



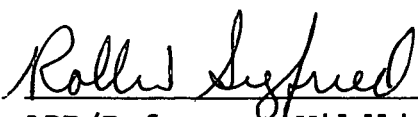
REVIEW AND APPROVALS

SHIAWASSEE NATIONAL WILDLIFE REFUGE

Saginaw, Michigan

ANNUAL NARRATIVE REPORT

Calendar Year 1996

 Refuge Manager	<u>3/5/99</u> Date	 Geographic ARD Review	<u>3/31/99</u> Date
		 ARD/Refuges & Wildlife	<u>3/23/99</u> Date

INTRODUCTION

Shiawassee National Wildlife Refuge (NWR) is located in the central portion of Michigan's lower peninsula, near the south end of Saginaw Bay. The north boundary of the refuge adjoins the south boundary of the City of Saginaw. It is in the fourth and fifth U.S. Congressional Districts of Michigan. The Michigan Islands NWR and the Wyandotte Islands NWR are also administered by Shiawassee NWR.

The establishment of Shiawassee NWR was authorized in March, 1953, by the Migratory Bird Conservation Commission under the Migratory Bird Conservation Act (16 U.S.C. 715-715s) "...as an inviolate sanctuary, or for any other management purpose, for migratory birds." As a result of local and regional conservationists' initiatives toward reclamation (from marginal agriculture to natural habitats), the state of Michigan established the Shiawassee River State Game Area adjacent to the Refuge. Together, these two areas encompass and practice complimentary management on approximately 20,000 acres of some of the most valuable waterfowl habitat in the State. The Refuge is 9,094 acres in size.

Shiawassee NWR, a portion of an area known locally as the *Shiawassee Flats*, has a contributing drainage area of approximately 6,060 square miles (10.6 percent of the state of Michigan). Four rivers converge in the Shiawassee NWR and account for the majority of the contributing drainage area. These rivers, along with their drainage area at the nearest USGS gauge, are as follows: the Tittabawassee, with a 2,400 square-mile drainage at gauge on river mile 23; the Flint, with a 1,200 square mile drainage at gauge on river mile 12; the Cass with an 850 square-mile drainage at gauge on river mile 17; and the Shiawassee, with a 640 square mile drainage at gauge on river mile 14. In addition to the four main tributaries, several smaller streams enter the Shiawassee River within or just upstream of the Refuge. The largest of these are the Bad River, draining 248 square miles; Mistequay Creek, draining 137 square miles; and Swan Creek, draining 176 square miles. At the northeastern edge of the Shiawassee NWR, at the confluence of the Tittabawassee and Shiawassee Rivers, the Saginaw River proper begins. The Saginaw River, 22 miles long, flows northerly from this point through the cities of Saginaw and Bay City to discharge into Saginaw Bay, an arm of Lake Huron.

Topography on the Shiawassee NWR is flat and generally ranges from 580 to 590 feet m.s.l. Flooding of the Refuge area occurs often, due to the Saginaw River's inability to carry the full load of runoff from the various tributary rivers. Flooding may be compounded by ice blockage of the various river channels during late-winter breakup. Water level elevations in the Saginaw Bay also have a heavy influence on flooding events in the Refuge area. Bay water levels are influenced by winds which may change water level elevations by four feet or more. The average water level in Saginaw Bay is 579.5 feet m.s.l.; however, deviations above and below that level are the rule rather than the exception. Although water level fluctuations from these "wind tides"

are not as high a magnitude on the Refuge as on the Bay, daily changes of one or two feet are quite common. The combination of high Bay water levels and high river discharges occurring concurrently poses the greatest threat to flooding.

As recognized during its initial establishment, Shiawassee NWR provides a valuable stopover for waterfowl migrating through the Saginaw Valley. In the fall, peaks of 35,000 ducks utilize the Refuge, including up to 4,000 black ducks. The significance of this last figure is such that the Refuge is included within one of six focus areas designated by the lower Great Lakes/St. Lawrence Basin Joint Venture of the North American Waterfowl Management Plan. The area also remains an important migration site for the Southern James Bay Population of Canada geese, with current spring/fall peaks of 25,000/23,000, respectively.

Due to its habitat diversity, the entire Refuge serves as endangered and threatened species habitat for a number of federal and state-listed wildlife species.

The Shiawassee NWR Management District, established in 1988, covers 45 counties in central and southern Michigan. It includes 99 easements totaling 4,260 acres, located in 34 different counties. The district also manages a 22-county area for wetland restorations.

In September, 1993, Shiawassee NWR entered into a partnership with the City of Saginaw through which the Refuge manages Green Point, a city-owned, environmental education facility. Renamed by the Service as Green Point Environmental Learning Center (ELC), the center is located on the Tittabawassee River, which flows adjacent to the Refuge.

Currently, the Shiawassee NWR is staffed by eight permanent employees, one temporary employee, and one term employee. The positions include a refuge manager, three refuge operations specialists, a wildlife biologist, an administrative technician, two maintenance workers, a biological sciences technician, and one park ranger.

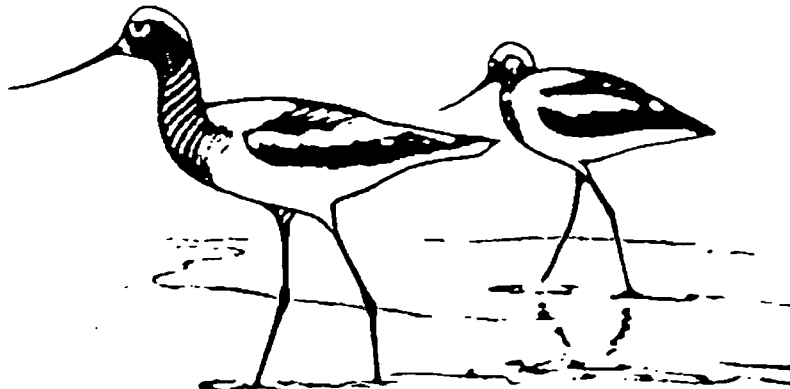


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A. HIGHLIGHTS

- ♦ Second highest precipitation levels ever experienced on the Refuge (Section B).
- ♦ Nearly 2,000 white oak seedlings, along with other bottomland hardwood tree species were planted on the Refuge. The trees were purchased through Challenge Grant funding (Section F.3).
- ♦ Propagation of *Galerucella californiensis* and *G. pusilla* beetles initiated to aid in the biological control of purple loosestrife (Section F.10a).
- ♦ Record number of bird species recorded on Refuge in 1996 (Section G.1).
- ♦ Refuge bald eagle pair produce one young (Section G.2a).
- ♦ Changes improve production in wood duck nest boxes (Section G.3b).
- ♦ Great blue herons nest at Shiawassee NWR for the first time in a decade (Section G.4).
- ♦ Restored wetland area of Farm Unit 1 provides benefits to a multitude of migratory bird species (Sections G.4 and G.5).
- ♦ June flooding washes out the nesting season of many critical Refuge bird species (Sections G.4 and G.7).
- ♦ Refuge Headquarters office renovation completed in August (Section I.2).

B. CLIMATIC CONDITIONS

Precipitation levels for 1996 were unpredictable throughout the year, resulting in wetter than normal conditions on the Refuge. The 12 month precipitation totals were above the 35-year average for the Shiawassee area. For the first three months of the year, snow and rain precipitation levels were normal. At the beginning of the growing season, spring rains became heavy and continuous, resulting in the flooding of most of the Refuge for the months of May and June. The flooding severely impacted most refuge activities and dramatically altered animal and plant productivity.

During the summer months, precipitation levels were near the 35 year average, while in the fall moisture levels increased and



High water in May topped the Woodland trail bridge over Bullhead Creek. (DGS)

resulted in above normal water levels. Precipitation levels in 1996 finished as the second highest level ever recorded on the Refuge. The 43.56 inches of precipitation experienced last year was more than what was received in 1986, the year of the 150-year flood. The Refuge also experienced below normal temperatures throughout most of the calendar year.

These two weather factors, complimented each other in creating a condition which profoundly affected Refuge operations, habitat, and wildlife. Habitat surveys reported changes in plant composition on a number of units as a result of the weather encountered this year. Overall, the Refuge was negatively impacted by these climatic conditions. Over the last few years, heavy precipitation levels throughout the Great Lakes Region has resulted in higher than normal Lake levels. Abundant precipitations levels coupled with the high Lake levels, will severely limit operation and management of the Refuge.

C. LAND ACQUISITION

1. Fee Title

Following the public meetings held in 1995, the Final Environmental Assessment (EA) for the Additions to Shiawassee NWR was completed this year. Due to the death of Stan Jackowicz (R3-Ascertainment) in February, the completion of this EA was put on hold until June. Stan was very instrumental in setting the course for completion of the Preliminary Project Proposal (PPP) for expansion of the Shiawassee NWR by 7,500 acres. His work ethic and drive will be missed by this Refuge and the Service.

Jane West (R3-Ascertainment) took on the responsibility of completing the EA, and visited the Refuge in June to review public comments and gather staff input. Final revisions were written and the Final EA was published in November, 1996. Land acquisition will include tracts listed in the EA, and purchased from willing sellers. These tracts lie along riparian corridors of the Cass, Shiawassee, and Tittabawassee rivers. Funding for the acquisitions will come through Congressional appropriations authorized under the Land and Water Conservation Fund.

3. Other

All Refuge land at Shiawassee NWR is held in fee title. Consumers Power Company has been granted various rights-of-way permits for wooden pole, overhead service lines (4800V) to the secondary headquarters, to Farm Unit 9E on Houlihan Road, Farm Unit 1, and to Moist Soil Units 1 and 2. They also hold fee title to a right-of-way for high-power transmission lines (on steel towers) across approximately one and one-half miles of the former Johnson Tract on the north side of the Refuge. Eastern Panhandle Gas Company has an easement for a gas pipeline running from the Evon Road area, under the Shiawassee River, and through the former Johnson Tract. Various local drainage ditches have rights-of-way through Refuge lands to the Saginaw River tributaries located within Refuge boundaries.

4. Farmers Home Administration Conservation Easements

The Shiawassee Wetland Management District (WMD) is responsible for a 45 county area located in southern Michigan. We currently administer 99 conservation easements in 34 counties within the WMD totaling 4,260 acres.

