

## 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.

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.



Photo by Kim LeBlanc

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

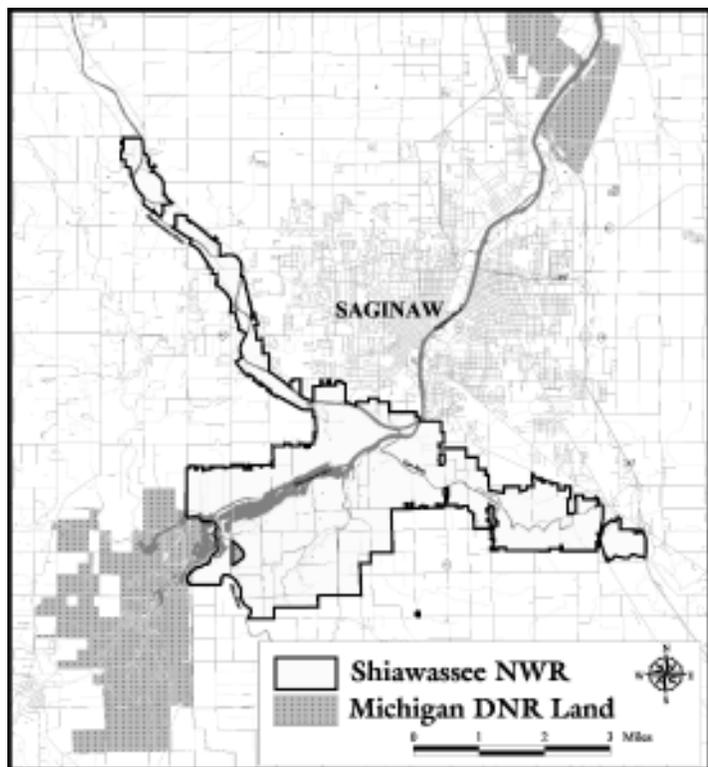
expected to be available with continued urban development. Although birds like the American robin, blue jay, downy woodpecker and black-capped chickadee do well in fragmented forested areas in suburbs, others like the pileated woodpecker, yellow-throated vireo, cerulean warbler, and broad-winged hawk 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).

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)

**Figure 3.2: Shiawassee NWR and Other Wildlife Areas**



## 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

### 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.

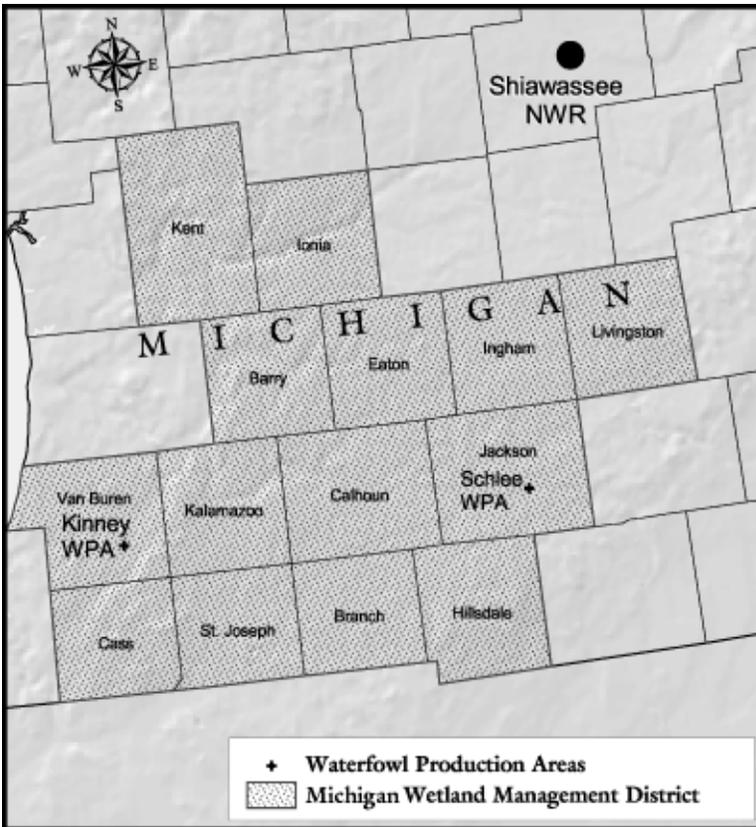
The Waterfowl Production Area Program, as authorized by Congress in 1958 by amendment to the Migratory Bird Hunting Stamp Act, was initiated in 1961 to preserve natural wetlands that were rapidly being destroyed nationwide by agricultural drainage, housing development and other commercial land use practices. 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.



