoration of the fish, wildlife and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

Description of Use:

What is the use? Permitted Archeological Investigations--Permitted archeological investigations are those requested by archeologists who are not performing the investigation for Refuge management purposes (e.g., not for Section 106 of the National Historic Preservation Act).

Where is the use conducted? Permits can be for anyplace on FWS owned and managed lands, but each permit is for specific lands.

When is the use conducted? The use can occur throughout the year.

How is the use conducted? Archeologists request Archaeological Resources Protection Act (ARPA) permits or Antiquities Act permits to conduct "Surveys, limited testing and/or limited collections on lands identified" and "Excavation, collection and intensive study of specific sites described" on Refuge land. Permits are issued by the Regional Director to qualified archeologists when the Refuge Manager determines the investigation will not interfere with Refuge programs.

Availability of Resources: A small amount of staff time will be required infrequently to administer and manage this activity. There is no associated overhead expense. Based on a review of the Refuge budget, there is adequate funding to ensure compatibility and to administer and manage the use.

Anticipated Impacts of the Use: Permitted archeological investigations result in minimal impacts to habitat and wildlife resources. The ground disturbance, however, can be minimal for small scale surface surveys to extensively disruptive for large scale excavations.

The archeological investigations would be conducted in the public interest for which Federal agencies protect archeological sites; and the results may be included in public interpretive exhibits and other public dissemination. The results of the study could increase Refuge understanding of prior human activities on the Refuge and could be part of Refuge interpretive programs.

Public Review And Comment: This compatibility determination was part of the Draft Shiawassee National Wildlife Refuge Comprehensive Conservation Plan and Environmental Assessment, which was announced in the Federal Register and available for public comment for 30 days.

Determination (*check one below*):

_____Use is Not Compatible

__X__Use is Compatible With the Following Stipulations

Stipulations Necessary To Ensure Compatibility: Applicant must obtain a Special Use Permit issued by the Refuge Manager. No special stipulations are necessary to ensure compatibility. The Refuge Manager will issue a Special Use Permit that might have administrative or management stipulations.

Predetermined stipulations on ARPA/Antiquities permits and the requirements in 43 CFR Part 7, "Protection of Archaeological Resources: Uniform Regulations," require land restoration and other protective measures by archeologists.

Justification:

Permitted Archeological Investigations are a compatible use at Shiawassee National Wildlife Refuge. This determination was made as part of the environmental assessment associated with the comprehensive conservation planning process.

Signature: Refuge Manager: s/Douglas G. Spencer August 15, 2001
(signature and date)

Concurrence: Regional Chief: s/Tom Worthington (Acting) August 27, 2001
(signature and date)

Mandatory 10- to 15-year Re-evaluation Date: 2016

COMPATIBILITY DETERMINATION

Use: Farming

Refuge Name: Shiawassee National Wildlife Refuge

Establishing and Acquisition Authority(ies): Established on Oct. 21, 1953

Shiawassee National Wildlife Refuge was established as part of a dedicated wildlife area in the flood plain area of central Saginaw County. The area consisted of two units, the Shiawassee National Wildlife Refuge administered by the U.S. Fish and Wildlife Service and the Shiawassee River State Game Area administered by the Michigan Department of Natural Resources. Establishment of the Shiawassee Project was authorized by the Migratory Bird Conservation Commission in May of 1953.

Federal acquisition authorities used to acquire the federal portion of the dedicated wildlife area were the:

> Migratory Bird Conservation Act (16 U.S.C. , 714-714r)
> Refuge Recreation Act (16 U.S.C. , 460k-460k-4)

Funds for acquiring the Federal lands were primarily derived from Federal duck stamp sales. The state lands were acquired from Pittman-Robertson Act funds supplemented by state hunting license receipts.

Refuge Purpose(s): Shiawassee National Wildlife Refuge was established under the dual authorities listed above with the following purposes:

> ... for use as an inviolate sanctuary, or any other management purpose, for migratory birds."
>
> ... suitable for (1) incidental fish and wildlife oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered or threatened species...."

National Wildlife Refuge System Mission: The National Wildlife Refuge System mission is to administer a national network of lands and waters for the conservation, management and, where appropriate, restoration of the fish, wildlife and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

Description of Use:

What is the use? Farming

Where is the use conducted? Farming occurs on 1,182 acres in the Refuge. The location of the croplands are depicted in Figure 4.1 of the Comprehensive Conservation Plan.

When is the use conducted? The use occurs throughout the year.

How is the use conducted? Farming occurs under a cooperative agreement, which is reviewed and signed annually. The agreement requires the cooperator to provide all the necessary agricultural equipment, supplies, and manpower to raise and harvest designated crops. The Refuge provides only the land needed for the program and oversight in the administration and operation of the program. The Refuge receives 30 percent of the yield of the designated crops. Land tracts designated for farming, crop rotations, farming techniques, and special restrictions are detailed in the cooperative agreement and are guided by the habitat and wildlife needs of the Refuge.

Availability of Resources: Approximately $2,192.00 of staff time is required to administer and manage this activity. We estimate that an additional $300.00 is required for overhead costs, for a total estimated cost of $2,492.00. Based on a review of the Refuge budget, there is adequate funding to ensure compatibility and to administer and manage the use.

Anticipated Impacts of the Use: Continuing this activity has shown no assessable environmental impact to the Refuge, its habitats or wildlife species. The activity is currently compliant with the purpose of the Refuge and the National Wildlife Refuge System Mission. The activity follows all applicable laws, regulations and policies; including Migratory Bird Conservation Act, Refuge Recreation Act, 50 CFR, National Wildlife Refuge System Manual, National Wildlife Refuge System goals and objectives, and Shiawassee NWR goals and objectives. This land use activity is tied to Refuge objectives by providing for the maintenance of migratory waterfowl and offering recreational opportunities to the general public. The program is also used to periodically rejuvenate moist soil units, set back plant succession and prevent encroachment of invasive species in some units. Each participant in this program must sign a cooperative agreement which has progressively moved operations away from conventional styles to sustainable agriculture; more beneficial to the environment and wildlife. Examples include prohibiting the use of insecticides, crop rotations developed to reduce the insect and weed problems, the development of grass buffer strips to reduce runoff, use of legumes to increase soil fertility, special guidelines on fall plowing to reduce soil erosion, crop scouting to reduce the dependance on commercial herbicides and fertilizers, and using only pre-approved herbicides from the Refuge list found to be less toxic to non-target species, the environment, and wildlife. Operating this activity does not alter the Refuge's ability to meet habitat goals and objectives.

This program supports a number of Refuge goals and objectives. It supports a blend of habitat types in prime condition that emphasizes the primary mission of the Refuge – migratory waterfowl and their distribution objectives. It also contributes to the Service's mission of maintaining and restoring a optimum blend of nesting, feeding, and loafing habitats for migratory birds. Lastly, it assists in the Refuge efforts to provide a goose hunting program, a wildlife-dependent opportunity that encourages appreciation of wildlife and the Refuge. Farming under a cooperative agreement allows the Refuge to accomplish its management goals without overburdening the time and energy of our personnel.

Public Review And Comment: This compatibility determination was part of the Draft Shiawassee National Wildlife Refuge Comprehensive Conservation Plan and Environmental Assessment, which was announced in the Federal Register and available for public comment for 30 days.

Determination (*check one below*):

_____Use is Not Compatible

__X__Use is Compatible With the Following Stipulations

Stipulations Necessary To Ensure Compatibility:

To ensure compatibility with National Wildlife Refuge System and Shiawassee NWR goals and objectives the activity can only occur under the following stipulations:

1. Activities are to occur on no more than 1,182 acres of the Refuge each year and in areas designated under the agreement.
2. All operations are to be carried out under cooperative agreements encouraging sustainable agricultural practices.
3. Cooperative agreement guidelines are to be reviewed each year to ensure compatibility and the maximum benefit for wildlife using the Refuge.
4. Sellers will be given a 2-year option to continue to farm lands that are acquired within the expansion area. The 2-year option lands will not be included in the 1,182-acre total.
5. Cooperative farmers will be encouraged to move from the wet, core area of the Refuge to acquired lands only if the acquired lands meet the following conditions: the land is presently in crops; the cropland is more than 1,000 feet from any river channel; the cropland does not flood more than once a year; and the seller of the land has been given the option to farm the land for 2 years.

Justification:

Farming is a compatible use at Shiawassee National Wildlife Refuge. This determination was made as part of the environmental assessment associated with the comprehensive conservation planning process.

Signature: Refuge Manager: s/Douglas G. Spencer August 15, 2001
(signature and date)

Concurrence: Regional Chief: s/Tom Worthington (Acting) August 27, 2001
(signature and date)

Mandatory 10- or 15-year Re-evaluation Date: 2016

COMPATIBILITY DETERMINATION

Use: Firewood Cutting

Refuge Name: Shiawassee National Wildlife Refuge

Establishing and Acquisition Authority(ies): Established on Oct. 21, 1953

Shiawassee National Wildlife Refuge was established as part of a dedicated wildlife area in the flood plain area of central Saginaw County. The area consisted of two units, the Shiawassee National Wildlife Refuge administered by the U.S. Fish and Wildlife Service and the Shiawassee River State Game Area administered by the Michigan Department of Natural Resources. Establishment of the Shiawassee Project was authorized by the Migratory Bird Conservation Commission in May of 1953.

Federal acquisition authorities used to acquire the federal portion of the dedicated wildlife area were the:

> Migratory Bird Conservation Act (16 U.S.C. , 714-714r)
> Refuge Recreation Act (16 U.S.C. , 460k-460k-4)

Funds for acquiring the Federal lands were primarily derived from Federal duck stamp sales. The state lands were acquired from Pittman-Robertson Act funds supplemented by state hunting license receipts.

Refuge Purpose(s): Shiawassee National Wildlife Refuge was established under the dual authorities listed above with the following purposes:

> ... for use as an inviolate sanctuary, or any other management purpose, for migratory birds."
>
> ... suitable for (1) incidental fish and wildlife oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered or threatened species...."

National Wildlife Refuge System Mission: The National Wildlife Refuge System mission is to administer a national network of lands and waters for the conservation, management and, where appropriate, restoration of the fish, wildlife and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

Description of Use:

What is the use? Firewood Cutting

Where is the use conducted? This activity is usually restricted to brushing and trimming road edges, limbing individual trees, selective cutting of forested lands for habitat improvements, and removal of trees that create a safety hazard to the general public or Refuge staff.

When is the use conducted? The use occurs primarily in the winter when the ground is hard.

The use may be permitted in the summer during dry periods.

How is the use conducted? A special use permit specifies when, where, and how firewood cutting will be conducted. Firewood cutting occurs only in areas designated in the special use permit and when needed as a necessary habitat or maintenance function.

Availability of Resources: Approximately $116 of staff time is required to administer and manage this activity. There is no overhead expense associated with this activity. Based on a review of the Refuge budget, there is adequate funding to ensure compatibility and to administer and manage the use.