Two of the 99 conservation easements were transferred in fee title to County Soil and Water Conservation Districts to be managed as outdoor education areas. The WMD received 2 new conservation easements to manage in fiscal year 1996.

D. PLANNING

2. Management Plan

In January, Water and Fire Management Plans were submitted to the Regional Office (RO) along with the Green Point Environmental Learning Center annual work plan. In August, Trapping and Hunting Plans were submitted to the RO.

5. Research and Investigations

Shiawassee NR93 Monitoring Nongame Migratory Bird Nesting on the Idle Fields & Wetlands of a Lapeer County Michigan Farm 31520-931 Principal 1996
Investigators: Private Lands Biologist Jim Hazelman and Refuge Biological Technician David Peters.



Peters and DeVries conducting breeding bird survey on Lapeer County Farm. (JTH)

This project takes advantage of an opportunity to monitor the breeding nongame bird community on a Lapeer County, Michigan, farm. This site's recently idled cropland and hayfield are enrolled in the U.S.D.A. Conservation Reserve Program, and several wetlands have been restored through the Partners For Wildlife program. Utilizing standardized point-count methods this study seeks to provide insight into the relationship of nongame migratory birds and the conservation initiatives initiated on agriculture lands by governmental agencies and rural landowners.

The study will illustrate bird composition and use in CRP fields during natural succession from cropland and hay/pasture fields to grassland and fallow field conditions. The data can be used to illustrate to rural landowners and agencies of the contribution their idled or retired agriculture land can make towards the conservation of declining migratory bird species and habitats. The study will present an evolving picture of avian use on a natural succeeding grassland community on a regional private land site. This study will go beyond the capability of road-restricted Breeding Bird Survey routes, yet have comparable data.

The effects of site maturity were evident in the 1996 point count results. As the wetlands reached a more fully vegetated condition, marsh wrens were recorded for the first time. As the grassland community extended its coverage on to the former croplands, the once abundant savannah sparrow declined to an all time low. Blackbird species benefit greatly from these fields, with 31 bobolinks and 29 red-winged blackbirds being recorded this year.

E. ADMINISTRATION

1. Personnel

We were pleased to have Ken Adams join our staff for a brief time this summer. Ken was a Cooperative Education student from Ohio State University, and had previously worked at Ottawa NWR. Ken provided a lot of biological support, especially in this, our first year of the *Galerucella* beetle rearing program. Ken transferred in September to a permanent position as a Wildlife Inspector at the Port of Chicago, in the Rosemont LE Office.



Restored Partners For Wildlife wetland on Gary Running Farm in Lapeer County. (JTH)



Staff Photo: Front Row (from left): 5,2,11,3,10;
Back Row: 4,6,1



Staff Photo: Nowosatko and Noftell

1. ADAMS, Kenneth D.- Biological Aide GS-4, EOD 6/10/96, Co-op Student, Ohio State U., transferred to LE-Chicago, 9/96
2. DASTYCK, James J - Wildlife Bio., GS-11, EOD 11/4/90, PFT
3. DE VRIES, Edward P - Refuge Ops Spec, GS-11, EOD 2/9/92, PFT
4. DUSHANE, Steven D - Park Ranger, GS-5, EOD 3/6/94, TFT, one-year temporary appt extension effective 3/6/96
5. GOCHE, Rebecca S - Refuge Ops. Spec, GS-9, EOD 8/22/93, PFT
6. HAZELMAN, James T - Refuge Ops. Spec GS-11, EOD 10/2/94, PFT
7. NOFTELL, Marcia K. - Admin. Tech GS-6, EOD 7/11/94, PFT
8. NOWOSATKO, Marion L - Maint. Worker WG-8, EOD 6/29/78, PFT
9. PETERS, David J - Bio. Sciences Tech, GS-4, EOD 5/5/91, TFT, one-year term extension effective 12/3/96
10. SPENCER, Douglas G - Refuge Manager GS-12, EOD 09/01/91, PFT
11. WYRICK, Christopher S - Maint. Helper WG-6, EOD 5/19/91, PFT

2. Youth Programs

Shiawassee NWR is a member of a partnership in cultural diversity formed by the U.S. Fish and Wildlife Service, the University of Michigan's School of Natural Resources, Buena Vista High School in Saginaw, and Gibsonburg High School in Ohio. Shiawassee NWR and Buena Vista High School signed a plan of action with other partners on October 21, 1992, to promote cultural diversity interest in the natural resource field. The "Plan of Action for Cultural Diversity" was implemented to encourage and provide students of color and other individuals the opportunity to contribute to the management of Michigan's natural resources. The 5 YCC participants for 1996 are listed below:

YCC ENROLLEES:

1. BAKSA, Brent M. - Social Service Aid GS-4 (group leader)
2. CARPENTER, LaShonda M. - enrollee
3. FINNEL, Arthur G. - enrollee
4. RAILLING, Aaron M. - enrollee
5. ROBINSON, Derrick L. - enrollee
6. TURNER, Sean A. - enrollee

The month of May involved preparation and planning for the summer YCC program, with the submission of Job Hazard Analyses and Form 4's, and the purchasing of supplies. Five enrollees and a group leader were selected. The program started on June 17 and began with cleanup and maintenance of the headquarters area and the "Landscaping for Wildlife Project". The group performed trail maintenance and removed litter. They also made several off-Refuge trips including; 1) a visit to Grayling, Michigan to view nesting sites of the endangered Kirtland's warbler and discuss management of this species with the MDNR,



YCC PHOTO From Left; 2,1,3,4,5,6 (DGS)

2) viewing of federally protected threatened and endangered species at the Detroit Zoo, and 3) a visit to the University of Michigan's School of Natural Resources to discuss natural resource careers. The program concluded on August 9.

3. Other Manpower Programs

In June, the Practical Education for Citizenship and Employment (PECE) group, a youth program funded by the city, began working at Green Point ELC with a group leader and eight enrollees. The PECE crew maintained 2.5 miles of trails at Green Point, mostly through wood chip replacement, and also pulled some purple loosestrife and willows in Moist Soil 2 at the Refuge. The program ended in August, with a total of 866 hours donated to the Refuge.

The Student Placement Services for the Saginaw School District funded one intern at Green Point ELC during the summer. David Boruszewski worked with groups visiting the Center, cleaned out storage areas, and helped with daily activities. He contributed a total of 191 hours to the Refuge.

4. Volunteer Program

Shiawassee NWR received assistance from 134 volunteers who contributed a total of 1,972 hours to the refuge in 1996. Refuge volunteers represent a diversity of interests and skills, as reflected once again in their contributions to the Refuge this year. Volunteers helped with the wood duck box program, nature trail and dike maintenance, administrative support, biological surveys, public use and education, facility and equipment maintenance, and the nonambulatory deer hunts.

A unique example of volunteer assistance provided was the help we received during the 1996 purple loosestrife control program. Volunteers helped Refuge staff dig up and pot loosestrife plants for nursery propagation of *Galerucella* sp. beetles, which will be utilized as a means for biological control of this invasive wetland plant.

On May 4, an appreciation breakfast was held at the Green Point Environmental Learning Center, to recognize the



Wildlife Observation Tower was restrained by the YCC. (DGS)



James Finlayson was recognized as the 1995 Refuge Volunteer of the Year at the Volunteer Breakfast on May 4. (EPD)

station volunteers who contributed over 3,000 hours in 1995, and to present them with awards and gifts. James Finlayson received the Volunteer of the Year award for his assistance with public events and programs at Shiawassee NWR and Green Point ELC.

5. Funding

Funds for FY96 were obligated conservatively. Approximately 80% of all the operating funds went toward salaries. Almost all travel and training were curtailed due to lack of allocated funds, except for training funded by the Regional Office or fire funds. Only mandatory travel/training was allowed, as required for law enforcement and the management of the Wetland Management District. Funding for utilities, office equipment maintenance and supplies, fuel, etc., was taken out of Maintenance Management System (MMS) funds.

Funds from recreational user fees collected on the Refuge were used to manage Refuge hunts. A total of \$6,197.00 was obligated.

DeSoto NWR sent a check for \$2,750 to the Burdick Seed Company in Saginaw, to add to an existing account set up for the purchase of seed, fertilizer, etc. Seed was purchased for the Landscaping for Wildlife project, and for seeding the dikes of the moist soil units. This fund was also used to purchase plastic pots, soil medium, netting, and other materials for propagation of host loosestrife plants for the *Galerucella* beetle-rearing program.

6. Safety

In 1996, Shiawassee NWR continued to comply with the friendly environmental compliance safety inspection carried out in May of 1995. The inspection covered environmental regulations enforced by the EPA and OSHA, dealing with hazardous materials and the hazardous communication program. The inspection was carried out by a team of personnel from the Army Corp of Engineers and the USFWS Region 3 engineering staff. To date, the Refuge has complied with 18 out of the 25 findings. At the end of the year a report was submitted to the Region on what would need to be done to correct the situations cited in the seven remaining findings. The refuge was also visited by the Regional Safety Manager in October. He conducted a safety evaluation of the Refuge facilities and land. A report on the evaluation was received at the Refuge late in the year. The findings will be acted upon in the coming year.

Shiawassee Refuge had some minor accidents last year which involved no lost time. Safety meetings were held monthly with the following topics discussed:

<u>Month</u>	<u>Meeting Topic</u>
January	Status and compliance with Environmental Audit.
February	Fire physicals and step tests.
March	Review of Refuge safety program and information on Hantavirus and safety.
April	Video - Defensive Driving Tactics
May	Staff were given information on a health hazard alert on Blastomycosis (Gilchrist's Disease). Information on this hazard, provided by the RO was explained and

	discussed.
June	Hazardous Communication Program review and update on training on hazardous products on the refuge.
July	Red Cross CPR training for refuge staff.
August	No safety meeting - three members of staff on wildfire detail.
September	Information on smoke hazards, first aid, chemicals, and system of burns.
October	Reviewed with the staff the hunting program and the safety precautions that must be taken during the fall.
November	No safety meeting.
December	The staff was presented information on burning wood for heat.

Doug Spencer, Ed De Vries, and Jim Dastyck attended a 40-hour Hazardous Waste Operations course in Lansing in June. The course complies with OSHA requirements for working at contaminated sites. Site sampling at Grassy Island (Wyandotte NWR) planned for later in the year, required completion of this course.