Photo by Kim LeBlanc

**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 jurisdic-

tion 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.

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.



Photo by Myles Willard

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.

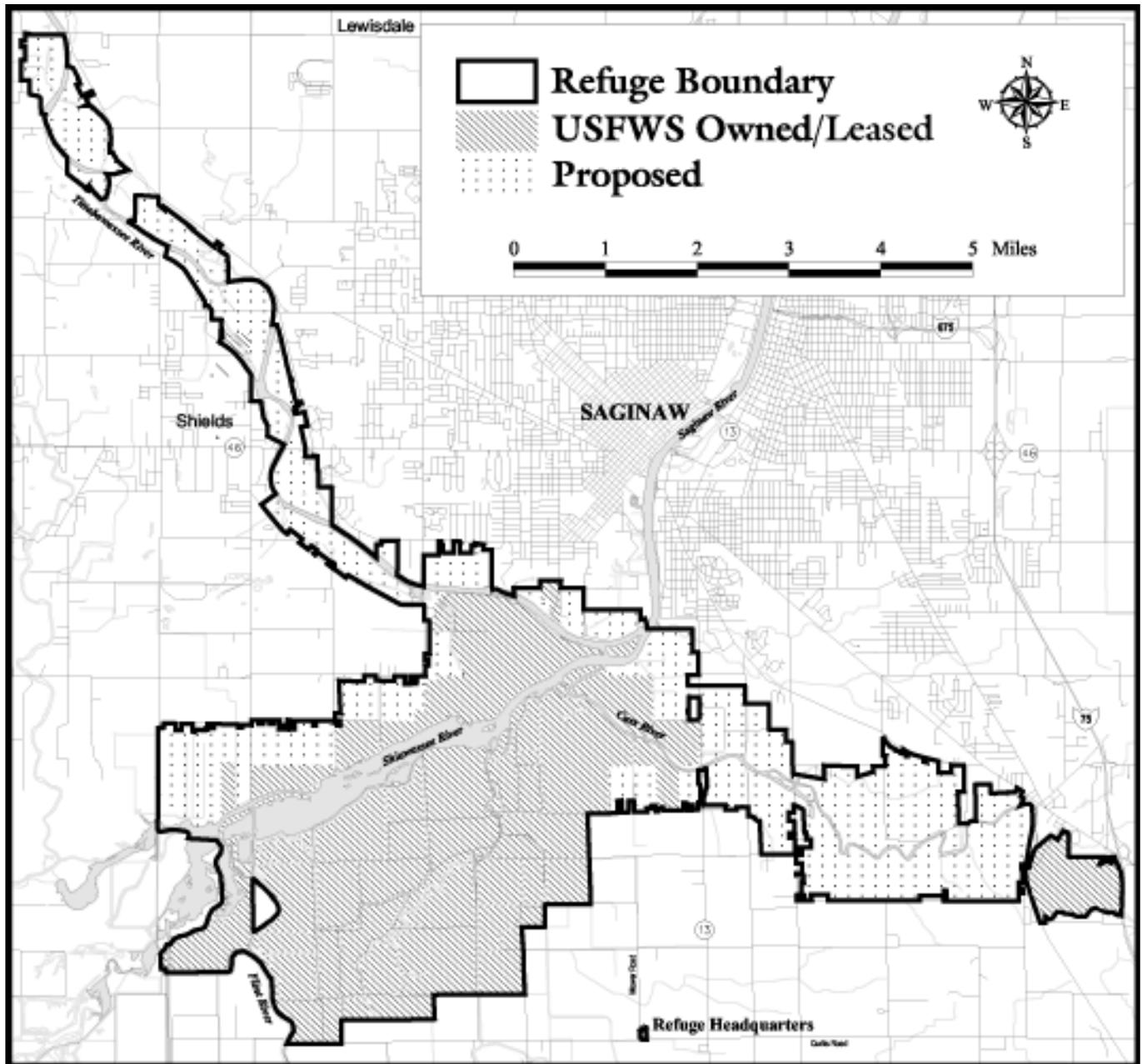
We have considered the ecosystem context, the over arching conservation programs, state listed species, and the regional resource conservation priorities as we wrote this comprehensive conservation plan.