Anticipated Impacts of the Use: Continuing this activity would have no assessable environmental impact to the Refuge, its habitats or wildlife species. The activity is also compliant with the purpose of the Refuge and the National Wildlife Refuge System Mission. The activity follows all applicable laws, regulations and policies; including Migratory Bird Conservation Act, Refuge Recreation Act, 50 CFR, National Wildlife Refuge System Manual, National Wildlife Refuge System mission, and Shiawassee NWR goals and objectives.

Conducting firewood cutting under a special use permit allows the Refuge to reduce the time and energy burden on maintenance personnel, achieve needed facility maintenance, and meet habitat goals and objectives.

Public Review And Comment: This compatibility determination was part of the Draft Shiawassee National Wildlife Refuge Comprehensive Conservation Plan and Environmental Assessment, which was announced in the Federal Register and available for public comment for 30 days.

Determination (*check one below*):

_____Use is Not Compatible

__X__Use is Compatible With the Following Stipulations

Stipulations Necessary To Ensure Compatibility: To ensure compatibility with National Wildlife Refuge System and Shiawassee NWR goals and objectives firewood cutting can only occur under the following stipulations:

1. Activities are to occur only under a special use permit and in areas designated by the permit.
2. Activities can only occur when needed as a necessary habitat and facility maintenance function.

Justification:

Firewood cutting is a compatible use at Shiawassee National Wildlife Refuge. This determination was made as part of the environmental assessment associated with the comprehensive conservation planning process.

Signature: Refuge Manager: s/Douglas G. Spencer August 15, 2001
(signature and date)

Concurrence: Regional Chief: s/Tom Worthington (Acting) August 27, 2001
(signature and date)

Mandatory 10- or 15-year Re-evaluation Date: 2016

Appendix E: Species List

Flora of Shiawassee National Wildlife Refuge

Documented list revised May 2001

Aceraceae: **Maple Family**

Acer negunda L. – Box Elder
Acer rubrum L. – Red Maple
Acer saccharinum L. – Silver Maple

Alismataceae: **Water-plantain Family**

Alisma plantago-aquatica L. – Water-plantain

Amaranthaceae: **Amaranth Family**

Amaranthus tuberculatus (Moq.) Sauer – Amaranth sp.

Anacardiaceae: **Cashew Family**

Rhus typhina L. – Staghorn Sumac
Toxicodendron radicans (L.) Kuntze – Poison Ivy

Apocynaceae: **Dogbane Family**

Apocynum androsaemifolium L. – Spreading Dogbane
Apocynum cannabinum L. – Indian Hemp

Araceae: **Arum Family**

Arisaema dracontium (L.) Schott – Green Dragon
Arisaema triphyllum L. – Jack-In-the-Pulpit
Peltandra virginica L. – Arrow-arum

Aristolochiaceae: **Birthwort Family**

Asarum canadense L. –Wild Ginger

Asclepiadaceae: **Milkweed Family**

Asclepias incarnata L. – Swamp Milkweed
Asclepias syriaca L. – Common Milkweed

Balsaminaceae: **Touch-me-not Family**

Impatiens capensis Meerb. – Spotted Jewelweed

Berberidaceae: **Barberry Family**

Berberis thunbergii DC. – Japanese Barberry
Podophyllum peltatum L. May – Apple

Betulaceae: **Birch Family**

Betula papyrifera Marsh – Paper, River or Canoe Birch
Carpinus caroliniana Walter Hornbeam; Blue beech, Musclewood

Campanulaceae: **Bellflower Family**

Campanula americana L. – Tall Bellflower
Lobelia cardinalis L. – Cardinal flower
Lobelia siphilitica L. – Great Blue Lobelia

Caprifoliaceae: **Honeysuckle Family**

Lonicera tatarica L. – Tartarian Honeysuckle
Sambucus canadensis L. – Common Elderberry
Viburnum lentago L. – Nannyberry
Viburnum opulus L. – Guelder-rose, High-bush Cranberry

Caryophyllaceae: **Pink Family**

Dianthus armeria L. – Deptford Pink
Silene vulgaris Moench Garcke – Bladder-Campion

Celastraceae: **Bittersweet Family**

Euonymus atropurpurea Jacq. – Eastern Wahoo, Burning Bush

Chenopodiaceae: **Goosefoot Family**

Chenopodium album L. – Lamb's-Quarters, "Pigweed"

Compositae (Asteraceae): **Aster or Daisy Family**

Achillea millefolium L. – Common Yarrow
Anthemis cotula L. – Mayweed: Dog fennel; Stinking Chamomile
Ambrosia artemisiifolia L. – Common Ragweed
Arctium minus Bernh. – Common Burdock
Aster ericoides L. – White Prairie Aster
Aster macrophyllus L. – Large-leaved Aster
Aster novae-angliae L. – New England Aster
Bidens cemua L. – Bur Marigold
Bidens comosus (Gray)Wiegand – Beggartick sp.
Bidens vulgatus f. puberula (Wiegand) – Beggartick sp.
Chrysanthemum leucanthemum L. – Ox-Eye Daisy
Cirsium arvense L. – Canada Thistle
Cichorium intybus L. – Chicory, Blue-sailors
Cirsium vulgare (Savi)Tenore – Bull Thistle
Conyza canadensis (L.) Cronquist – Horseweed
Erigeron strigosus Willd. – Fleabane
Eupatorium maculatum L. – Joe-Pye Weed
Eupatorium rugosum Houtt. – White Snakeroot
Gnaphalium uliginosum L. – Low Cudweed
Helenium autumnale L. – Sneezeweed
Hieracium aurantiacum L. – Orange Hawkweed
Hieracium kieracium piloselloides Vill.– Smoothish Hawkweed; King Devil; Yellow Hawkweed
Lactuca scariola L. – Prickly Lettuce
Matricaria discoidea DC. – Pineapple-weed
Rudbeckia hirta L. – Black-eyed Susan
Solidago canadensis L. – Canada Goldenrod
Euthamia graminifolia (L.) Nutt – Flat-topped, Bushy or Grass-leaved Goldenrod
Sonchus oleraceus L. – Common Sow-Thistle
Taraxacum officinale Wiggers – Common Dandelion
Tragopogon pratensis L. – Goats-Beard
Vernonia gigantea (Walter) – Ironweed
Xanthium strumarium – Cocklebur

Convolvulaceae: **Morning-glory Family**

Convolvulus arvensis L. – Field-Bindweed
Calystegia sepium L. – Hedge Bindweed

Cornaceae: **Dogwood Family**

Cornus alternifolia – Alternate-leaved Dogwood; Pagoda Dogwood
Cornus foemina ssp. racemosa Lam. – Gray Dogwood
Cornus stolonifera Michx. – Red-osier Dogwood

Corylaceae

Carpinus caroliniana Walt. – Ironwood

Cruciferae: **Mustard Family**

Alliaria petiolata (Bieb,)Cavara&Grande – Garlic Mustard
Barbarea vulgaris R.Br. – Common Wintercress; Yellow Rocket
Capsella bursa-pastoris L. – Shepherd's-purse
Cardamine bulbosa (Muhl.)BSP – Spring Cress
Cardamine douglassii Britton – Pink Spring Cress

Erucastrum gallicum Willd. – Dog Mustard
Erysimum cheiranthoides L. – Wormseed Mustard
Rorippa palustris L. – Mustard sp.; Yellow Cress

Cucurbitaceae: **Gourd Family**
Echinocystis lobata (Michx)T.&G. – Wild Cucumber

Cuscutaceae: **Dodder Family**
Cuscuta gronovii Schultes – Common or Swamp Dodder

Cyperaceae: **Sedge Family**
Carex annectens Bickn. – Sedge sp.
Carex brunnescens (Pers.)Poiret – Sedge sp.
Carex intumenscens Rudge – Sedge sp.
Carex granularis Willd. – Meadow Sedge
Carex muskingumensis Schw. – Sedge sp.
Carex lupulina Willd. – Hop Sedge
Carex tenera Dewey. – Sedge sp.
Cyperus diandrus Torrey – Low Flatsedge
Cyperous erythrorhizos Muhl. – Red-Rooted Flatsedge
Cyperus esculentus L. – Yellow Nutsedge
Cyperus strigosus L. – Straw-colored Nutsedge
Scirpus americanus Pers. – Threesquare
Scirpus atrovirens Willd. – Bulrush sp.
Scirpus fluviatilis Torr. – River Bulrush
Scirpus validus Vahl – Softstem Bulrush

Dioscoreaceae: **Yam Family**
Dioscorea villosa L. – Wild Yam

Dipsacaceae: **Teasel Family**
Dipsacus fullonum L. – Wild Teasel

Equisetaceae: **Horsetail Family**
Equisetum arvense L. – Field Horsetail
Equisetum hiemale L. – Common Scouring Rush

Euphorbiaceae: **Spurge Family**
Euphorbia nutans Lag. – Spurge Sp.

Fagaceae: **Beech Family**
Fagus grandifolia Ehrh. – Beech
Quercus alba L. – White Oak
Quercus macrocarpa Michx. – Bur Oak
Quercus rubra L. – Red Oak

Geraniaceae: **Geranium Family**
Geranium maculatum L. – Wild Geranium

Gentianaceae: **Gentian Family**
Gentiana andrewsii Griseb. – Closed or Bottle Gentian

Gramineae: **Grass Family**
Agrostis gigantea Roth. – Redtop
Bromus japonicus Murray – Japanese Brome
Echinochloa muricata (Beauv.)Fern. – Wild Millet
Elymus virginicus L. – Virginia Rye
Eragrostis hypnoides (Lam.)BSP. – Love Grass
Hordeum jubatum L. – Squirrel-tail Grass
Leersia Oryzoides (L.)Sw. – Rice Cutgrass
Leersia virginica Willd. – White Grass
Muhlenbergia frondosa f.*commutata* (Scribner)Fern. – Muhly Grass
Panicum clandestinum L. – Deer Tongue Grass or Corn Grass

Panicum dichotomiflorum Michaux – Spreading Witch-grass
Panicum virgatum L. – Switchgrass
Phalaris arundinacea L. – Reed Canary Grass
Phragmites australis (Cav.) Steudel – Common Reed
Setaria faberi Herrm. – Giant Foxtail
Setaria glauca (L.)Beauv. –Yellow Foxtail
Spartina pectinata Link – Freshwater (prairie) Cordgrass

Hydrocharitaceae: **Frog's-bit Family**

Elodea nuttallii (Planchon) St.John – Waterweed; Elodea

Iridaceae: **Iris Family**

Iris pseudacorus L. – Yellow Flag
Iris virginica L. – Southern Blue Flag

Juncaceae: **Rush Family**

Juncus dudleyi Wieg – Dudley's Rush

Juglandaceae: **Walnut Family**

Carya cordiformis (Wang) K.Koch – Bitternut Hickory
Carya laciniosa Michx. G. Don – Shellbark Hickory
Carya ovata (Miller) K.Koch – Shagbark Hickory
Juglans nigra L. – Black Walnut