DeVries and Dastyck participating in Hazwoper training. (DGS)

F. HABITAT MANAGEMENT

1. General

The ability to manage refuge wetlands is tied directly to the level of the Saginaw Bay and River. Because of the Refuge's close proximity (13 miles) to the Saginaw Bay, the water elevation in the Bay (part of Lake Huron) have a direct impact on the Saginaw River and therefore impact water management activities on the Refuge. The Lake and Bay have risen well above the historical average as a result of record precipitation levels throughout the Great lakes Region during the winter and spring of 1995 and 96. When heavy rains came in May and June, the Shiawassee flats area was extensively flooded. The overall habitat condition at Shiawassee NWR was below average, with changes in wildlife use and plant composition varying on a tract by tract basis as a result of the flooding. The flooding occurred at a time when plants were just developing and most wildlife species were raising young. This adversely affected such things as moist soil plant development, crop production, seedling development of woody species and fruit and mast production. These extreme weather conditions affected food availability for adult wildlife and their young and reduced our ability to manage the moist soil units and other wetland management areas to benefit waterfowl and other migratory species. The flooding also reduced mammal populations throughout the Refuge and Shiawassee flats area.

2. Wetlands

A wide variety of wetland habitats are encountered at Shiawassee NWR, including moist soil units (MSU), greentree reservoirs, marshes, open water or pools, rivers and stream habitats. The Refuge currently protects and manages 3,479 acres of wetland habitats. The following is a chronology of events that occurred on each of these wetland units.

a. Moist Soil Unit 1.

This 136 acre unit is managed to provide optimum feeding habitat for migrating waterfowl. The unit also provides mudflats for shorebirds after the waterfowl migration. As usual, the spring thaw left this wetland tract with water levels above depths preferred by waterfowl. This necessitated an early spring drawdown that was not completed until mid April due to gate repairs. The drawdown lowered depths close to optimum levels preferred by waterfowl. After completing the drawdown, the unit remained stable for only three weeks. In May and June, heavy rains flooded most of the refuge and left the moist soil unit well above planned water depths. Flood conditions persisted for two months and on July 5, water was still covering the entire unit. Normally by this date the unit has already been dewatered to encourage moist soil plant development. The extended flooding dramatically altered plant development on the area. Sharp increases were noted in the amount of bulrush and spikerush covering the field. Field inspections found moist soil plants such as millet, smartweed, *Bidens* sp.etc., still occurring however, at lower densities.

The unit was kept dry through early October. Installation of a new water control structure prevented water from being added to the unit to control unwanted plant development. This allowed plants as cocklebur and bullrush to increase exponentially over the unit. Late summer field inspections indicated that while cocklebur, bulrush and spikerush increased, some undesirable plant species like purple loosestrife,

cottonwood and willow experienced declines. Late fall rains and water management activities gradually raised water levels in the unit to ideal depths by the middle of December.

Due to flood conditions, wildlife responded as expected with declines in use days for all migratory bird species during the spring migration. Fall flights experienced just the opposite conditions. The late summer drawdown provided an ideal mudflat situation for the fall marsh and shorebird flights. Fall waterfowl use figures showed continued utilization throughout the season as the water levels were gradually raised; resulting in more birds spending time in the unit this year.

b. Moist Soil Unit 2.

This 75 acre unit, adjacent to MSU 1, is operated and managed with the same intent; to provide feeding and loafing habitat for waterfowl and potential mudflats for shorebirds. The area lacks the open water segment associated with the lower elevations of MSU 1. Over the last few years the field has been dominated by moist soil plants over the eastern portion of the unit and emergent vegetative cover on the western part of the tract. This unit receives water in series after moving through Moist Soil Unit 1. At "ice out" in March, water levels were close to targeted depths, providing good feeding levels for waterfowl, making any drawdown unnecessary. Water levels were maintained at planned heights until mid April, when water was pumped from the moist soil unit 1 and 2 into the adjacent Pool 2 unit. The outcome was a mudflat in the southeast 1/4 of the field with the remainder of the area covered with just a couple inches of water. For a short period of time this provided ideal shorebird habitat and the birds responded with increased use. Within a couple of weeks, steady rains caused flooding over the entire area. The unit was under water for May and June. Finally, in the first part of July, a drawdown was initiated. The field followed the same water regime as MSU 1 for the remainder of the year. The plant community and food production levels found in this moist soil unit were strongly affected by weather conditions and scheduled renovation work. Field inspections showed a well developed purple loosestrife stand again this year. However, the stand was not as extensive or as dense as in 1995. The only control measure being used in this field is mowing. The purple loosestrife stand invading this tract has been pegged as a plant nursery for the beetle propagation project the refuge is involved in. Chemical control will not be used until after the year 2000. Beetles may be released on this site when the project is completed. Strong stands of millet, smartweed, and Bidens were found on the northeast corner of the unit. Moist soil plants such as millet were able to take advantage of the mowed portion of the field. The west end of the field was dominated by cattails, swamp milkweed and bulrush, plus invasive species such as cottonwood and purple loosestrife. Spring wildlife use on this unit showed an increase in goose and shore bird numbers, while duck numbers remained stable. The increases were attributed to cover preferences, where they readily took to the mowed area with it's shallow surface water and scattered mudflats. Fall use figures were down sharply. The major factor in this drop was the lack of surface water covering the unit. This offered little enticement for birds to use the field. This unit finished the year below planned water level management goals.

c. Moist Soil Unit 3.

Controlled management of this 92 acre field is still not possible due to the existing dike system and water control structure deficiencies. As a result, the management objective of providing feeding and loafing habitat for migratory waterfowl, marsh birds, and shorebirds is dependent on unpredictable weather patterns. This spring, river levels and weather conditions left this unit dry the early part of the year. Through the latter part of April and all of May and June, steady rains completely flooded this field. In July, the unit went through a rapid decline in water depth, leaving the field dry through September. Only minor gains were made in water depth through the fall bird flights. The area finished the year with substantial rains raising the water level to a beneficial depth for birds. Field surveys in the late summer showed the unit still remained a cordgrass-dominated plant community. Other common species were reed canary grass, smartweed and cocklebur. Encroachment of purple loosestrife continues to be only a minor problem. Spot spraying and hand pulling will be sufficient for control in 1997. As expected, wildlife use during the spring was way down. Low water levels left the unit dry early in the season, offering little advantage to waterfowl. As the season progressed, the area flooded, scattering the waterfowl and leaving no habitat for migratory shorebirds. The fall bird flights encountered conditions that mirrored 1995. Low water levels left the unit dry, presenting little enticement for fall flights to use the field. Until structural repairs to the dike system can be completed, use of this unit by wildlife remains subject to the whims of nature. This often provides poor habitat conditions during the peak use periods.

d. Moist Soil Unit 4.

This 82 acre unit is adjacent to MSU 3 and tied to the same weak dike and water control structure system; making water management just as impractical for this unit. Over the years, this field has developed into more of an emergent marsh on the northern 1/4 of the area, and a mixed moist soil/wet prairie on the southern 3/4 of the unit. The water regime in this unit followed very similar patterns to the other tracts on the Refuge. This management unit was flooded to excess in January. Shortly after January, the water depths went through a rapid decline, leaving the field dry into April. During the month of April, nature provided some early spring rains that caused the field to flood for the second time. As the weeks progressed, the unit gradually lost water and reached a level that was good for waterfowl. This situation persisted for only a couple of weeks before heavy rains produced extensive flooding in May and June. As soon as the precipitation stopped, the area moved quickly to drought conditions and the field remained dry until the fall. Precipitation occurring in October and November provided some habitat for migratory birds. The field finished the year with patchy ice covering the area and a water depth which provided limited habitat for waterfowl. Summer field surveys showed the northern portion of the field dominated by cattails and bulrush. The southern portion was dominated by cordgrass, foxtail, reed canary grass and some *Bidens* species. A lot of the typical plant species found on this tract were flooded out in the late spring. Willow was again found in the central portion of the unit. Control of purple loosestrife is not an issue in this area. Any needed control can be obtained by hand pulling or spot spraying individual plants. Wildlife use of this unit is directly tied to weather conditions and water availability; with nature's whims the controlling factor. With this in mind, the unit was either

totally dry or flooded almost the entire spring, and experienced a sharp decline in bird use. The drought conditions encountered during the summer extended through the fall shorebird flights. Things improved only slightly later in the year for the waterfowl, with a resulting small gain in use. Renovation work planned for this unit was not completed due to urgent needs at other work sites.

e. Pool 1A.

This 315 acre, open water unit operates chiefly as a loafing area for waterfowl. The unit also supports ideal year round habitat for a variety of marsh birds, and occasional seasonal habitat for shorebirds. The unit has now operated at management levels for four years. When snow and ice melted on this pool, in mid March, the unit was near planned water depth. The area experienced none of the typical early spring rains, leaving the unit at or below targeted water volumes into the middle of May. Once the rains started falling, they simply would not stop. The unit was flooded through May and June, reducing the amount of late spring waterfowl use and providing almost no habitat for migrating marsh and shorebirds. High water also reduced the nesting success of most wetland bird species. Through the remainder of the year the tract followed the water regime of all the units, with drought conditions gradually lowering depths through the summer and early fall. Late fall rains were not sufficient to raise water levels to intended depths by the end of the year. Field surveys during the summer not only indicated what the plant composition was but exposed damage caused by the flood. Erosion was observed on the top and sides of the dike along Spaulding Drain. Little or no erosion was noticed where buffer strips of emergent foliage prevented direct exposure to the earthen berm. The major components of the plant community changed little from last year. Emergent vegetation such as cattails, plus woody trees and purple loosestrife are still the dominant species. However, the early summer flooding did impact the development of some of the more desired food plants. Summer water levels are balanced between the need to overtop undesirable vegetation (to enhance the pool community and habitat potential) and the need to maintain water below the level of repair (to enhance the development of grasses needed to stabilize the dike and allow renovation work). This compromise still permits some measure of control in reducing infestations of purple loosestrife and cottonwood. Prolonged exposure to standing water has resulted in reduced distribution and density of these plants. Changes in this year's use figures can be attributed to a combination of factors such as water depth, food availability, flooding impacts and development of associated wetland habitats. With the ability to manage and adjust water depths, bird use of this unit can probably be maintained between $\frac{1}{2}$ and 1 million fall use days, and 50,000 to 100,000 spring use days.

f. Pool 1B.