## 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.

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.



Photo by Myles Willard

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, Greffe, 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 tilled 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

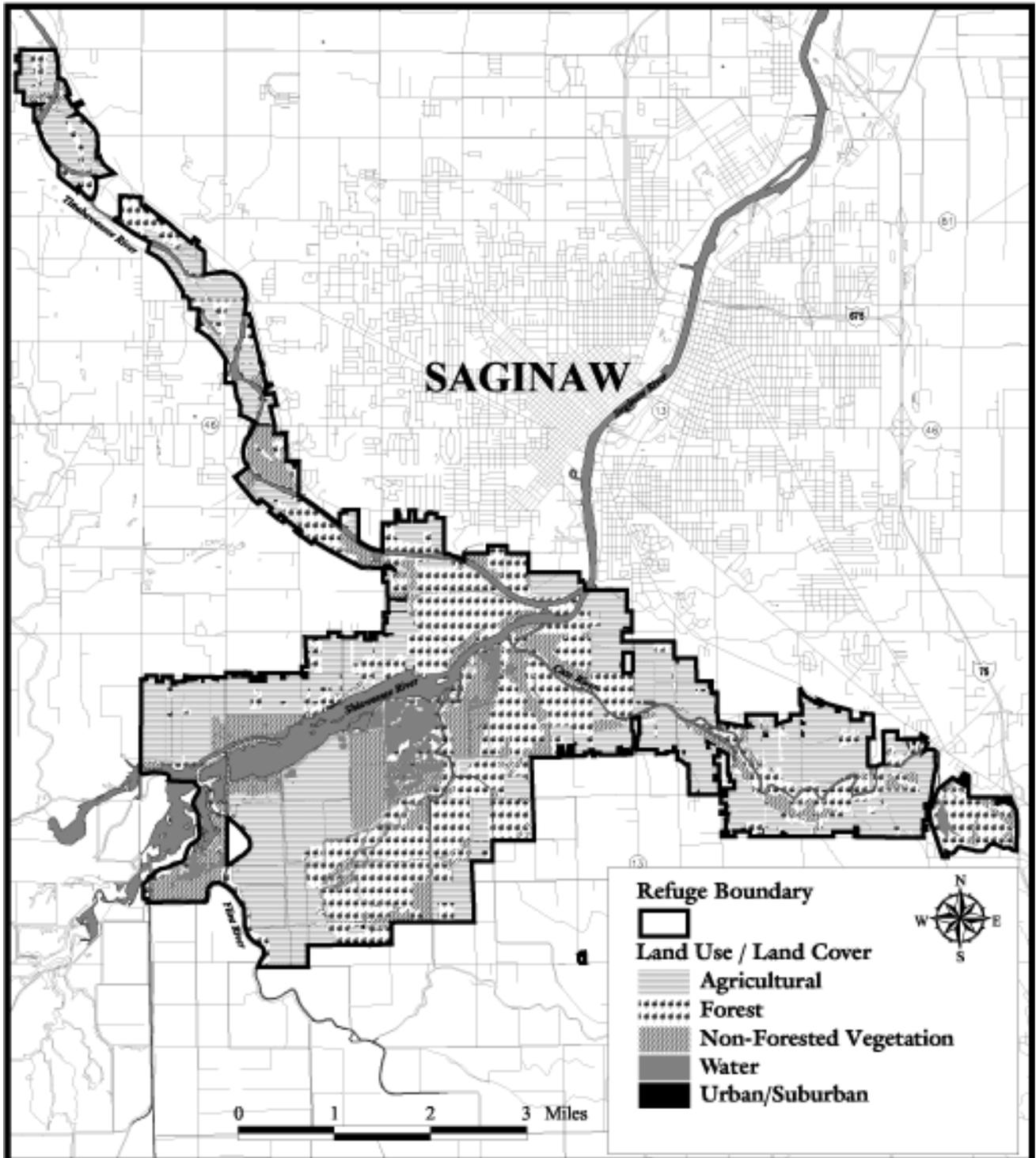
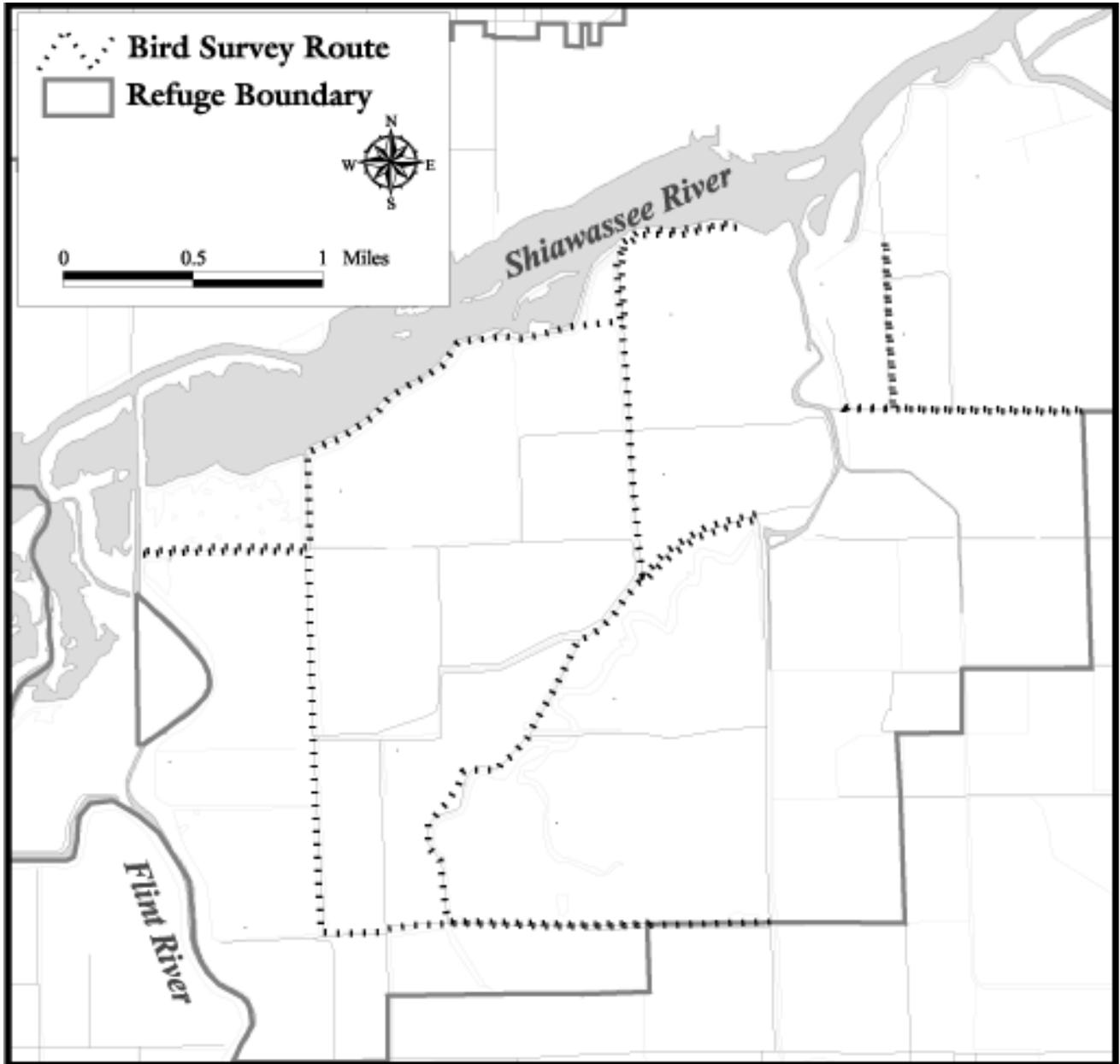


Figure 3.7: Route Used in Bird Counting



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.

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.



Photo by Kim Lablanc

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

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.



Photo by Kim LeBlanc

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.