Labiatae: **Mint Family**

Glechoma hederacea – Ground Ivy; Gilt-over-the-ground; Creeping Charlie
Leonurus cardiaca L. – Motherwort
Lycopus americanus Muhl. – Water-Horehound
Lycopus virginicus L. – Bugleweed
Mentha arvensis L. –Wild Mint
Monarda fistulosa L. – Wild Bergamont
Nepeta cataria L. – Catnip; Catmint
Physostegia virginiana (L.)Benth. – False Dragonhead; Obedient Plant
Prunella vulgaris L. – Self-heal; Heal-all
Scutellaria galericulata – Marsh Skullcap
Scutellaria lateriflora L. – Mad-dog Skullcap
Stachys hispida Pursh. – Hedge Nettle sp.
Stachys tenuifolia Willd. – Hedge Nettle sp.
Teucrium canadense L. – Wood-Sage, Germander

Lauraceae: **Laurel Family**

Lindera benzoin (L.)Blume – Spicebush

Leguminosae: **Pea Family**

Apios americana Medicus – Groundnut: Wild-bean; Indian-potato
Coronilla varia L. – Crown Vetch
Lathyrus sylvestris L. – Perennial or Everlasting Pea
Lotus corniculata L. – Birdfoot Trefoil
Medicago lupulina L. – Black Medick
Melilotus alba Medicus – White Sweet-Clover
Melilotus officinalis L. – Yellow Sweet-Clover
Trifolium pratense L. – Red Clover

Lemnaceae: **Duckweed Family**

Lemna minor L. – Lesser Duckweed
Lemna trisulca L. – Star Duckweed
Spirodela polyrhiza (L.) Schleiden – Greater Duckweed

Liliaceae: **Lily Family**

Asparagus officinalis L. – Garden Asparagus
Erythronium americana Ker – Trout-Lily, Adder's-Tongue; Dog tooth-violet
Lilium michiganense Farw. – Michigan Lily
Smilacina stellata (L.)Desf. – Starry False Solomon-Seal
Trillium grandiflorum (Michuax) Salisb – Common Trillium

Lythraceae: **Loosestrife Family**

Ammannia robusta Heer&Regel – Ammannia
Lythrum alatum Pursh – Winged Lythrum; Wing-angled Loosestrife
Lythrum salicaria L. – Purple Loosestrife

Malvaceae: **Mallow Family**

Abutilon theophrasti Medicus – Velvet Leaf
Hibiscus trionum L. – Flower-of-an-hour

Menispermaceae: **Moonseed Family**

Menispermum canadense L. – Moonseed

Moraceae: **Mulberry Family**

Morus alba L. – Russian Mulberry or White Mulberry
Morus rubra L. – Red Mulberry

Nymphaeaceae: **Water-lily Family**

Nuphar variegata Durand – Spatterdock; Yellow Pondlily
Nymphaea odorata Arlon – Sweet-scented White Water Lily; Water Nymph

Oleaceae: **Olive Family**

Fraxinus pennsylvanica var. *subintegerrima* (Vahl)Fern. – Green Ash or Red Ash
Fraxinus americana L. – White Ash

Onagraceae: **Evening Primrose Family**

Oenothera biennis L. – Common Evening Primrose

Osmundaceae: **Royal Fern Family**

Osmunda regalis L. – Royal Fern

Oxalidaceae: **Oxalis or Wood-sorrel Family**

Oxalis fontana Bunge – Wood-Sorrel

Penthoraceae: **Ditch Stonecrop Family**

Penthorum sedoides L. – Ditch Stonecrop

Plantaginaceae: **Plantain Family**

Plantago major L. – Common Plantain
Plantago rugelii Decne. – Broadleaf Plantain; Rugel's Plantain

Polemoniaceae: **Phlox Family**

Phlox divaricata L. – Wild Blue Phlox

Polygonaceae: **Smartweed Family**

Polygonum amphibuim L. var. *emersum* Michaux – Marsh or Water Smart weed
Polygonum hydropiperoides Michaux – Mild Water-Pepper
Polygonum lapathifolium L. – Nodding Smartweed; Willowweed
Polygonum pensylvanicum L. – Pinkweed; Bigseed Smartweed
Polygonum scandens L. – False Buck-wheat; Black-bindweed
Polygonum virginianum L. – Jumpseed
Rumex altissimus Wood – Dock sp.
Rumex crispus L. – Curly Dock or Sour Dock

Polypodiaceae: **Fern Family**

Dryopteris spinulosa (O.F.Mull.)Watt – Spinulose Woodfern, or Shield Fern
Matteuccia struthiopteris (L.) Todaro – Ostrich Fern
Onoclea sensibilis L. – Sensitive Fern
Thelypteris palustris Schott – Marsh Fern

Pontederiaceae: **Pickerel-weed Family**

Heteranthera dubia (Jacq.)MacM. f. *terrestris* (Farw.)Vict. – Water Star-Grass
Pontederia cordata L. – Pickerelweed

Portulacaceae: **Purslane Family**

Claytonia virginica L. – Spring Beauty
Portulaca oleracea L. – Common Purslane; Pusley

Potamogetonaceae: **Pondweed Family**

Potamogeton crispus L. – Curly Muck-weed; Pondweed
Potamogeton nodosus Poiret – Longleaf Pondweed
Potamogeton pectinatus L. – Sago Pondweed

Primulaceae: **Primrose Family**

Lysimachia ciliata L. – Fringed Loosestife
Lysimachia nummularia L. – Moneywort

Ranunculaceae: **Buttercup / Crowfoot Family**

Anemone canadensis L. – Canada Anemone
Ranunculus acris L. – Tall or Common Buttercup
Ranunculus flabellaris Raf. – Yellow Water Buttercup; Yellow Water Crowfoot
Ranunculus sceleratus L. – Cursed Crowfoot
Thalictrum dasycarpum Fisch. & Ave-Lall. – Purple Meadow-Rue
Thalictrum dioicum L. – Early Meadow-Rue

Rosaceae: **Rose Family**

Crataegus sp. – Hawthornes
Guem canadense Jacq. – Avens sp.
Guem laciniatum Murray – Avens
Prunus virginiana L. – Choke Cherry
Rosa blanda Aiton – Wild Rose
Rubus occidentalis L. – Black Raspberry
Spirea alba Duroi – Meadowsweet

Rubiaceae: **Madder Family**

Cephalanthus occidentalis L. – Buttonbush
Galium aparine L. – Cleavers ; Goosegrass
Galium obtusum Bigelow – Bluntleaf Bedstraw

Rutaceae: **Rue Family**

Zanthoxylum americanum Miller – Prickly-Ash

Salicaceae: **Willow Family**

Populus deltoides Marsh – Cottonwood
Populus tremuloides Michaux – Quaking Aspen
Salix discolor Muhl – Pussy Willow
Salix exigua Nutt. – Sandbar Willow
Salix nigra Marsh –Black Willow
Salix petiolaris J.E.Smith – Slender or Meadow Willow

Scrophulariaceae: **Snapdragon Family**

Lindernia dubia var. anagallidea (Michaux) Cooperr. – False Pimpernel

Mimulus ringens L. – Square-stemmed Monkey-flower
Penstemon digitalis Sims – Foxglove Beard-tongue
Verbascum blattaria L. – Moth Mullein
Vervascum thapsus L. – Common Mullein; Flannel Plant
Veronica anagallis-aquatica – Water Speedwell

Simaroubaceae: **Quassia Family**
Ailonthus altissima (Miller) Swingle – Tree-of-Heaven

Solanaceae: **Nightshade Family**
Solanum dulcamara L. – Bittersweet; Nightshade

Sparganiaceae: **Bur-reed Family**
Sparganium eurycarpum Engelm. – Giant Bur-reed

Staphyleaceae: **Bladdernut Family**
Staphylea trifolia L. – American Bladdernut

Tiliaceae: **Linden Family**
Tilia americana L. – Basswood, Linden

Typhaceae
Typha angustifolia L. – Narrow-leaved Cattail
Typha latifolia L. – Broad-leaved or Common Cattail

Ulmaceae: **Elm Family**
Celtis occidentalis L. – American Hackberry
Ulmus americana L. – American or White Elm

Umbelliferae: **Carrot or Parsley Family**
Daucus carota L. – Queen Anne's Lace; Wild Carrot
Pastinaca sativa L. – Wild Parsnip
Sanicula gregaria Bickn. – Black Snakeroot
Sium suave Walter – Water Parsnip
Torilis japonica (Houtt.)DC – Hedge Parsley

Urticaceae: **Nettle Family**
Boehmeria cylindrica L. – False Nettle
Laportea canadensis L. – Wood Nettle
Pilea pumila L., A. Gray – Clearweed; Richweed

Verbenaceae: **Vervain Family**
Phyla lanceolata Michaux – Frog-Fruit
Verbena hastata L. – Blue Vervain
Verbena urticifolia L. – White Vervain

Violaceae: **Violet Family**
Viola sororia Willd. – Common Blue Violet
Viola pubescens Aiton – Yellow Violet

Vitaceae: **Grape Family**
Parthenocissus quinquefolia (L.)Planchon – Virginia Creeper; Woodbine
Vitis riparia Michaux – Riverbank Grape

Fish Found or Expected to Occur in the Rivers that Flow into the Shiawassee National Wildlife Refuge

Species
Alewife
Bass, largemouth
Bass, rock
Bass, smallmouth
Bass, white
Bluegill
Bowfin
Buffalo, bigmouth
Bullhead, black
Bullhead, yellow
Carp, common
Catfish, channel
Chub, creek
Chub, hornyhead
Chub, river
Crappie, black
Crappie, white
Dace, finescale
Dace, northern redbellied
Darter, blackside
Darter, channel (MIT)
Darter, Iowa
Darter, Johnny
Darter, river (MIT)
Drum, freshwater
Gar, longnose
Goldfish
Hogsucker, northern
Lamprey, sea
Lamprey, silver
Lapomis sp. (Hybrids)
Minnow, bluntnose
Minnow, brassy
Minnow, fathead
Mudminnow, central
Perch, log
Perch, pirate
Perch, trout
Perch, yellow
Pike, northern
Quillback
Redhorse, golden
Redhorse, shorthead
Redhorse, silver
Salmon, chinook
Salmon, coho
Shad, gizzard
Shiner, blacknose
Shiner, common, plus hybrids
Shiner, emerald
Shiner, golden
Shiner, mimic
Shiner, sand
Shiner, spotfin
Shiner, spottail
Shiner, striped
Silversides, brook
Smelt, rainbow
Stickleback, brook
Stonecat
Stoneroller
Sturgeon, lake (MIT)
Sucker, white
Sunfish, green
Sunfish, longear
Sunfish, pumpkinseed
Trout, brown
Trout, lake
Trout, rainbow
Walleye