This wetland unit is a 190 acre body of water immediately adjacent to Pool 1A. The pool, as is the case with 1A, operates as an open water area for loafing waterfowl. Management and events reported in Pool 1B mirrored those reported for 1A through most of the calendar year. The pool was frozen from the first of the year to middle March. After the spring thaw the unit settled out at a water depth which was optimum for waterfowl. The unit remained at this level until June. Heavy rains during the months of May and June pushed the water levels well into flood stage. In July, enough water had been drained from the unit to be near target levels. As in Pool 1A, the unit gradually lost water depth

through the summer and early fall. From September to the end of the year, the pool gradually increased in water depth. Again, the pool was near optimum use levels for waterfowl during the fall. Weather did not impact this unit as severely as its sister pool. Though the pool experienced differences in the composition of the plant community and losses to nesting birds, erosion was not as big a problem. Erosion was limited to small sections of the north and south dikes. Impacts to the plant community were felt by flooding preventing the development of many moist soil and emergent plant species. This pool has not experienced an invasion of purple loosestrife like other units and no control measures were taken. The area was dominated by emergent vegetation such as cattails, woody species such as willow and a variety of wetland food plants. It will be important to check and see if the bird response in this field was really a result of water depth or correlated to other factors.

g. Pool 2.

The renovation work started on this wetland in 1994 continued through the 1995 calendar year. This greatly affected water levels encountered by wildlife on this 115 acre pool. This pool entered the year with standing water covering the northern 1/3 of the unit. Drawdowns for water control repairs and the lack of fall rains in 1995 left little standing water on the tract going into 1996. Water was added to the unit through a gravity feed from MSU 1 & 2 around the end of March. However, the water receded just as quickly through a hole that had developed in the screwgate on the east dike. Repairs were completed to the structure the same day the hole was discovered; but water depths had returned to the level experienced at the start of the year. With water levels low on the unit, the pool was burned on April 2. Organic matter on the southern half of the unit was successfully burned off. The northern half was too wet to burn. After the prescribed burn and a clean out of the flapgate near the moist soil pump, water was again fed into the pool from the moist soil units. By mid-April, the water depths were close to planned levels where they remained until heavy rains in May and June flooded the entire tract. In July, the unit was rapidly drained to target depth. This was done to allow as much time as possible for renovation to the east dike near the screwgates. Water levels gradually declined through September as drought conditions assisted repairs to the dike. During that time the east dike was resloped and brought back up to grade. This is only a temporary repair, particularly with the high lake levels. This dike is the lowest on the unit and is fairly exposed to river effects through the Eastwood Drain. In order to properly protect this area the dike will have to be covered with filter fabric and stone. Late fall rains did manage to raise water levels slightly by the end of the year. However, the rains came late in the season and offered little potential for increase in bird use. The unit iced over in the first part of December. With the pool low during both the spring and fall flights for waterfowl, use figures were down accordingly. However, what ducks and geese didn't want, marsh and shorebirds did, and numbers during both flights increased. Cattails still cover the unit in pretty much a homogeneous stand. Muskrat numbers are low throughout the area, but with water placed on this unit in the spring of 1997, there is hope that their activity and numbers will open more of the unit. Other species noted in the pool were *Bidens* and rice cutgrass in the southeast and southwest corners, along with nutsedge on all of the edges. There was some willow and pickerel weed in the northeast corner of the Pool.

h. Pool 4.

Pool 4 continues to be inaccessible due to removal of the Miller Road Bridge. This situation persists to complicate, and make nearly impossible any maintenance or water management plans practical for this pool. Water levels, vegetation and wildlife are infrequently monitored. Pool 4 is currently in negotiations for land exchange with the State of Michigan. Substantial management measures are unlikely in the near future until the status of this unit is decided.

i. North Marsh.

North marsh is a 113 acre unit that provides a stable emergent marsh habitat used by waterfowl, marsh and shorebirds, plus a variety of other wildlife. Habitat quality in terms of water depth, vegetative diversity, and interspersation continues to be favorable. This unit is used extensively by wildlife as a loafing and brooding area. The exterior dike on the east side of the unit was breached in 1991. A repair project has been planned since that time. Materials for the repair have been stock piled on site but the lack of time and personnel kept this construction project off line again in 1996. Without having the breach repaired, the habitat potential and corresponding amount of wildlife use is the result of nature's whims. The weather-impacted water depths for this unit were extremely low at the beginning of the year. The marsh rose slowly over the winter and at ice out was near target levels. The marsh gradually lost water through the last part of March and all of April. This was quickly followed by extensive flooding through the months of May and June. Most of that time, the area around Evon Road was covered with more than a foot of water, and North Marsh was one big pool. The timing of the flood caused a drop in spring migratory bird use along with the loss of most production of ground nesting birds. Other wildlife species also suffered as a result of the flood. Following on the heels of the flood was an extensive drought experienced from July through the end of September. Going into the fall season the water levels were above planned heights, despite the drought, due to high lake and river levels. The water level slowly rose as rains and increased river depths pushed the unit about four inches above plan, where it finished the year. Fall bird use was also affected by the water regime encountered during the year. The timing of the flood destroyed most development of seed producing plants on the unit. The good stands of lovegrass, frogfruit, false pimpernel and nutsedge that were observed in 1995 were not seen this year. The resulting reduction in food availability depressed the number of birds using the area in the fall. The unit went into the winter and ice-up at 582.7.

j. Trinklein 1N.

This is one of three newly restored wetland units. It was converted from agricultural land back to wetlands in 1994. This tract is 91 acres in size and is designed to be a mosaic pattern of semi-permanent emergent marsh, moist soils and grassy nesting cover. All the needed tile, dike and water structure work was completed in 1994 while the unit was still in crop production. This is the second full year this unit has been operated as a wetland. The area has reverted to a mosaic pattern of a shallow emergent marsh in the northwest 1/4 of the field with



Trinklein 1N Unit which was converted to a wetland in 1994. (ED)

the remainder of the tract a blend of nesting grasses and shallow moist soil areas. The wetland was still not a controlled unit most of the year. The unit could be managed only after additional work was carried out on the west dike and water control structures. Water levels could not be recorded until August, when a staff gauge was placed in the ditch feeding all three of the converted wetlands. The unit finished the year with water control capabilities, except for re-enforcement needed on the west dike. Filter fabric and stone must be placed on the inside of this dike to prevent muskrat holes from creating leaks through the berm. Visual observations in the spring showed water depths providing an excellent mosaic of habitats and needed water depths for migratory birds of all species. Because of the large dike protecting this tract, the wetland was not affected by the flooding experienced elsewhere on the refuge. The unit carried optimum water levels through the spring and summer, with a recorded low of 580.4 (after August when the staff gauge was in operation) in September. During the fall and winter months the unit gradually increased in depth and finished the year at 581.1. This unit may have operated close to optimum levels in providing food and habitat for the variety of migratory bird species using the refuge. Large numbers of raptors, grassland birds, marsh birds, shorebirds and waterfowl were observed using the area throughout the year. However, things were not all rosy this year. The first signs of pest plants were found scattered through the unit. Seedling purple loosestrife and cottonwood plants were invading the transition zone between water and land. Considerable effort was spent to locate and hand pull as many of the seedlings as possible. A little over half of the wetland was thoroughly covered by late summer. The rest of the unit will be worked next year.

k. Trinklein 1C.

This 79 acre land tract is the center unit of the 241 acre conversion area restored in 1994. The area is composed of a shallow ponded area on the northeastern corner of the field, with the remainder of the tract operating as a mosaic mix of moist soil and grass nesting cover. The water regime for this unit followed the same pattern reported for Unit 1N; with very similar results. The field developed a good mix of food and cover for a variety of migratory bird species. This was also the first year pest plants were observed in this tract. Scattered purple loosestrife seedlings were encountered in the moist soil areas. An effort was made to hand pull all of the seedlings in the wetland. By the end of the summer, the entire unit had been canvassed and any plant encountered was removed. The wildlife and bird response to this unit was also similar to Unit 1N. However, this field is slightly higher and dryer than 1N and thus offered less total available habitat for waterfowl, but better habitat for other migratory bird species.

1. Trinklein 1S.

This is the southern-most unit of three land tracts converted from agricultural production to wetland habitats in 1994. The 71 acre field is a mix of grass nesting cover and two seasonal wetlands. The largest of the two wet areas appears to be developing into a shallow marsh, dominated by cattails. Habitat development on this unit cultivated less diversity and less of a mosaic pattern than the other sites. The wet areas are located in the west central portion of the field and the northeast corner near the 2-track road. The remaining expanse is covered by grassland offering nesting cover to a variety of bird species. This tract, being the highest and driest portion of the conversion, offers generous spring time use for waterfowl with limited potential during the fall. The fall use depends on significant amounts of rain to provide standing water for birds. Proper water depths can be maintained on this unit only when separate water control is obtained for each tract. This section did not experience the incursion of pest plants found in the other fields.

3. Forests

There are 4,225 acres of forested habitat at Shiawassee NWR. This acreage includes two tracts (300 acres and 520 acres) that operate as greentree reservoirs. These forest stands are mostly composed of bottom land hardwood tree species, made up of second-growth, even-age stands. The dominant species are silver maple, green ash, oaks, and hickories with very little under story. The forests are heavily used by deer, squirrels, raccoons, hawks and owls. The timberlands also provide habitat for a variety of more specialized forest interior avifauna. These units are the last remaining large tracts of bottom land forest in Saginaw County. Regeneration of selective and clear cuts, carried out in the late 80's, have shown steady development since deer numbers started to decrease in 1993. Deer numbers have stabilized around 35 animals per square mile and seedlings such as green ash and cottonwood have shown significant growth. Other tree species are still being over-browsed. To help with regeneration, the Refuge planted 1,600 white oaks, 200 cottonwood, and a few box elders at two sites. The plantings were a Challenge Grant project with the Service and the Shiawassee Flats Advisory Council as partners. The 14 to 16 inch seedlings were doing well at both sites until the May and June floods. The seedlings at one site could not survive two months under water, and suffered 90%

mortality, while at the other site the few plants that survived the floods were accidentally mowed since they appeared dead. The refuge could not plant nuts from mast producing trees this year, due to their lack of production. The forest management goal is to develop a two tier canopy, favoring mast and cavity-producing trees without jeopardizing populations of interior forest birds.