Species (**Bold** indicates species that are abundant or common on the refuge for at least part of the year)	Nested on refuge recently Y=Yes	Status On Refuge				Potential Benefit by Habitat Objectives (Habitat used regularly for **f**ood, **n**esting, or **c**over) * indicates the species is found in habitat as result of best management practices where buffer strips and ditches develop a beneficial plant structure										Status In Region and State
		a - abundant: a common species that is very numerous c - common: certain to be seen or heard in suitable habitat, not in large numbers u - uncommon: present, but not always seen o - occasional: seen only a few times during the season r - rare: seen every two to five years				1	2	3	4	5	6	7	8	9	10	R3 - Region 3 Conservation Priority SMC - Species of Mgt. Concern SSC- State Special Concern ST - State Threatened SE - State Endangered T - Federal Threatened E - Federal Endangered
		Spring	Summer	Fall	Winter	Unfragmented Forest	Multi-story Forest	Green Tree Reservoir	Deep Water Pools	Moist Soil Units 200 acres	Emergent Marsh	Grasslands 400 acres	Croplands 980 acres	Cropland converted to moist soil,	Riverine, includes habitat up to normal high water	
Birds With Special Regional Status and Present in Numbers That Make a Significant Contribution to the Local Population																
Rare/Declining Concerns																
Least bittern	Y	r	o	r				f,c		f,c	f,n,c			f,n,c	f,n,c	R3,SMC,ST
Canada goose (SJBP)	Y	a	c	a	a			f,c	f,c	f,n,c	f,n,c	n,c	f,c	f,n,c	f,n,c	R3
Northern pintail		u		u						f,c	f,c	f,c	f,c	f,c	c	SMC
Lesser scaup		u		u					f,c		f,c			f,c	f,c	SMC
Bald eagle	Y	u	u	u	u	n,c	n,c	f,c	f		f			f,c	f,n,c	R3,T,ST
Northern harrier		u	o	u	u					f,c		f,n,c	f,c	f,c		SMC,SSC
Common tern		u		u					f	f,c	f,c			f,c	f,c	R3,SMC,ST
Black tern		r	o	r					f,c		f,n,c					R3,SMC,SSC

Species (**Bold** indicates species that are abundant or common on the refuge for at least part of the year)	**Nesting ?**	**Status on Refuge** (See top of table for codes)				**Potential Benefit** f=food, n=nesting, c=cover; *see top of table for explanation										**Status In Region and State** (See top for codes)
	Y=Yes	Sp	S	Fall	W	Unfragmented	Multi-story Forest	Green Tree Reservoir	Deep Water Pools	Moist Soil Units	Emergent Marsh	Grasslands	Croplands	Converted Croplands	Riverine	
Red-headed woodpecker	Y	u	u	u		f	f					*f,c	*f,c		f,n,c	SMC
Northern flicker	Y	c	c	c	r	f,n,c	f,n,c					*f,n,c	*f,c		f,n,c	SMC
Wood thrush	Y	u	u	u		f,n,c	f,n,c	f							f,n,c	R3,SMC
Bobolink	Y	o	o	u								f,n,c		f,n,c		R3,SMC
Eastern meadowlark		o	r	r								f,n,c		f,c		R3,SMC
Chestnut-sided warbler		u		u			f,n,c									SMC
Recreational/Economic Value Concerns																
Wood duck	Y	c	c	c		n	n	f,c		f,c	f,n,c		f,c	f,c	f,n,c	R3
American black duck		c	u	c	c			f,c	c	f,c	f,c	f,c	f,c	f,c	f,c	R3
Mallard	Y	a	c	a	c			f,c	c	f,n,c	f,n,c	f,n,c	f,n,c	f,n,c	f,n,c	R3
Blue-winged teal	Y	c	u	c				f,c		f,n,c	f,n,c	f,n,c	f,c	f,n,c	c	R3
Canvasback		o		o					f,c		f,c			f,c	f,c	R3
Nuisance Concerns																
Double-crested cormorant		c		c					f,c		f,c			f,c	f,c	R3
Canada goose (Urban giants)	Y	a	c	a	a			f,c	f,c	f,n,c	f,n,c	n,c	f,c	f,n,c	f,n,c	R3
State Concerns																
Caspian tern		u		u					f		f,c				f,c	ST
Black-crowned night heron		u	u	u				f,c			f,c				f,c	SSC
Cooper's hawk		o	r	o	r	n	n			f		f,c	f,c	f,c	f,c	SSC
Common moorhen	Y	u	u	u					f,n,c	f,c	f,n,c			f,c	f,c	SSC

Prothonotary warbler	Y	u	u	r		f,n,c	f,n,c								f,n,c	SSC
Wilson's phalarope		r		o						f,c	f,c			f,c	f	SSC
Birds with Special Regional Status, But Rare on the Refuge																
American bittern		r	r					f,c		f,c	f,n,c	n,c		f,n,c	f,n,c	R3,SMC,SSC
Northern goshawk				r	r	f,c	f,c	f,c		f		*f,c	*f,c	f,c	c	R3,SMC,SSC
Red-shouldered hawk		r	r	r	r	f,n,c	f,n,c			f	f	*f	*f,c	f,c	f,n,c	R3,SMC,ST
Peregrine falcon										f,c	f,c	f,c	f,c	f,c	c	R3,E,SE
Upland sandpiper		r		r						f,c	f,c	f,c	f,c	f,c	f	R3,SMC
American woodcock		r	r	r		f,c	f,c						f,c		f,c	R3
Short-eared owl					r					f,c		f,c	f,c	f,c		R3,SMC,SE
Olive-sided flycatcher		r		r												R3,SMC
Sedge wren	Y	r	r	r						f,n,c	f,n,c	f,n,c		f,n,c		R3,SMC
Veery		r		r		f,n,c	f,n,c								f,n,c	R3,SMC
Blue-winged warbler		r		r			f,n,c			f,n,c					f,n,c	R3,SMC
Golden-winged warbler		r		r			f,n,c			f,n,c					f,n,c	R3,SMC
Cerulean warbler		r	r	r		f,n,c	f,n,c								f,n,c	R3,SMC,SSC
Kirtland's warbler		r		r						f,c		f,c	f,c		f,c	R3,E,SE
Field sparrow	Y	r	r	r								f,n,c	f,n,c			R3,SMC
Osprey		r	r	r				f,c	f		f			f	f,c	ST
Merlin				r						f,c	f,c	f,c	f,c	f,c	f,c	ST
Forster's tern			r						f		f,c				f,c	SSC
Yellow-headed blackbird	Y	r	r								f,n,c			f,n,c		SSC
Birds Currently Not on Regional Lists																
Pied-billed grebe	Y	u	u	u					f,c		f,n,c			f,n,c	f,n,c	

Species (**Bold** indicates species that are abundant or common on the refuge for at least part of the year)	**Nesting ?**	**Status on Refuge** (See top of table for codes)				**Potential Benefit** f=food, n=nesting, c=cover; *see top of table for explanation										**Status In Region and State** (See top for codes)
	Y=Yes	Sp	S	Fall	W	Unfragmented	Multi-story Forest	Green Tree Reservoir	Deep Water Pools	Moist Soil Units	Emergent Marsh	Grasslands	Croplands	Converted Croplands	Riverine	
Great blue heron		a	a	a	u	n	n	f,c		f,c	f,n,c		*f,c	f,n,c	f,n,c	
Great egret		u	c	c				f,c		f,c	f,c		*f,c	f,c	f,c	
Green heron	Y	u	u	u		n	n	f,c		f,c	f,n,c		*f	f,c	f,n,c	
Tundra swan		u		u					f,c	f,c	f,c		f,c	f,c	f,c	
Snow goose		u	u	o					c	f,c	f,c		f,c	f,c	f,c	
Green-winged teal		c	o	c				f,c		f,c	f,c	f,c	f,c	f,c	f,c	
Northern shoveler		u		u						f,c	f,n,c	f,n,c	f,c	f,n,c	c	
Gadwall		o		o						f,c	f,c	f,c	f,c	f,c	c	
American wigeon		u		u				f,c		f,c	f,c	f,c	f,c	f,c	c	
Redhead	Y	o	r	o					f,c		f,n,c			f,c	f,n,c	
Ring-necked duck		u		u				f,c	f,c		f,c			f,c	f,c	
Common goldeneye		o		o	o				f,c		f,c			f,c	f,c	
Bufflehead		u		u				f,c	f,c	f,c	f,c			f,c	f,c	
Hooded merganser	Y	u	o	u		n	n	f,c	f		f,c			f,c	f,n,c	
Common merganser		c	r	a	c			f	f,c		f,c			f,c	f,c	
Ruddy duck		u		u					f,c		f,c			f,c	f,c	
Turkey vulture		u	u	u		f,n,c	f,n,c			f		f	f			
Sharp-shinned hawk		o	r	o	r					f		*f,c	*f,c	f,c	f,c	
Red-tailed hawk	Y	c	c	c	c	f,n,c	f,n,c			f	f,c	f	f,c	f,c	f,n,c	
Rough-legged hawk		r		r	u					f		f,c	f,c	f,c		

American kestrel		o	r	o	o					f		f,c	f,c	f		
Ring-necked pheasant	Y	u	u	u	u					f,c	c	f,c	f,c	f,c		
Virginia rail	Y	u	u	u							f,n,c			f,n,c	f,n,c	
Sora	Y	u	u	u							f,n,c			f,n,c	f,n,c	
American coot	Y	u	u	u					f,n,c	f,c	f,n,c			f,c	f,n,c	
Black-bellied plover		o		o						f,c	f,c		f,c	f,c	f	
Semipalmated plover		u		u						f,c	f,c		f,c	f,c	f	
Killdeer	Y	c	c	c						f,c	f,c		f,c	f,c	f	
Greater yellowlegs		c		c						f,c	f,c		f,c	f,c	f	
Lesser yellowlegs		c		c						f,c	f,c		f,c	f,c	f	
Solitary sandpiper		u		u						f,c	f,c		f,c	f,c	f	
Spotted sandpiper	Y	c	c	c						f,n,c	f,c		f,c	f,n,c	f	
Semipalmated sandpiper		u		u						f,c	f,c		f,c	f,c	f	
Least sandpiper		u		u						f,c	f,c		f,c	f,c	f	
White-rumped sandpiper		o		o						f,c	f,c		f,c	f,c	f	
Baird's sandpiper		o		o						f,c	f,c		f,c	f,c	f	
Pectoral sandpiper		u		u						f,c	f,c		f,c	f,c	f	
Stilt sandpiper		o		u						f,c	f,c		f,c	f,c	f	
Dunlin		c		u						f,c	f,c		f,c	f,c	f	
Short-billed dowitcher		u		u						f,c	f,c		f,c	f,c	f	
Long-billed dowitcher		r		o						f,c	f,c		f,c	f,c	f	
Common snipe		u		u						f,c	f,c	f,c	f,c	f,c	f	
Bonaparte's gull		u		u		f,c	f,c		f,c	f,c	f,c		f,c	f,c	f,c	
Ring-billed gull		c	c	a	o	f,c	f,c		f,c	f,c	f,c		f,c	f,c	f,c	
Herring gull		u	u	c	u				f,c	f,c	f,c		f,c	f,c	f,c	
Mourning dove	Y	c	c	c	c	f,n,c	f,n,c,						f,c		f,n,c	