The greentree reservoir is intended to provide flooded bottom land habitat during the spring and fall migrations. Winter precipitation and gravity inflow added little water depth to already very dry units through March. In mid-April, the pools were finally able to gain some water as rivers rose from spring rains. This permitted waterfowl only about two weeks to use the available habitat before floods covered both pools through the months of May and June. As waters finally receded in July, we were able to assess damage to the dikes. We fared better than expected; finding no breaks in any of the dikes. However, we did suffer extensive damage. Soil and material was lost along the entire length of the Spaulding Drain Dike; on the east side of the pools. The road was heavily rutted and almost not driveable. The Flint River also eroded and completely removed a couple feet on the river portion of the dike. The Spaulding Drain Dike will breach in some future year if the dike is not offset or reinforced with filter fabric and stone. Erosion was also noted around the spillway separating Pool 3 from Pool 1B. After the floods, water levels in the pools gradually declined through October. During that time, emergency repairs were easily completed. Late fall rains raised water levels by the end of the year. No management activities for controlling pest plant species were initiated this year. Low water levels and the lack of spring rains offered little opportunity to apply additional water to the trees during the migrational flights. This was followed by extensive flooding through the months of May and June. These impacts not only reduced the use by migrating birds, but severely influenced the reproductive success of ground nesting and low, cavity nesting birds. Fall use by all migratory bird species was up sharply. This was probably a result of response to food availability. The largest portion of the increased use was by shorebirds, and ducks such as teal and widgeon. The timing of the flood and subsequent drought provided ideal shallow water, mud-like flats during the early fall flights. After these birds moved on, late fall rains raised the water levels for birds such as mallards and black ducks.

4. Cropland

Cropland acreage was reduced by 241 acres in 1995, with the conversion of the Trinklein units to wetland habitat. The conversion is located in the central portion of the Refuge, on the eastern edge of the 750 acre Trinklein agricultural unit. Historical records of dominant vegetative and habitat types for Saginaw County show this tract had originally existed as a complex of different wetland types (forested, emergent marsh and wet grassland habitat). This made the area a natural for transformation to a more diverse and complex wetland habitat system.

With 241 acres removed from active farming, the Refuge agricultural program for 1996 was comprised of 1,182 acres. The primary objective of the cooperative farming program is to provide food for waterfowl during the spring and fall migrations. However, approximately half of the total acreage is designed to support the managed goose hunt. Narrow strips of winter wheat are planted adjacent to corn strips that serve as cover (see section H8) 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 is left standing in the field through winter, and used as a hot food for early spring migrants.

The 1996 growing season was close to a disaster with yields well below historical averages. The fields were planted in the early spring, when heavy rains occurred and continued for two months. Even with most of the fields having capabilities to draw off excess water, the rains and flooding were too extensive, and most units could not keep up with the situation. Almost all the cropland fields were planted two and even three times. Planting continued into July, with cooperators having to switch to short duration and low yield seed sources. The few fields that weren't replanted suffered severe development and production impacts. Pre-emergent herbicide treatments were a complete failure and many of the post-emergent attempts were also unsuccessful. The timing was often too late to effectively reduce pest weed species. Finally, light, scattered, summer rains were insufficient to free crop from the grips of a drought and allow normal crop growth. When the fields reached harvest stage, crop yields were way below average, with many areas producing no crop at all. This provided ideal conditions for wildlife damage. Losses to wildlife were magnified due to low production and yields. With the fall season in full bloom, cooperators were busy trying to salvage remaining yields before migratory birds claimed the rest. Damage was so severe that the Refuge reduced the number of cropland hunt blinds by a third; there was no cover to hide in. With the dry weather pattern extending through the harvest season, farmers were able to till a number of their units as called for in the plan.

As part of the IPM Plan, for 1994 and 1995, over 400 acres were formally crop-scouted. Each cooperator had a portion of acreage enrolled in the program, on which the scout developed recommendations for herbicide and fertilizer use. The farmers were required to follow the recommendations on enrolled lands. The idea was to reduce overall amounts of chemicals applied to an area without lowering yields. Results over the two years indicate that yields and chemical use held steady, near typical levels. It appears that economics have already moved cooperators to a point of applying minimal amounts of chemical in order to achieve average yields on Refuge lands. With Refuge budget constraints and the ability of cooperators to obtain free soil sample analysis for fertilizer applications, the formal crop scouting program was dropped for 1996. However, all of the recommendations made by the crop scout were incorporated into each of the cooperator's programs, and will continue to be used until no longer pertinent.

5. Grassland

Grassland development and maintenance on Shiawassee continues to be a slow process. Wet heavy soils coupled with frequent flooding favor growth of hydric plants such as willow and resists the development of grasses. Prior to 1995 the Refuge had 580 acres in scattered parcels classified as grassland. About 2/3 were being naturally maintained in meadow condition while the remainder were slowly converting to shrub and tree habitat.

The 1996 assessment of the grassland units showed many of the fields doing well. The 75 acre switchgrass unit was burned under prescription in the spring and re-invigorated the field. The 60 acre grassland on

the north side has developed over the last couple of years with the timothy and clover mix increasing in density and starting to out-compete the Canada thistle that covered a good part of that area. The wet prairie grassland in MSU 3 continued to develop. This cordgrass dominated unit continued to expand and increase in density. Historic vegetation maps show the area as a native wet meadow or grassland. With this in mind the Refuge has proceeded to encourage the current natural development of this area to grassland habitat and away from a more typical moist soil unit. The 241 acre Trinklein conversion has resulted in a big increase in grassland acreage at Shiawassee NWR. This expansion has raised the total refuge acreage to over 680 acres. About half of the conversion has become a mosaic pattern of grassland interspersed with moist soils and emergent marsh. The grasslands are composed of timothy, foxtail, smooth brome, reed canary grass, and clover. The area was used heavily by grassland bird species on their spring and fall migration and by a large raptor population for most of year. This was the first year that nesting was observed in all of the conversion units by grassland bird species.

6. Other Habitats

Little was done with The Landscaping for Wildlife Project at Shiawassee NWR this year with the venture nearing completion. The plan was to develop 2.5 acres of Refuge land, adjacent to the headquarters, as a demonstration site for the public on ways to attract wildlife to typical urban, suburban and rural backyards. Over the years, high school students, YCC enrollees and refuge staff have changed the landscape into three typical backyards. They constructed stone walls, hiking trails, ponds and landscaped shrubs, trees and perennial flower beds. The project has had signage placed around the original trials. A 1.5 acre native grassland expansion was seeded after construction of a trail around the site. In 1996, the 1.5 acre native grass plot showed some improvement with native grasses and a few forbs recorded throughout the plot. The backyard project still needs to have a few trees that died last year replaced, develop additional signage for the new grassland plot, add some feeders plus bird and butterfly boxes to the original section, and improve the plant diversity of the urban segment.



Forbs and grasses planted in the Backyard Habitat Demonstration Area. (DGS)

9. Fire Management

Again in 1996, spring burning conditions were ideal ; offering a excellent opportunity to complete a number of prescribed burns which had been delayed and rescheduled over the years. This year the Refuge was

able to carry out a number of the burns. Successful prescribed fires were carried out on Pool 2, Trinklein Dikes and the switchgrass unit. No wildfires were experienced this year.

10. Pest Control

a. Purple loosestrife and other plant pests

Refuge personnel did not conduct any chemical control of purple loosestrife on any of the approximately 1,180 acres normally impacted by this species. The only pest control measures employed on the Refuge (non chemical) in 1996 were in Moist Soil Unit 2 and on the Trinklein Conversion units. A mechanical mowing technique was used on 40 acres of MSU 2 in July. This prevented the maturation of purple loosestrife seeds on the unit and allowed other plants to compete and develop in the mowed areas. Hand pulling of plants in the conversion unit was time consuming but successful. All plants encountered in the south and central units were removed, with the northern field about 50% cleared of the plants. After completion of the work no purple loose strife seed heads were observed the remainder of the year in the conversion area. The presence of this pest plant elsewhere on the Refuge was less evident this year, the result of extensive flooding on the Refuge.

Biological control is the only real hope for control of this plant over the long haul. Shiawassee NWR was one of three refuges designated to receive *Galerucella* beetles and propagate them this year; with excess beetles being released on Shiawassee NWR lands or being shipped to other Refuges for release. Shiawassee NWR was to receive 1,500 adult beetles in the spring of 1996. However, nature threw us a curve. Weather conditions in the spring delayed the development of host plants needed to raise the beetles on. This delayed shipment and caused heavy mortality in the winterized adults. When the shipment was received on June 6, the adults had already laid eggs on the plant media and a large segment of them had perished.

The Refuge recovered only 147 adult beetles, which were placed on 17 potted and enclosed host purple loosestrife plants. The Refuge has committed resources to this new program for at least three years.

In June, several severe weather fronts with tornado like winds decimated the insectary; resulting in the loss of all but 45 beetles. After the flooding had receded and repairs were made to the site, the adequacy of the original site was reviewed. The review resulted in the development of a new site for the insectary which was completed in early July. As the new facilities were completed in mid-July plants and the newly



Suspended nets over potted loosestrife plants within the new beetle insectary or "Bug House". (EPD)

emerging beetles were transferred to the site. By the end of the season the new insectory had produced enough beetles to release 2,000 on the Refuge and over winter 1,485 inside a refrigerator and 626 outside under natural conditions. The 2,000 beetles released on the Refuge were made at two different locations. Both sites were set up for monitoring in the coming years.

b. Gypsy Moths

The Refuge has cooperated with the USDA in their Gypsy moth detection program for several years. Ten traps were placed at various locations throughout the Refuge in June and were left until September. After removal, the traps were sent to the USDA Forest Health Protection Unit in St. Paul, Minn. The report from the office listed an average of 341 moths per trap from the 10 traps returned. Potential control efforts are generally not considered until detection levels exceed 300 moths per trap.

12. Wilderness and Special Areas

Three of the five islands which comprise the Michigan Islands NWR are designated as wilderness areas. The Shiawassee NWR has management responsibility for one of the islands, Scarecrow Island, located in Thunder Bay, Lake Huron. This 7-acre island was established as a wilderness area in 1970. The other two wilderness islands are located in northern Lake Michigan, and are administered by Seney NWR.

Scarecrow Island is an important rookery site for double-crested cormorants. Its rocky, graveled shoreline is also attractive to gulls and terns, as well as other shorebirds. Beyond the shoreline exists a periphery of shrub species, chiefly elderberry and red-osier dogwood. A tangle of blown down trees and snags on the center of the island provides nesting sites for the cormorants.

Public use is prohibited on the island, and Refuge staff inspect the island annually to assess wildlife populations, note habitat conditions, and repost signs as needed.

14. Farmers Home Administration Conservation Easements

The Shiawassee Wetland Management District (WMD) is responsible for a 45 county area located in southern Michigan. We currently administer 99 conservation easements in 34 counties within the WMD totaling 4,260 acres. Two of the 99 conservation easement were transferred in fee title to County Soil and Water Conservation Districts to be managed as outdoor education areas. The WMD received 2 new conservation easements to manage in fiscal year 1996.

With the assistance of Len Schumann, East Lansing Private Lands Office and Jim Hazelman, Shiawassee NWR, 15.0 conservation easements were inspected in 1996. Most were posted in past years and minor violations such as encroachment by farm equipment from adjacent fields and small wildlife food plots were noted. Many have been sold or are for sale causing ongoing people management problems. Most new landowners are not aware of the easement or believe the easement to be similar to a power line or utility right-of way easement.

As indicated in previous years, easements continue to be sub-divided increasing the number of landowners and management responsibilities (currently 99 easements are owned by 109 landowners). It appears this will continue to occur and continue to cause management concerns for the WMD. The WMD will

attempt to review the remaining easements this fiscal year in an attempt to update all records. We will continue to resolve these ongoing easement problems. If annual inspections are to continue additional assistance (seasonal employee) will need to be added to assist in the management of the 99 conservation easements. Enforcement problems continue to occur on many of the conservation easements. Many violations are minor in nature and are being addressed during field visits.

Special Use Permits (SUP) were issued to 2 landowners with conservation easements in fiscal year 1996. All SUP's were issued to the landowners for improving the wildlife habitat on the easements. A 5 acre grassland area was planted on one easement to provide nesting and winter cover for wildlife in Gladwin County.

15. Private Lands

The Shiawassee National Wildlife Refuge, Private Lands Office administers a 22 county Private Lands Management District (PLMD) located in central Michigan. Fifty-six wetland basins were restored in 18 counties within the PLMD under the Service's Partners For Wildlife Program for a total of 291.0 acres. An additional 134 acres of grassland nesting habitat was seeded on 6 sites for 135 acres. A total of 425 acres of wetland and associated upland habitat was restored in fiscal year 1996. Table 1 summarizes wetland restorations completed in 1996 by the Shiawassee PLMD.

The Service and MI-DNR have identified 15 counties within the state as focus areas for the States wildlife habitat planning program and the Partners for Wildlife wetland restoration program. Six of these focus area counties occur in the Shiawassee PLMD they include Huron, Lapeer, Mecosta, Montcalm, Newaygo, and Sanilac Counties. Efforts by the Shiawassee PLMD incorporated the County Soil and Water Conservation Districts (SWCD) of all six of these counties as well as those in Gladwin, Clare, Muskegon, and St. Clair Counties to assist the Service in the restoration of wetland habitats. Cooperative partnerships developed with these Soil and Water Conservation Districts resulted in 31 wetland basins restored for 163 acres and an additional 5 acres of upland waterfowl nesting habitat. The SWCD solicit and screen potential cooperators in their county, assist with the engineering, design and coordinate the construction phase with the landowner. The Service reviews and must approve each project designed by the SWCD's prior to project implementation. These agreements save Service time and incorporate local expertise (SWCD's) to locate new projects.

Funding for the SWCD cooperative agreements and construction dollars have come from the Service's Partners for Wildlife program, Ducks Unlimited, Inc, Wildlife Forever, West Michigan Wetland Foundation, Pheasants Forever, Michigan Wildlife Habitat Foundation, Michigan Duck Hunters Association and the Grosse Ile land and Nature Conservancy. Ducks Unlimited funds were the result of a cooperative effort by the East Lansing Private Lands Office and Shiawassee NWR and amounted to \$30,000.00. Partner contributions to the Partners For Wildlife Program for fiscal year 1996 totaled \$44,835.00. Other partners include the Michigan Department of Natural Resources, Natural Resource Conservation Service and the Farm Service Agency who assisted in locating, engineering and developing habitat restoration projects in the 22 county PLMD.

Another major focus area within the Shiawassee PLMD is the Saginaw Bay National Watershed Initiative (Watershed) which encompasses all or parts of 22 counties in Southern Michigan. Of the 22 counties in the Watershed 16 counties are contained in the Shiawassee PLMD and includes the entire

Shiawassee National Wildlife Refuge. The Watershed is a priority within the North American Waterfowl Management Plan's (NAWMP), Lower Great Lakes Joint Venture Area. Efforts to restore wetlands within the watershed have been limited because of the importance this area has as an agriculture production area and proximity to large population centers. Of the 425 acres of wetlands and grasslands restored in fiscal year 1996, 47 basins for 211 acres in 12 counties are within the Watershed. Currently 6 County SWCD offices in the watershed are funded by Cooperative Agreements with the Service.

Swampbuster actions continue to be slow. The Shiawassee PLMD concurred on 1 wetland appeal in fiscal year 1996. I still find it extremely odd that only 1 Swampbuster actions occurred in a 22 county area .

Wetland Reserve Program (WRP): The Shiawassee National Wildlife Refuge - Private Lands office continued to participate on the Natural Resource Conservation Service (NRCS), WRP evaluation team that determined eligibility and ranking requirements for 32 tracts (29 landowners) signed up for the 1995, WRP in 11 counties in central Michigan. Assisted NRCS in the development of the Wetland Reserve Plan of Operation, and the wetland design and restoration plans on 13 of the original 32 tracts accepted into the WRP program.

G. WILDLIFE

1. Wildlife Diversity

Shiawassee NWR and the adjoining Shiawassee River SGA contain the largest remaining tracts of bottom land forests and wetlands in Saginaw County. The natural flooding regime of this area has been significantly altered by human activity. Agricultural crop production, as well as residential, industrial, and commercial activities now occur here, on what were once extensive marshes, floodplain prairies, and wet deciduous woods. Among 1996 Refuge programs aimed at conserving and restoring these ecosystems were; the publication of the Final Environmental Assessment for the Shiawassee NWR Additions Proposal (Sec. C1); the continued development and management of the 241 acre Trinklein conversion site in the heart of the Refuge (Sec. F4); and the planting of over 1,450 deciduous tree seedlings within two forest openings (Sec. F3).

A record of 220 bird species were recorded on the Refuge in 1996, three of which had not been observed here previously (Sec. G). The official Refuge bird list now includes 258 species.

Ongoing efforts to catalog Refuge flora identified nineteen previously unrecorded species in 1996. Grasses and duckweed received particular attention this year.

2. Endangered and/or Threatened Species

a. Federal

Eleven bald eagles were recorded along the twenty-four mile Refuge Mid-winter Bald Eagle Survey route, conducted on January 12. The year's peak observed population for the species was twenty-two on November 23. This figure equals the previous Refuge high. The average population for this species was eight in 1996 on the Refuge.

Shiawassee NWR was home for a single nesting pair of bald eagles again in 1996. This territory, established in 1985, failed to fledge any young in 1993,

and in 1995. This year, the pair were the subject of a FWS Ecological Services East Lansing Field Office (ELFO) contract study by Eagle Environmental. Both adults were captured and fitted with tail mounted radio transmitters. The one fledgling they raised in 1996 was subsequently banded as well. The one significant piece of data the Refuge derived directly from the study was the knowledge that the female half the pair is a young adult, this year likely being her first nesting.

A second bald eagle nest built in spring of last year near the mouth of the Spaulding Drain was not utilized.

One peregrine falcon was observed during it's northward passage. Three individuals of this species were subsequently recorded in the fall, with one individual lingering for a period of fifteen days, and another for ten.

b. State

Peregrine falcons, currently listed as endangered by the State of Michigan, once again gave chase to ducks and shorebirds on the Refuge in 1995 (Sec. G2a). The similarly classified short-eared owl also visited, as individuals on three occasions in April.

Caspian and common terns (state-threatened, see also Sec. G.5) move inland to the Refuge from their nesting colonies in Saginaw Bay during the post-breeding period. They frequent the exposed unvegetated shoals found in Pools 1A and 1B, at the mouth of the Spaulding Drain, and the recently restored Trinklein Marshes.

Nesting least bitterns (state-threatened) were heard calling from the cattails in Pool 1A and Pool 2, but not from their traditional location in North Marsh. Thus the species did not illustrate any increase in overall abundance, and what nesting did occur was significantly impacted in 1996 by two breeding season floods that inundated breeding sites. A single king rail (state-endangered) was heard calling from the northeast corner of Moist Soil 1 on the last day of May.

Red-shouldered hawks (state-threatened) continued to be scarce at this location, and only a single individual was recorded in 1996. As it has throughout the Midwest, this buteo has declined significantly in Michigan, particularly in the southern half of the lower peninsula. Through the restoration of floodplain forest and buffer areas, on existing tracts and those acquired through the Shiawassee NWR additions initiative, this site has the opportunity to begin establishing more of the extensive bottomlands that red-shouldered hawks prefers, setting the stage for repopulation in this segment of it's former range.

Osprey (state-threatened) were recorded on three dates in 1996, and a record tying annual total of three merlins (state-threatened). The state-threatened bald eagle maintained it's resident status in 1995 (Sec. G2a), as did the similarly listed eastern fox snake. This reptile is limited in it's distribution to the coastal zone of Michigan's "thumb". Protected populations occur at Shiawassee NWR and Shiawassee River SGA in Saginaw Co., and the Pte. Mouillee SGA in Monroe Co..