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Black-billed cuckoo	Y	o	o	o								f,c	f,c		f,n,c	
Yellow-billed cuckoo	Y	o	o	o								f,c	f,c		f,n,c	
Eastern screech-owl	Y	u	u	u	u					f	f,c	f,c	*f,c	f	f,n,c	
Great horned owl	Y	u	u	u	u	f,n,c	f,n,c			f		f	*f		f,n,c	
Barred owl	Y	u	u	u	u	f,n,c	f,n,c			f		f	*f	f	f,n,c	
Common nighthawk		o		o						f	f	f,c	f,c	f	f	
Chimney swift		o	o	o						f	f	f	f	f	f,n,c	
Ruby-throated hummingbird		u	o	o						f	f	f		f	f,n,c	
Belted kingfisher	Y	u	u	u				f	f		f				f,n,c	
Red-bellied woodpecker	Y	c	c	c	c	f,n,c	f,n,c								f,n,c	
Downy woodpecker	Y	c	c	c	c	f,n,c	f,n,c					*f			f,n,c	
Hairy woodpecker	Y	u	u	u	u	f,n,c	f,n,c								f,n,c	
Eastern wood pewee	Y	c	c	u		f,n,c	f,n,c			f	f	*f			f,n,c	
Alder flycatcher						f,n,c	f,n,c			f,n,c	f,n,c	*f			f,n,c	
Willow flycatcher	Y	u	u	o		f,n,c	f,n,c			f,n,c	f,n,c	*f,n,c			f,n,c	
Least flycatcher	Y	u	u	o						f,n,c	f,n,c	*f,n,c			f,n,c	
Eastern phoebe	Y	u	u	u						f,n,c	f,n,c	*f,n,c			f,n,c	
Great crested flycatcher	Y	c	c	u		f,n,c	f,n,c			f	f	f			f,n,c	
Eastern kingbird	Y	u	u	u						f,n,c		f,n,c	*f,n,c			
Horned lark	Y	c	c	c	c					f,n,c		f,n,c	*f,n,c	f,n,c		

Tree swallow	Y	a	c	a						f,n,c	f,n,c	f,n,c	*f	f	f,n,c	
Northern rough-winged swallow	Y	c	u	c						f,c	f,c	f,c	*f,n	f,c	f,n,c	
Bank swallow		c	u	c						f,c	f,c	f,c	*f,c	f,c	f,n,c	
Cliff swallow										f,c	f,c	f,c	*f,n,c	f,c	f,n,c	
Barn swallow	Y	c	c	c						f,c	f,c	f,c	*f,n,c	f,c	f,n,c	
Blue jay	Y	c	c	c	c		f,n,c					f	f		f,,n,c	
American crow	Y	c	c	c	c	f,n,c	f,n,c			f,c		f	f,c		f,n,c	
Black-capped chickadee	Y	a	a	a	a	f,n,c	f,n,c					f	f		f,n,c	
Tufted titmouse	Y	c	c	c	c	f,n,c	f,n,c								f,n,c	
White-breasted nuthatch	Y	c	c	c	c	f,n,c	f,n,c								f,n,c	
Brown creeper	Y	c	u	u	u	f,n,c	f,n,c								f,n,c	
House wren	Y	c	c	c		f,n,c	f,n,c					f,c	*f,n,c		f,n,c	
Marsh wren	Y	c	c	c							f,n,c			f,n,c		
Golden-crowned kinglet		u		u		f,c	f,c								f,c	
Ruby-crowned kinglet		u		u		f,c	f,c					f,c			f,c	
Blue-gray gnatcatcher	Y	u	u	o		f,n,c	f,n,c								f,n,c	
Eastern bluebird	Y	u	o	u			f,n,c					f,n,c	*f,n,c			
Gray-cheeked thrush		o		o												
Swainson's thrush		u		u		f,c	f,c								f,c	
Hermit thrush		u		u		f,c	f,c								f,c	
American robin	Y	a	a	a	r	f,n,c	f,n,c				f	f,c	*f,n,c		f,n,c	
Gray catbird	Y	c	c	c			f,n,c			f,c		f,c	*f,n,c		f,n,c	
Brown thrasher	Y	o	o	o			f,n,c			f,c		f,c	*f,n,c		f,n,c	
Cedar waxwing	Y	u	u	u	u							f,c	*f,n,c		f,n,c	
Northern shrike					o											
European starling	Y	c	c	c	c					f,c		f,c	*n,c	f,c	n,c	

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Yellow-throated vireo	Y	o	o	r			f,n,c								f,n,c	
Warbling vireo	Y	u	u	u			f,n,c			f,c		f,n,c	f,c		f,n,c	
Red-eyed vireo	Y	u	u	u		f,n,c	f,n,c								f,n,c	
Tennessee warbler		u		u		f,c	f,c								f,c	
Nashville warbler		u		u			f,n,c			f,c	f,c	f,c			f,c	
Yellow warbler	Y	c	c	c			f,n,c			f,n,c		f,n,c			f,n,c	
Magnolia warbler		u		u			f,c			f,c		f,c			f,c	
Cape May warbler		u		u			f,c			f,c		f,c			f,c	
Black-throated blue warbler		u		u		f,c	f,c								f,c	
Blackburnian warbler		u		u			f,c			f,c		f,c			f,c	
Palm warbler		u		u			f,c			f,c		f,c			f,c	
Bay-breasted warbler		u		u		f,c	f,c			f,c		f,c			f,c	
Blackpoll warbler		o		o												
Black-and-white warbler		u		u		f,n,c	f,n,c								f,n,c	
American redstart	Y	u	u	u		f,n,c	f,n,c			f,c		f,c			f,n,c	
Ovenbird	Y	u	u	u		f,n,c	f,n,c									
Northern waterthrush		u		u		f,n,c	f,n,c								f,n,c	
Mourning warbler		o		o			f,c			f,n,c		f,n,c			f,n,c	
Common yellowthroat	Y	c	c	c						f,n,c	f,nc	f,n,c			f,n,c	
Hooded warbler						f,n,c	f,n,c								f,n,c	

Wilson's warbler		u		u		f,c	f,c			f,c		f,c			f,c	
Canada warbler		u		u			f,c			f,c		f,c			f,n,c	
Scarlet tanager	Y	u	u	o		f,n,c	f,n,c								f,c	
Northern cardinal	Y	c	c	c	c					f,n,c	f,n,c	f,n,c			f,n,c	
Rose-breasted grosbeak	Y	c	u	u			f,n,c				f,n,c	f,n,c			f,n,c	
Indigo bunting	Y	u	u	u			f,n,c			f,n,c	f,n,c	f,n,c	f,n,c	f,n,c	f,n,c	
Rufus-sided towhee		o	r	o			f,n,c			f,n,c		f,n,c				
American tree sparrow		o			c		f,c			f,c	f,c	f,c			f,c	
Chipping sparrow	Y	u	u	u								f,n,c				
Vesper sparrow	Y	u	u	u								f,n,c	f,n,c			
Savannah sparrow	Y	c	c	c						f,n,c	f,n,c	f,n,c	f,n,c	f,n,c		
Fox sparrow		o		o												
Song sparrow	Y	a	a	a	o		f,n,c			f,n,c	f,n,c	f,n,c	f,n,c	f,n,c	f,n,c	
Lincoln's sparrow		o		o			f,c			f,c	f,c	f,c	f,c	f,c	f,c	
Swamp sparrow	Y	o	o	o						f,n,c	f,n,c	f,n,c		f,n,c		
White-crowned sparrow		u		u			f,c			f,c	f,c	f,c	f,c	f,c	f,c	
White-throated sparrow		c		c			f,c			f,c	f,c	f,c		f,c		
Dark-eyed junco		c		c	u		f,c			f,c	f,c	f,c	f,c	f,c	f,c	
Lapland longspur		o			r					f,c		f,c	f,c			
Snow bunting		o			u					f,c		f,c	f,c			
Red-winged blackbird	Y	a	a	a	r					f,n,c	f,n,c	f,n,c	f,c	f,n,c		
Rusty blackbird		u		u			f,c			f	f,c	f	f	f,c	f,c	
Common grackle	Y	c	c	c			f,n,c			f,c	f,n,c	f,c	f	f,n,c	f,n,c	
Brown-headed cowbird	Y	c	c	c	r		f,n,c			f,n,c	f,c	f,n,c	f,c	f,n,c	f,n,c	
Northern oriole	Y	u	u	o			f,n,c								f,n,c	
American goldfinch	Y	a	a	a	a					f,n,c	f,n,c	f,,n,c	f,c		f,n,c	

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House sparrow		u	u	u	u		f,n,c			f,c		f,c	f,n,c		f,n,c	
Birds Currently Not on Regional Lists And Rare on the Refuge																
Horned grebe		r		r					f,c		f,c			f,c	f,c	
American white pelican		r	r						f,c		f,c			f,c	f,c	
Cattle egret		r	r							f,c	f,c	f,c	f,c	f,c	f,c	
Greater white-fronted goose				r					c	f,c	f,c		f,c	f,c	f,c	
Greater scaup		r		r					f,c		f,c			f,c	f,c	
Red-breasted merganser		r		r					f,c		f,c				f,c	
Broad-winged hawk		r	r	r		f,n,c	f,n,c			f		f	f,c	f,c	f,n,c	
Golden eagle		r		r	r							I	I	I		
Ruffed grouse		r	r	r	r	f,n,c	f,n,c									
Wild turkey						f,n,c	f,n,c					f,n,c	f,c			
Sandhill crane		r		r						f,c		f,c	f,c			
Amercian golden plover										f,c	f,c		f,c	f,c	f	
American avocet		r		r						f,c	f,c		f,c	f,c	f	
Hudsonian godwit		r		r						f,c	f,c		f,c	f,c	f	
Marbled godwit		r								f,c	f,c		f,c	f,c	f	
Red knot				r						f,c	f,c		f,c	f,c	f	
Sanderling				r						f,c	f,c		f,c	f,c	f	
Red-necked phalarope		r		r						f,c	f,c		f,c	f,c	f	

Whimbrel											f,c	f,c		f,c	f,c	f	
Ruff											f,c	f,c		f,c	f,c	f	
Snowy owl						r					f,c		f,c	f,c			
Pileated woodpecker	Y	r	r	r	r	f,n,c	f,n,c									f,n,c	
Red-breasted nuthatch					r	f,,c	f,c									f,c	
Winter wren		r		r		f,c	f,c									f,c	
Water pipet		r		r													
Solitary vireo		r		r													
Philadelphia vireo		r		r			f,c									f,c	
Orange-crowned warbler		r		r												f,c	
Northern parula		r		r			f,n,c									f,c	
Connecticut warbler		r		r		f,c	f,c				f,c		f,c			f,c	
Eastern towhee							f,n,c				f,n,c		f,n,c				
Brewer's blackbird		r		r							f,c	f,c	f,c	f	f,c	f,c	
Purple finch					r		f,c									f,c	
House finch														f,n,c			
Common redpoll					r												
Hoary redpoll																	
Pine siskin					r		f,c				f,c		f,c	f,c	f,c	f,c	
Evening grosbeak					r		f,c				f,c	f,c	f,c	f,c	f,c	f,c	
Birds Incidental on the Refuge																	
Common loon																	R3,SMC
Trumpeter swan																	R3,SMC,SE
Prairie warbler											f,c		f,c				R3,SMC,SE
King rail																	SE
Snowy egret																	

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Ross' goose										f,c	f,c		f,c	f,c		
Black-necked stilt										f,c	f,c		f,c	f,c	f	
Willet										f,c	f,c		f,c	f,c	f	
Glaucous gull									f,c		f,c		f,c		f,c	
Great black-backed gull									f,c		f,c		f,c		f,c	
Acadian flycatcher						f,n,c	f,n,c									
Carolina wren						f,n,c	f,n,c								f,n,c	
Yellow-breasted chat										f,c		f,c			f,n,c	
Dickcissel	Y											f,n,c		f,n,c		

Shiawassee National Wildlife Refuge
Wildlife Species

Mammals

Virginia Opossum – *Didelphis virginiana*
Northern Short-tailed Shrew – *Blarina brevicauda*
Star-nosed Mole – *Condylura cristata*
Big Brown Bat – *Eptesicus fuscus*
Little Brown Bat – *Myotis lucifugus*
Coyote – *Canis latrans*
Red Fox – *Vulpes vulpes*
Raccoon – *Procyon lotor*
Long-tailed Weasel – *Mustela frenata*
Least Weasel – *Mustela nivalis*
Mink – *Mustela vision*
Striped Skunk – *Mephitis mephitis*
River Otter – *Lutra canadensis*
White-tailed Deer – *Odocoileus virginianus*
Southern Flying Squirrel – *Glaucomys volans*
Woodchuck – *Marmota monax*
Gray Squirrel (Black Morph) – *Sciurus carolinensis*
Fox Squirrel – *Sciurus niger*
Eastern Chipmunk – *Tamias striatus*
Red Squirrel – *Tamiasciurus hudsonicus*
Beaver – *Castor canadensis*
White-footed Mouse – *Peromyscus leucopus*
Deer Mouse – *Peromyscus maniculatus*
Meadow Vole – *Microtus pennsylvanicus*
Muskrat – *Ondatra zibethicus*
Meadow Jumping Mouse – *Zapus hudsonius*
Eastern Cottontail – *Sylvialagus floridanus*

Reptiles

Blanding's Turtle – *Empydoidea blandingii*
Common Map Turtle – *Graptemys geographica*
Midland Painted Turtle – *Chrysemys picta margnata*
Snapping Turtle – *Chelydra serpentina serpentina*
Eastern Spiny Softshell Turtle – *Trionyx spiniferus spiniferus*
Eastern Garter Snake – *Thamnophis sirtalis sirtalis*
Butler's Garter Snake – *Thamnophis butleri*
Eastern Fox Snake – *Elaphe vulpina glovdi*
Eastern Milk Snake – *Lampropeltis triangulumn triangulum*

Amphibians

Red-backed Salamander – *Plethodon cinereus*
Blue-spotted Salamander – *Ambystoma laterale Hallowell*
American Toad – *Bufo americanus Holbrook*
Northern Spring Peeper – *Hyla crucifer crucifer*

Gray Treefrog – *Hyla versicolor/chrysoscelis*
Western Chorus Frog – *Pseudacris triseriata triseriata*
Green Frog – *Rana clamitans melanota*
Wood Frog – *Rana sylvatica*
Northern Leopard Frog – *Rana pipiens*

Invertebrates

No formal, complete survey of Refuge invertebrates exists, so the following is an incomplete listing representing only those species documented.

Damselflies
(*Calopterygidae*):
American Rubyspot – *Hetaerina americana*

Dragonflies
Darners (*Aeshnidae*):
Lance-tailed Darner – *Aeshna constricta*
Common Green Darner – *Anax junius*
Clubtails (*Compidae*):
Midland Clubtail – *Gomphus fraternus*
Emeralds (*Corduliidae*):
Common Baskettail – *Epitheca cynosura*
Skimmers (*Libellulidae*)
Calico Pendant – *Celithemis elisa*
Halloween Pendant – *Celithemis eponina*
Eastern Pondhawk – *Erythemis simplicicollis*
Dot-tailed Whiteface – *Luecorrhinia intacta*
Widow Skimmer – *Libellula luctuosa*
Common Whitetail – *Libellula /Plathemis lydia*
Twelve-spotted Skimmer – *Libellula pulchella*
Blue Dasher – *Pachydiplax longipennis*
Wandering Glider – *Pantala flavesens*
Eastern Amberwing – *Perithemis tenera*
Ruby Meadowfly – *Sympetrum rubicundulum*
Yellow-legged Meadowfly – *Sympetrum vicinum*
Carolina Saddlebags – *Tramea carolina**
Black Saddlebags – *Tramea lacerata*

Butterflies

Papilionidae:
Black Swallotail – *Papilio polyxenes asterious*
Tiger Swallowtail – *Papilio glaucus*
Giant Swallowtail – *Papilio cresphontes*
Pieridae:
Cabbage White – *Pieris rapae*
Clouded Sulfur – *Colias philodice eriphyle*
Lycaenidae:
Bronze Copper – *Lycaena hyllus*
Acadian Hairstreak – *Satyrium acadia*

* Identification tentative, based on current state odonata list.

Banded Hairstreak – *Saytyrium calanus*
Eastern Tailed Blue – *Everes comyntas*
Spring Azure – *Celastrina ladon*

Nymphalidae:

American Snout – *Libytheana carinenta*
Great Spangled Fritillary – *Speyeria cybele*
Pearl Crescent – *Phyciodes tharos*
Question Mark – *Polygonia interrogationis*
Eastern Comma – *Polygonia comma*
Gray Comma – *Polygonia progne*
Milbert's Tortoise Shell – *Nymphalis milberti*
Mourning Cloak – *Nymphalis antiopa*
Baltimore – *Euphydryas phaeton*
American Painted Lady – *Vanessa virginiensis*
Painted Lady – *Vanessa cardui*
Red Admiral – *Vanessa atalanta rubria*
Buckeye – *Junonia coenia*
Red-spotted Purple – *Limenitis arthemis astyanax*
Viceroy – *Limenitis archippus*
Hackberry Emperor – *Asterocampa celtis*
Northern Pearly Eye – *Enodia anthedon*
Little Wood Satyr – *Megisto cymela*
Common Wood Nymph – *Cerlyonis pegala*
Monarch – *Danaus plexippus*

Hesperiidae:

Juvenal's Duskywing – *Erynnis juvenalis*
Silver-spotted Skipper – *Epargyreus clarus*
Common Sooty Wing – *Pholisora cattullus*
Least Skipper – *Ancyloxypha numitor*
European Skipper – *Thymelicus lineola*
Yellow-patched Skipper – *Polites peckius*
Little Glassy Wing – *Pompeius verna*

<u>Moths</u>

Sphingidae:

Modest Sphinx – *Pachysphinx modesta*
Pandorus Sphinx – *Eumorpha pandorus*
White-lined Sphinx – *Hyles lineata*
Lettered Sphinx – *Deidamia inscripta*

Saturniidae:

Polyphemus Moth – *Antheraea polyphemus*
Cercropia Moth – *Hyalophora cecropia*

Arctiidae:

LeConte's Haploa – Haploa lecontei
Isbella tiger Moth – Pyrrharctia isabella
Salt Marsh Moth – Estigmene acrea
Fall Webworm Moth – Hyphantria cunea
Yellow Bear Moth – Spilosoma dubia

Virgin Tiger Moth – *Grammia virgo*
Delicate Cycnia – *Cycnia tenera*
Oregon Cycnia – *Cycnia oregonensis*
Milkweed Tussock Moth – *Euchaetes egle*
Virginia Ctenucha – *Ctenucha virginica*
Yellow-collared Scape Moth – *Cisseps fulvicollis*

Noctuidae:

Old Man Dart – *Agrotis vetusta*
Ipsilon Dart – *Agrostis ipsilon*
Dingy Cutworm Moth – *Feltia jaculifera*
Master's Dart – *Feltia herilis*
Rubbed Dart – *Euxoa detersa*
Clandestine Dart – *Spaelotis clandestina*
Catocaline Dart – *Cryptocala acadiensis*
Armyworm Moth – *Pseudaletia unipuncta*
Northern Burdock Borer – *Papaipema arctivorens*
Copper Underwing – *Amphipyra pyramidoides*
Pearly Wood-nymph – *Eudryas unio*
Eight-spotted Forester – *Alypia octomaculata*
Common Looper Moth – *Autographa precationis*
Celery Looper Moth – *Anagrapha falcifera*
Forage Looper Moth – *Caenurgina erechtea*
The Herald – *Scoliopteryx libatrix*
Maple Zale – *Zale galbanata*
Maple Looper Moth – *Parallelia bistriaris*
Darling Underwing – *Calocala cara*
Green Cloverworm Moth – *Plathypena scabra*
Spotted Grass Moth – *Rivula propinqualis*
Yellowish Zanclognatha – *Zanclognatha ochreipennis*
Wavy-lined Zanclognatha – *Zanclognatha ochreipennis*

Geometridae:

Lesser Maple Spanworm Moth – *Itame pustularia*
Porcelain Gray – *Protoboarmia porcelaria*
Linden Looper Moth – *Erannis tiliaria*
False Crocus Geometer – *Xanthotype urticaria*
Crocus Geometer – *Xanthotype sospeta*
Pale Beauty – *Campaea perlata*
Elm Spanworm Moth – *Ennomos magnaria*
Common Metarranthis – *Metarranthis angularia*
White Slant Line – *Tetracis cachexiata*
Large Maple Spanworm Moth – *Prochoerodes transversata*
Horned Spanworm Moth – *Nematocampa limbata*
Wavy-lined Emerald – *Synchlora aerata albolineata*
Chickweed Geometer – *Haematopis grataria*
Large Lace-border – *Scopula limboundata f. relevata*
Soft-lined Wave – *Scopula inductata*
Lesser Grapevine Looper Moth – *Eulithis diversilineata*
Barberry Geometer – *Coryphista meadii*
White-banded Toothed Carpet – *Epirrhoe alternata*
The Beggar – *Eubaphe mendica*

Three-patched Bigwing – *Heterophelps refusaria*
Three-spotted Fillip – *Heterophelps triguttaria*

Pterophoriadae:

Plume Moth – *Platyptillia carduidactyla*
Plume Moth – *Emmelina monodactyla*

Pyraliadae:

European Corn Borer Moth – *Ostrinia nubilalis*

Tortricidae:

Oblique-banded Leafroller Moth – *Choristoneura rosaceana*
Sparganothis Fruitworm Moth – *Sparganothis sulfureana*

Appendix F: Compliance Requirements

Appendix F: Compliance Requirements

Rivers and Harbor Act (1899) (33 U.S.C. 403): Section 10 of this Act requires the authorization by the U.S. Army Corps of Engineers prior to any work in, on, over, or under a navigable water of the United States.