3. Waterfowl

a. Geese

This year's wintering Canada goose population fell to a low count of 37 birds

in the third-quarter of February. Northward moving flocks began arriving by the end of that same month. The observed spring peak of 19,148 occurred March 21. Spring loafing and feeding were concentrated in cropland areas with standing water, primarily Farm Unit 1 and the adjacent Trinklein conversion marshes. As they have the previous two years, the last northward migrating goose flocks departed for their nesting grounds during the third week in April.

The 1996 annual Refuge Canada goose production survey index figure of 114 goslings was below the previous two year totals. However, the 1996 totals were closer to the average gosling production index for the last decade. Unlike the early years of the Refuge, it's no longer necessary to manage for goose nesting, the well established resident flock does well without any assistance. Many of the nesting islands previously established in Pool 1A and 1B for goose nesting, can now be allowed to remain covered with the natural stands of willow that previous management plans struggled to eliminate. These willow islands now provide nesting for the more selective willow flycatcher and common yellowthroat, provide shelter for ducks during windy weather conditions, and roosting sites for herons and egrets.

The arrival of southward migrating Canada Geese (*B.c. maxima*, the resident sub-species), began in early September. Geese populations increased slowly throughout the remainder of the month and into mid-October. A major influx of Geese occurred on October 17, 1996, that would become the season's peak observed population. The primary component of these flocks are the Southern James Bay population of the interior race (*B.c. interior*), the remainder being Mississippi Valley interiors, giants, potential mixed-races, as well as a few Richardson's (*B.c. hutchinsii*). Similar to 1994 and 1995, fall goose populations never exceeded the 20,000 level, but did however average over 12,000 throughout the final two and a half months of the year. A total of 80 Canada goose neckcollars were read and submitted with full information during the fall and early winter period.

A minimal number of snow geese (peak of 13) visited on their way to the breeding grounds. The perennially more extensive fall lesser snow goose migration wasn't much to speak of either, with a peak of only 27 birds. By comparison, this species smaller and much rarer relative, the Ross' goose, visited in an locally unprecedented single flock of ten birds on November 14.

b. Ducks

Winter conditions were severe on the Refuge, from mid-January thru mid-February, there were no ducks present on the Refuge. The arrival of migratory waterfowl flocks began a month later in March. Spring duck use on the Refuge was most notable for northern pintail, northern shoveler, gadwall, widgeon, canvasback, ring-necked duck, lesser scaup, and the ruddy duck. The species lingered on the Refuge into the month of June and July, not typical at this location.

The annual duck production index of 279 was up 50 ducklings from 1995. Data gathered through brood surveys, nestbox checks, and random observations totaled 206 wood duck, 43 mallard, 21 hooded mergansers, and nine blue-winged teal. This represents a decline in mallards to a figure more similar with early 90's records for the Refuge. Wood duck hatching rates from the Refuge's artificial nest boxes improved as a result of a switch from a straw to a cedar wood chip bottom lining, and the replacement of nine duplex boxes with single nest boxes.

The arrival of ducks staging for southward migration began towards the end of August. Fall duck populations were unusual with respect to the diversity of species present throughout the fall migration period in Pool 1A. Mallards, the major component of fall waterfowl populations on the Refuge, reached an observed peak of 19,062 on November 14. Fall American black ducks populations returned to more typical levels as compared to the low numbers recorded last fall. Notable seasonal peaks were observed for gadwall (151) and ruddy ducks (340). Also, unusual in its occurrence, was a small group of northern shovelers that stayed into mid-December, obviously filtering something worthwhile in the waters of the two, often crowded, ice-free areas that remained in Pool 1A.

C. Swans

Major staging areas for tundra swans occurs north of the Refuge, along the southern shores of Saginaw Bay at Fish Point and Nayanquing Point State Wildlife Areas. Flocks visiting the Refuge in 1996 were larger than in recent years, peaking at 254 swans in spring and 385 in autumn. Most of the tundra swans move through the Refuge quickly, though a few individuals lingered throughout the spring and fall migrations. Tundra swans have a distinct preference for the flooded portions of Farm Unit 1 in the spring and Pool 1A in the fall. They are seldom found outside of these areas, returning to these units after daily flights to feed in fields outside the Refuge.

4. Marsh and Waterbirds

After an absence of over a decade, great-blue herons once again nested at Shiawassee NWR. Five subsequently successful nests were constructed in a row of dead cottonwoods in north central North Marsh. Also missing for at least ten years, the call's of the American bittern can once again be heard from Shiawassee NWR's marshes. In 1995, the species established territory in southwest Pool 1A and directly across the dike from the pool, foraging in the wet fields and ditches of the newly restored wetlands of the Trinklein Marsh Bremer Unit. This year they chose Pool 2, also recently restored..

Verifying the occurrence and abundance of nesting marsh birds on the Refuge is assisted by the use of taped-call playback censuring. In addition to the three heron species mentioned above, pied-billed grebes, American coots, Virginia rails, soras, and common moorhens also nested in 1996. Unfortunately, the parental efforts of those doing so in units surrounded by low-level dikes came to naught, as two successive breeding season floods put their homes under 3+' of water. The sight of young pied-bill and coot families swimming in the well-protected Trinklein Marshes made the significance of this area all the more apparent.

Migrational waterbird highlights included an eared grebe in May, the first Refuge record for this species, (second for the county); a king rail in the same month; a cattle egret in October; a glossy ibis in June, the third refuge record for this species; and a record number of 809 double-crested cormorants on September 12.

5. Shorebirds, Gulls, Terns and Allied Species

Shorebird use was scattered throughout the entire spring migration period. Water levels too deep for shorebird use were maintained in Moist Soil 1. A mid-April prescribed burn of the Moist Unit 2 switchgrass field and Pool 2 attracted common snipe to the Refuge in record numbers for the Saginaw Bay Area. Otherwise, the visit by a marbled godwit provided the only highlight of the northward shorebird migration.

In the fall season, shorebird habitat was available predominately in Moist Soil 1 and the Leach and Bremer Units of the Trinklein Marshes, providing foraging opportunities that attracted rare visits by a willet, red-necked phalaropes, and a buff-breasted sandpiper.

Though no gull or tern species nest here, the Refuge has been taking an increasingly important role in the spring migratory and post-breeding season movements of these birds. Use by the state threatened Caspian tern was up 5% from last year, 173% above the 1988-95 average. This species has increased its presence on the Refuge annually since 1989. Use by the state threatened, federal candidate common tern increased nearly as much, 158% above the 1988-94 average. The exposed, unvegetated shoals and shoreline in the Leach and Bremer Units of the Trinklein Marshes must be viewed as by far the most significant Refuge factor for these increases. Black terns a Federal candidate species, increased 275% above average for this same period, an exceptional figure even despite it being influenced by relatively small total annual visitation. An extended presence by black terns in and around Pool 2 through all of May gave rise to hopes for nesting, but it did not occur. Despite this, 1996 was another encouraging year for terns at Shiawassee.

As with terns and so many other species, a mosaic of seasonal shallow flooded wetlands restored in the eastern third of Farm Unit 1, were attractive to gulls in the spring and summer. A highlight was the May 31 visit of an adult Franklin's gull, the first record of this species on the Refuge, and a juvenile laughing gull that stayed throughout August, the second Refuge occurrence for this species. A lesser black-backed gull made it's first recorded visit to Shiawassee NWR and Saginaw County in 1996, with individuals observed on three separate occasions.

6. Raptors

Refuge raptor populations closely follow the general trends for these species. The exception would be rough-legged hawks, which winters at Shiawassee NWR in large concentrations. Eastern screech-owls, which reached high population numbers in the early 1990's, appeared to be at more normal population number this year.

In addition to those species noted in Sections G.2a and G.2b, raptors recorded in 1996 included a broad-winged hawk, two snowy owls, and several northern goshawks.

7. Other Migratory Birds

In 1996, the fifth field season of the point count survey that monitors the composition of songbirds nesting within the Refuge's larger forest tracts. A total of 135 individuals of 28 species were recorded at the twelve points. This was a good year in terms of diversity, but average as far as abundance. Eastern wood-pewees were the most abundant species encountered. No significant changes were detected in two of the other primary migratory species;



An increase number of rose-breasted grosbeaks were recorded during the Refuge bird surveys. (Myles Willard)

red-eyed vireo and great crested flycatcher, but house wren numbers declined by 50% over the previous years totals. Rose-breasted grosbeaks rebounded after last years decline, but not so for the wood thrush. Yellow-billed cuckoos were the most numerous ever seen, in the short period that the count has been conducted. Of the resident species, only brown-creepers populations remained static, with chickadees, nuthatches few in numbers, as occurred in 1994.

The prothonotary warbler maintains a small but none the less significant nesting population at Shiawassee NWR, as this is the species' northern-most breeding site in Michigan. This species is given consideration during water management planning for Pools 3 and 5, where the birds nests. A late spring flood, followed immediately by more flooding in June, inundated many of the cavities the prothonotarys were using, and contributed to one of the worst nesting seasons the birds have had in recent years.

The occurrence of songbirds using the Refuge as a migratory stopover continues to be monitored, defined, and recorded. The first official Refuge record of the Brewster's warbler, blue-winged x golden-winged hybrid, occurred in mid-May. Concern for the common nighthawk continues, as none were recorded in 1996.

8. Game Mammals

The white-tailed deer population was estimated to be 700 animals on the entire Refuge prior to the hunting season, which is an 8% increase over 1995, due in part to a slight distribution shift by the herd. Though the current population of 32 deer per square mile is healthy for this herd, it remains a concern. Repeated overbrowsing and subsequent loss of tree seedlings affect natural regeneration of the forest, as well as other indigenous flora species that occur on the Refuge. The state population of this animal is at an all time high. Efforts to control Refuge deer numbers are detailed within section H.

10. Other Resident Wildlife

Twenty moth species and two butterflies not previously recorded on the Refuge were encountered in 1996. It is not believed that any of these species are new occurrences on the Refuge. More likely it is the first time they have been identified and recorded as occurring on the Refuge by staff. A data base of moth's and butterflies that occur on Shiawassee NWR is being collected. The largest group of lepidoptera encountered were 134 *Cisseps fulvicollis*, the yellow-collared scape moth. A total of 134 were counted on August 26, all sipping nectar from joe-pye weed flowers.