Antiquities Act (1906): Authorizes the scientific investigation of antiquities on Federal land and provides penalties for unauthorized removal of objects taken or collected without a permit.

Migratory Bird Treaty Act (1918): Designates the protection of migratory birds as a Federal responsibility. This Act enables the setting of seasons, and other regulations including the closing of areas, Federal or non-Federal, to the hunting of migratory birds.

Migratory Bird Conservation Act (1929): Establishes procedures for acquisition by purchase, rental, or gift of areas approved by the Migratory Bird Conservation Commission.

Fish and Wildlife Coordination Act (1934), as amended: Requires that the Fish and Wildlife Service and State fish and wildlife agencies be consulted whenever water is to be impounded, diverted or modified under a Federal permit or license. The Service and State agency recommend measures to prevent the loss of biological resources, or to mitigate or compensate for the damage. The project proponent must take biological resource values into account and adopt justifiable protection measures to obtain maximum overall project benefits. A 1958 amendment added provisions to recognize the vital contribution of wildlife resources to the Nation and to require equal consideration and coordination of wildlife conservation with other water resources development programs. It also authorized the Secretary of Interior to provide public fishing areas and accept donations of lands and funds.

Migratory Bird Hunting and Conservation Stamp Act (1934): Authorized the opening of part of a refuge to waterfowl hunting.

Historic Sites, Buildings and Antiquities Act (1935), as amended: Declares it a national policy to preserve historic sites and objects of national significance, including those located on refuges. Provides procedures for designation, acquisition, administration, and protection of such sites.

Refuge Revenue Sharing Act (1935), as amended: Requires revenue sharing provisions to all fee-title ownerships that are administered solely or primarily by the Secretary through the Service.

Transfer of Certain Real Property for Wildlife Conservation Purposes Act (1948): Provides that upon a determination by the Administrator of the General Services Administration, real property no longer needed by a Federal agency can be transferred without reimbursement to the Secretary of Interior if the land has particular value for migratory birds, or to a State agency for other wildlife conservation purposes.

Federal Records Act (1950): Directs the preservation of evidence of the government's organization, functions, policies, decisions, operations, and activities, as well as basic historical and other information.

Fish and Wildlife Act (1956): Established a comprehensive national fish and wildlife policy and broadened the authority for acquisition and development of refuges.

Refuge Recreation Act (1962): Allows the use of refuges for recreation when such uses are compatible with the refuge's primary purposes and when sufficient funds are available to manage the uses.

Wilderness Act (1964), as amended: Directed the Secretary of Interior, within 10 years, to review every roadless area of 5,000 or more acres and every roadless island (regardless of size) within National Wildlife Refuge and National Park Systems and to recommend to the President the suitability of each such area or island for inclusion in the National Wilderness Preservation System, with final decisions made by Congress. The Secretary of Agriculture was directed to study and recommend suitable areas in the National Forest System.

Land and Water Conservation Fund Act (1965): Uses the receipts from the sale of surplus Federal land, outer continental shelf oil and gas sales, and other sources for land acquisition under several authorities.

National Wildlife Refuge System Administration Act (1966), as amended by the National Wildlife Refuge System Improvement Act (1997)16 U.S.C. 668dd668ee. (Refuge Administration Act): Defines the National Wildlife Refuge System and authorizes the Secretary to permit any use of a refuge provided such use is compatible with the major purposes for which the refuge was established. The Refuge Improvement Act clearly defines a unifying mission for the Refuge System; establishes the legitimacy and appropriateness of the six priority public uses (hunting, fishing, wildlife observation and photography, or environmental education and interpretation); establishes a formal process for determining compatibility; established the responsibilities of the Secretary of Interior for managing and protecting the System; and requires a Comprehensive Conservation Plan for each refuge by the year 2012. This Act amended portions of the Refuge Recreation Act and National Wildlife Refuge System Administration Act of 1966.

National Historic Preservation Act (1966), as amended: Establishes as policy that the Federal Government is to provide leadership in the preservation of the nation's prehistoric and historic resources.

Architectural Barriers Act (1968): Requires federally owned, leased, or funded buildings and facilities to be accessible to persons with disabilities.

National Environmental Policy Act (1969): Requires the disclosure of the environmental impacts of any major Federal action significantly affecting the quality of the human environment.

Uniform Relocation and Assistance and Real Property Acquisition Policies Act (1970), as amended: Provides for uniform and equitable treatment of persons who sell their homes, businesses, or farms to the Service. The Act requires that any purchase offer be no less than the fair market value of the property.

Endangered Species Act (1973): Requires all Federal agencies to carry out programs for the conservation of endangered and threatened species.

Rehabilitation Act (1973): Requires programmatic accessibility in addition to physical accessibility for all facilities and programs funded by the Federal government to ensure that anybody can participate in any program.

Archaeological and Historic Preservation Act (1974): Directs the preservation of historic and archaeological data in Federal construction projects.

Clean Water Act (1977): Requires consultation with the Corps of Engineers (404 permits) for major wetland modifications.

Surface Mining Control and Reclamation Act (1977) as amended (Public Law 95-87) (SMCRA): Regulates surface mining activities and reclamation of coal-mined lands. Further regulates the coal industry by designating certain areas as unsuitable for coal mining operations.

Executive Order 11988 (1977): Each Federal agency shall provide leadership and take action to reduce the risk of flood loss and minimize the impact of floods on human safety, and preserve the natural and beneficial values served by the floodplains.

Executive Order 11990: Executive Order 11990 directs Federal agencies to (1) minimize destruction, loss, or degradation of wetlands and (2) preserve and enhance the natural and beneficial values of wetlands when a practical alternative exists.

Executive Order 12372 (Intergovernmental Review of Federal Programs): Directs the Service to send copies of the Environmental Assessment to State Planning Agencies for review.

American Indian Religious Freedom Act (1978): Directs agencies to consult with native traditional religious leaders to determine appropriate policy changes necessary to protect and preserve Native American religious cultural rights and practices.

Fish and Wildlife Improvement Act (1978): Improves the administration of fish and wildlife programs and amends several earlier laws including the Refuge Recreation Act, the National Wildlife Refuge System Administration Act, and the Fish and Wildlife Act of 1956. It authorizes the Secretary to accept gifts and bequests of real and personal property on behalf of the United States. It also authorizes the use of volunteers on Service projects and appropriations to carry out a volunteer program.

Archaeological Resources Protection Act (1979), as amended: Protects materials of archaeological interest from unauthorized removal or destruction and requires Federal managers to develop plans and schedules to locate archaeological resources.

Federal Farmland Protection Policy Act (1981), as amended: Minimizes the extent to which Federal programs contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses.

Emergency Wetlands Resources Act (1986): Promotes the conservation of migratory waterfowl and offsets or prevents the serious loss of wetlands by the acquisition of wetlands and other essential habitats.

Federal Noxious Weed Act (1990): Requires the use of integrated management systems to control or contain undesirable plant species, and an interdisciplinary approach with the cooperation of other Federal and State agencies.

Native American Graves Protection and Repatriation Act (1990): Requires Federal agencies and museums to inventory, determine ownership of, and repatriate cultural items under their control or possession.

Americans With Disabilities Act (1992): Prohibits discrimination in public accommodations and services.

Executive Order 12898 (1994): Establishes environmental justice as a Federal government priority and directs all Federal agencies to make environmental justice part of their mission. Environmental justice calls for fair distribution of environmental hazards.

Executive Order 12996 Management and General Public Use of the National Wildlife Refuge System (1996): Defines the mission, purpose, and priority public uses of the National Wildlife Refuge System. It also presents four principles to guide management of the System.

Executive Order 13007 Indian Sacred Sites (1996): Directs Federal land management agencies to accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners, avoid adversely affecting the physical integrity of such sacred sites, and where appropriate, maintain the confidentiality of sacred sites.

National Wildlife Refuge System Improvement Act (1997): Considered the "Organic Act of the National Wildlife Refuge System. Defines the mission of the System, designates priority wildlife-dependent public uses, and calls for comprehensive refuge planning.

National Wildlife Refuge System Volunteer and Community Partnership Enhancement Act (1998): Amends the Fish and Wildlife Act of 1956 to promote volunteer programs and community partnerships for the benefit of national wildlife refuges, and for other purposes.

National Trails System Act: Assigns responsibility to the Secretary of Interior and thus the Service to protect the historic and recreational values of congressionally designated National Historic Trail sites.

Appendix G: Bibliography

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Appendix H: Mailing List

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Federal Officials
U.S. Senator Debbie Stabenow
U.S. Senator Carl Levin
U.S. Representative Dave Camp
U.S. Representative James Barcia

Federal Agencies
USDA/Natural Resource Conservation Service
USDI/Fish and Wildlife Service, Albuquerque, New Mexico; Anchorage, Alaska; Atlanta, Georgia; Denver, Colorado; Fort Snelling, Minnesota; Hadley, Massachusetts; Portland, Oregon; Washington, D.C.
USDI/East Lansing Private Lands Office; East Lansing Field Office; Alpena Fishery Resources Office; Ann Arbor Law Enforcement Field Office; Great Lakes Science Center, Biological Resources Division, USGS
USEPA, Great Lakes National Program Office, Chicago, Illinois;
USNPS, Sleeping Bear Dunes National Lakeshore, National Park Service, Omaha, Nebraska

State Officials
Governor John Engler
Senator Michael Goschka
Representative Carl Williams
Representative Jim Howell
Rep. A.T. Frank

State Agencies
Director Russell Harding, Michigan Department of Environmental Quality
Director K.L. Cool, Michigan Department of Natural Resources
State Historic Preservation Officer, Lansing, Michigan
Michigan Sea Grant College Program

City/County/Local Governments
City Manager, City of Saginaw, Michigan
Superintendent of Parks, City of Saginaw, Saginaw, Michigan
Chairman, Saginaw County Board of Commissioners
Director, Saginaw County Parks and Recreation Commission
Planning Director, Saginaw County Metropolitan Planning Commission
Township Manager, Thomas Township, Michigan
Township Manager, Bridgeport Township, Michigan
Township Manager, Saginaw Township, Michigan
Supervisor, Spaulding Township, Michigan
Supervisor, James Township, Michigan
Saginaw County Convention and Visitor Bureau

Libraries
Hoyt Main Public Library
Bridgeport Public Library

St. Charles District Library
Thomas Township Library
Zavel Memorial Public Library

Organizations

Pheasants Forever
Shiawassee Flats Advisory Council
The Nature Conservancy
National Audubon Society
Trout Unlimited
Michigan Duck Hunters Association
Ducks Unlimited
Great Lakes Commission
Saginaw Valley Audubon Society
MUCC District 10
Michigan Mountain Bike Association
Michigan Deer Hunters Association
Michigan United Conservation Clubs, Lansing
Castle Museum, Saginaw County Historical Society
Wildlife Management Institute
PEER Refuge Keeper
The Wilderness Society, Washington, D.C.
National Wildlife Federation, Ann Arbor, Michigan
Sierra Club, Midwest Office, Madison, Wisconsin
National Wildlife Refuge Association, Washington, D.C.
The Conservation Fund, Arlington, Virgina
Saginaw Bay WIN
Saginaw Valley Land Conservancy
Ruffed Grouse Society
Partnership for the Saginaw Watershed
Chippewa Nature Center
Friends of Shiawassee National Wildlife Refuge

Corporate

Johnny Panther Quest
Spicer Engineering

Newspapers

Saginaw News
Bay City Times
Flint Journal
Township Times
Birch Run-Bridgeport Herald

Tribes

Saginaw Chippew Tribe, Mt. Pleasant, Michigan

Individuals

Individuals who participated in open houses or focus groups or who requested to be on the mailing list.

Appendix I: List of Preparers

Appendix I: List of Preparers

Mark Beaudin, *Park Ranger*
Mr. Beaudin wrote the introduction.

James J. Dastyck, *Wildlife Biologist, Shiawassee National Wildlife Refuge*
Mr. Dastyck is the primary author of the resource and biological sections.

Edward P. DeVries, *Primary Refuge Operations Specialist, Shiawassee National Wildlife Refuge*
Mr. DeVries assisted in overall direction, supervision, writing and editing.

John Dobrovolny, *Regional Historian, Region 3*
Mr. Dobrovolny is the primary author of cultural resource sections.

Rebecca Goche, *Park Ranger, Shiawassee National Wildlife Refuge*
Ms. Goche is the primary author of public use sections.

James Hazelman, *Refuge Operations Specialist, Shiawassee National Wildlife Refuge*
Mr. Hazelman is the primary author of private lands sections.

Jane Hodgins, *Technical Writer/Editor, Region 3*
Ms. Hodgins served as primary editor.

James Hudgins, *Station Manager, East Lansing Private Lands Office*
Mr. Hudgins is the primary author of the Michigan Wetland Management District section.

Sean Killen, *Cartographer, Region 3*
Mr. Killen produced figures and maps from GIS.

Judy McClendon, *Project Leader, Southern Missouri Ascertainment Office, Region 3*
Ms. McClendon wrote the initial draft of the environmental assessment.

John H. Schomaker, *Refuge Planning Specialist, Region 3*
Mr. Schomaker provided coordination and served as co-author.

Douglas G. Spencer, *Refuge Manager, Shiawassee National Wildlife Refuge*
Mr. Spencer provided overall direction, supervision, and coordination with agencies and the public. He assisted in writing and editing.

We gratefully acknowledge the help of Murray Laubhan and Richard Schroeder of the U.S. Geological Survey, Biological Resources Division, Midcontinent Ecological Science Center, Fort Collins, Colorado, for their guiduance and assistance in developing the habitat goals and objectives. We really appreciate their effort and expertise.

Appendix J: Summary and Disposition of Public Comments

Appendix J: Summary and Disposition of Public Comments on Draft Comprehensive Conservation Plan

Ten organizations and five individuals submitted comments on the Draft Comprehensive Conservation Plan. The following organizations submitted comments: Frankenmuth Conservation Club, Michigan Bow Hunters Association, Michigan Department of Natural Resources, Michigan United Conservation Clubs, Saginaw City Council, Saginaw County Board of Commissioners, Saginaw County Mosquito Abatement Commission, Saginaw County Mosquito Abatement Commission Technical Advisory Group, Shiawassee Flats Citizen & Hunters Association, Wildlife Management Institute.

We considered the comments as we prepared the final Comprehensive Conservation Plan. The following paragraphs describe the comments and our response.

Mosquito Control

The Saginaw County Mosquito Abatement Commission (SCMAC) expressed concerns that eliminating routine mosquito control would create a public health threat from mosquito-borne disease. The SCMAC, however, failed to identify any specific human health threat that would result from eliminating the current mosquito control operations on the Refuge. None of the species currently targeted for control on the Refuge is a primary vector of Eastern Equine Encephalitis, St. Louis Encephalitis, or West Nile virus (a disease that has yet to be identified in Michigan). LaCrosse encephalitis is vectored primarily by the treehole mosquito, *Ochlerotatus triseriatus*, a species that has not been targeted for control on the Refuge. The mosquito species currently being controlled on the Refuge are all weak fliers, and seldom venture far from their woodland larval habitat.

The SCMAC questioned the authority of the Regional Director of the U.S. Fish and Wildlife Service to determine a human health emergency. As stated in the CCP, the Regional Director would determine a human health emergency "for purposes of treatment of refuge lands for disease-carrying mosquitoes". To clarify this, it is expected that the State would initially determine a general health emergency and the Regional Director could, after consultation, determine that the health emergency necessitates the treatment of mosquitoes on Refuge lands.

The SCMAC stated that mosquito pesticides are "unlikely to have substantial effects on aquatic and/or flying insects or fish in or near wetlands". Numerous scientific studies have indicated that all currently used mosquitocides have the potential to impact non-target organisms. A published multi-year study conducted in Minnesota indicated significant food web effects from the long-term use of Bti, the pesticide currently being applied on the Refuge by SCMAC. (Hershey et al. 1998, Niemi et al. 1999)

The SCMAC also claimed that by eliminating mosquito control on the Refuge, the Service would be in violation of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and its companion legislation, the Food Quality Protection Act (FQPA). The objective of FIFRA and FQPA is to protect human health and the environment from

pesticides through appropriate registration and labeling procedures. Neither FIFRA nor FQPA requires federal agencies to control mosquitoes.

The above discussion also responds to comments received from the Saginaw County Mosquito Abatement Commission Technical Advisory Group.

As stated in the plan, the Refuge will continue to cooperate with the Saginaw County Mosquito Abatement Commission in the monitoring of mosquito populations on Refuge lands and in the removal of tires or other debris that serve as artificial breeding sites.

Croplands

Some comments supported the draft plan's reduction of croplands. Other comments cautioned against elimination of food plots and proposed that crop depredation will continue to be an issue for the next 15 years and beyond. The value of cropland for geese and wildlife viewing were also noted. These points are addressed in the rationale of objective 1.8. In addition, we note that when we decrease cropland we will increase shallow and deepwater habitat, which will provide alternative food sources for migrating waterfowl and other wetland-dependent migratory birds.

We will consider the use of small food plots to enhance wildlife observation as we write a more detailed step-down plan for public use. We have noted this intention in our cropland discussion in the CCP.

The seriousness of the concern related to crop depredation is dependent upon the rate of conversion of lands within the Refuge and the rate of changing land use outside the Refuge. Both of these rates are uncertain. As part of the entire plan, we will monitor our management of croplands and its effects and consider these effects during plan review and revision.

Habitat Management

Organizations criticized the objectives for deep-water and moist soil habitats. They felt that the acres specified were too low and that the habitats should be maximized for migratory species. Our intent is to maximize the acres available. But to control the vegetation in these habitats, it is not possible to have all the acres available each year. We feel that the objectives better reflect what actually occurs and is realistic under active management. Also, the objectives set minimum acres; we will attempt to exceed theses minimums whenever possible.

A comment suggested that we place greater stress on the importance of the Refuge to waterfowl, especially the Southern James Bay Population of interior Canada geese. We recognize that a purpose of the Refuge is for waterfowl. The Refuge supports migrants in mid-migration with deep water habitat and supports waterfowl production with shallow water habitats. We have amended wording in the plan to reenforce the waterfowl purpose of the Refuge.

An organization urged us to state a preference for native plants in grasslands (objective 1.7). Native plants are our preference. We have added a phrase in the plan that makes this preference more explicit.

Wildlife-Dependent Recreation

Organizations and individuals encouraged us to emphasize hunting, fishing, and trapping more in the plan. Their comments included requests to include the importance of hunting and active management of habitats in interpretive materials; expand and maximize hunting, fishing, and trapping opportunities. Two organizations wrote in support of the "Early Youth Waterfowl Hunt." Another comment urged us to mention the potential need to control turkey populations through hunting.

The comments related to interpretive materials, hunting, and trapping will be considered when the more detailed step-down plans are written and revised. We note, however, that Congress did not designate trapping as a "wildlife-dependent recreational use" in the National Wildlife Refuge System Improvement Act of 1997. Trapping is not considered as one of the "Big 6" activities. We recognize trapping as a management technique and we will use it, if necessary, to manage populations on the Refuge for specific purposes. The topics covered in the step-down plans will include the "Early Youth Waterfowl Hunt" and the possibility of a turkey hunt. Bank fishing access is expanded within the plan. If the fishing use does not show a detrimental effect on wildlife or refuge resources, we will consider additional access sites during future plan reviews. We also recognize the potential for conflicts between people and deer, turkey and Canada geese. If conflicts increase to an unacceptable level, we will modify our hunting program to address the conflicts.

Trails

An organization cautioned that trails should not conflict with hunting and other priority uses. Two individuals suggested specific alignments for new trails and associated facilities within the Refuge. We think trails facilitate the wildlife-dependent recreational uses of observation, photography, environmental education, and interpretation. We do not think the existing and proposed trails conflict with the hunting that occurs on the Refuge. We have considered adding more trail access in the next 15 years. We think that we should construct the trails that are proposed in the plan and monitor their use and effect on wildlife in order to meet our "Wildlife First" mission. If trail use does not show an effect on wildlife, we will consider additional trails during future plan reviews.

Other Topics

An individual urged us to increase our consideration of reptiles and amphibians in the plan and to include more specificity, highlight the monitoring of these species, consider these species in developing acquisition priorities and in management, monitor the impact of public use on these species, increase the emphasis on these species in education programs, and use volunteers to benefit these species. These comments will be considered and incorporated as more specific step-down plans are written. We recognize that reptiles and amphibians are an important aspect of the biological web on the Refuge. We intend to not harm these species and to better understand their status on the Refuge during the life of the plan.

An individual repeated the need for additional law enforcement that was heard during the scoping meetings. The additional law enforcement positions proposed in the plan address this need.

An organization wrote encouraging us to restore the natural stream flow to the Flint River by installing a cofferdam on the Spaulding Drain. The organization correctly identified this as a problem that is off the Refuge. We expect to address this issue as part of our watershed and water quality activities within the Comprehensive Conservation Plan.

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