15. Animal Control

Public hunting by permit was used to control a white-tailed deer herd that would otherwise cause significant damage to Refuge vegetation (Sec. H.8). Public trapping by permit was used to reduce muskrat populations, as this mammal's bank burrows contribute to dike deterioration (Sec. H.10). Woodchuck burrows can significantly affect the integrity of refuge dikes also, which is a particular concern during flood events. Selective population control efforts are required annually to keep pace with this damage. A total of 350 gas cartridges were expended in 1996, primarily targeting woodchucks inhabiting the main dike surrounding Farm Unit 1.

16. Marking and Banding

The Shiawassee NWR black duck banding program was conducted during the second half of September. A minimal effort was made to band black ducks due in part to a lack of black duck concentrations on the Refuge, and staffing priority adjustments for Galerucella propagation and other field activities. A single confusion trap was set. Initially the trap was placed in the borrow ponds of north central Farm Unit 1, but was subsequently moved to a site along the Pool 1A and 1B cross dike.

The confusion trap site was visited and baited each day, but was not activated until after dark on the evening prior to scheduled banding operations. A total of eight adult black ducks were banded, as well as two wood ducks and a single blue-winged teal. The Michigan Department of Natural Resources has a banding quota for mallards, so the Refuge assists by banding any mallards that might be inadvertently captured. This year, 72 mallards were banded.

H. PUBLIC USE

1. General

Table 1 shows the total Refuge visits data for the past four years. Table 2 shows the breakdown of visitation for 1996. "Interpretation" includes trail use, special on-site programs, Green Point Environmental Learning Center (ELC), and the Refuge headquarters. "Education" includes teachers and students taught on-site. "Outreach" includes off-site programs. "Recreation" includes hunting, fishing, trapping, skiing, bicycling, and wildlife observation. Note: **Type of Visit** totals do not equal **Total Refuge Visits** due to multi-use visitors.

TABLE 1: Comparison of total Refuge visits for past four years.

Year	Total Visits
1996	56,008
1995	64,785
1994	73,439
1993	52,300

TABLE 2: Types of visits at Shiawassee National Wildlife Refuge in 1996.

Type of Visit	1996
Interpretation	27,255
Education	2,900
Outreach	2,200
Recreation	35,247
TOTAL REFUGE VISITS	56,008

A total of 6,165 people used the Green Point Environmental Learning Center (ELC) in 1996. This was up slightly from 1995's 6,125 visits. The Center set a record with 1,125 visits in May. A new fuel oil burning boiler was installed at Green Point on October 24. The old fence on the north side of Green Point's property was removed by our summer youth work crews, and a new white cedar, split rail fence was installed.

2. Outdoor Classrooms - Students

Over 800 additional students participated in environmental education programs in 1996 (see Table 2) compared to 1995's 2,089 visits. Pre-school aged children make up our largest audience. Our other audiences include elementary students, home schoolers, youth and adult groups (such as 4-H and Teen Parents), high school and middle school students, Boy Scouts, and Girl Scouts.

Refuge Operations Specialist Becky Goche and Park Ranger Steve Dushane participated in several programs that targeted minority youth. In May, they presented programs to middle school students at the "King-Chavez-Parks Day" at the University of Michigan in Ann Arbor. Thirty-three children came to Green Point in June for "Scouting Around the World" activities. Ninety children were reached at the same program held at an inner city school in August. During July, 100 children involved with the Houghton-Jones Neighborhood summer program visited Green Point.

The annual Summer Discovery Program for Kids was held June 24-27. Despite all the rain, flooding, and droves of mosquitoes, the program was still a success, as twenty children participated.

During the week of August 5-9, the Mitten Bay Girl Scout Council held a Girl Scout Day Camp at Green Point. Fifty girls ranging in age from 6-14, participated in a variety of programs including bird identification, canoeing, casting animal tracks, and camping skills.

3. Outdoor Classrooms - Teachers

Green Point ELC became a "Global Learning and Observations to Benefit the Environment" (GLOBE) site. Pam Thompson, science teacher at Arthur Hill High School, set up two study sites at Green Point and the adjacent Hickey tract.

Ann Murphy, a teacher at Shields Elementary School, participated in the "Connections" program. Green Point is a partner with EcoEducation of St. Paul, Minnesota, that developed and distributed the "Connections" curriculum free-of-charge to certain teachers throughout Region 3.

4. Interpretive Foot Trails

Students from Heritage High School installed new interpretive signs along the Woodland Trail at the Stroebel Road access.

Two separate periods of flooding in May and June severely impacted the trails at Green Point ELC. The trail surface materials were washed away, a boardwalk was damaged, and many trees were blown down. The summer work crews, like the P.E.C.E. crew members shown above, and volunteers spent many hours cutting and removing limbs, repairing the boardwalk, and resurfacing the trails with wood chips and stone.

6. Interpretive Exhibits/Demonstrations

In February, Green Point ELC received and installed 2 exhibits fabricated by Wilderness Graphics, Inc. The staff was disappointed with the quality of the displays. Damage and flaws were documented and sent to Wilderness Graphics, Inc. and Tom Worthington (Regional Office). Other displays received in 1996 included a green heron donated by David Peters, a wild turkey hen and pine marten donated by the Frankenmuth Museum, and a black-capped chickadee donated by Myles Willard.

The Refuge general brochure and Green Point ELC Trail Map were completed and made available to the public in 1996.

Interpretive signs were installed on Refuge and Green Point kiosks. These signs were designed by Wilderness Graphics, Inc. and fabricated by the Regional Sign Center.

Park Ranger Steve Dushane coordinated the showing of Region 3's "Saving Our Endangered Species, Saving Ourselves?" traveling display at the Hall of Ideas in the Midland Center for the Arts. The exhibit was displayed April 10 - June 5. On April 23-25, staff from the Refuge, the East Lansing Field Office, and the Bay City Law Enforcement Office staffed the exhibit during the National Science and Technology Week activities. Hundreds of children and adults went through the exhibit and picked up handouts on endangered species and the Refuge.

The Lucky Ducky game board was painted onto the east side of the parking lot at Green Point ELC on July 26. This is used in a very physical activity to help children understand the hazards ducks face during migration. No more raw knuckles and uniforms covered with chalk dust caused by doing it by hand!



1995 photo of PECE group kids at wood chip pile. (BG)

7. Other Interpretive Programs

People of all ages learned about raptors and other birds at the IMBD Celebration.

Three hundred people attended the second annual International Migratory Bird Day Celebration at Green Point ELC on May 11.

Associated Wildlife Educators, Inc. presented two live raptor programs. Jim Hudgins (East Lansing Field Office) talked on wetland restorations. Biological Technician David Peters and Volunteer Bob Grefe did a bird banding demonstration. Cherri Allen, of Cherri's Feed-N-Seed, spoke on how to attract birds to your backyard. Boy Scout Troop 312 helped people build simple bird feeders. Park Ranger Steve Dushane and

Biological Technician David Peters designed and developed an interactive bird identification contest for children ("Bird Eye-Q"), which was very popular. The day's activities were publicized a week earlier on a local station's weekend TV show. Several Refuge staff and volunteers helped during the day. Park Ranger Dushane received an On-the-Spot award for coordinating the day's activities.

Sharon Griffes-Tarr, State Wildflower Artist of the Year in 1994 and 1996, held an artist's workshop at the Green Point ELC on May 18. Five people participated.

The annual Refuge Open House held on September 7 attracted 320 people to the auto tour route. Visitors had an opportunity to see the newly remodeled headquarters building, and potential Refuge hunters could scout the area for deer.

The Refuge celebrated National Wildlife Refuge Week (October 5-12) with four programs. The weather was rainy and cool most of the week which may have contributed to low numbers.

October 5	- Refuge Auto Tour	- 185 people
October 7	- Woodland Trail Hike	- 4 people
October 9	- Night Prowl at Green Point ELC	- 10 people
October 10	- Refuge Bicycle Tour	- 4 people



Photo of presenter with snowy owl. (Jim Hudgins)

8. Hunting

a. Waterfowl

The total harvest from the 1996 goose hunt was 616 birds, which was a slight increase over the last couple years, and still below the 1979-1994 average. By the end of the hunt, the Refuge had registered 1,087 hunter visits on 23 hunt days. The average hunter success for the season was 57 percent, which is up slightly from previous years. The harvest quota for Michigan Department of Natural Resources (MI-DNR), Management Zone 222, remained at 2,000 birds and was not reached this year. Based on 100 random culmen measurements taken during the mandatory goose check-in, it was estimated that 26 percent of the total harvest were resident Canada geese.

There were no changes in the application procedures administered by the MI-DNR for 1996. The legal hunting season remained at 50 consecutive days again this year. The Refuge was open to hunting only in the morning (daylight to 12 Noon), for 23 days. Hunting commenced on October 12 and closed on November 3. Reserved permits were required during the first two weeks due to the high public interest in the Refuge Goose hunt program. The third and final week of the goose hunt is set up as an open draw to attract local hunters.

The Refuge also offered a youth goose hunt scheduled for the second weekend. This hunt was limited to youths between the ages of 12 and 17, with a maximum of 2 youths per blind. It was mandated that a non-hunting adult supervisor accompany each party. All hunts were intensively managed with an orientation and blind drawing at 5:30 a.m., and mandatory check-in at 1 p.m. Only 21 blinds were available, with a maximum of three persons per blind. In addition, three river blinds, allowing access to the Shiawassee River, were available each hunt day through the open draw period.

This was the 14th consecutive year the MI-DNR was permitted to administer a waterfowl hunting program in Pool 4 and adjoining marshes. A total of 182 geese and 1,252 ducks were harvested from these areas. The MI-DNR also held the first ever youth waterfowl hunt day in the same area. An additional 25 ducks were harvested at that time.

b. White-tailed deer

The MI-DNR, Shiawassee Flats Deer Management Unit 222, estimated the 1996 deer herd at 1,402 animals, with a harvest goal of 685 deer. The Refuge portion of the assigned goal was to harvest 270 deer. The objective is to carry a winter herd of 600 animals on the management unit (222), including both state and federal lands. With this in mind, the Refuge portion of the harvest is directed towards antlerless deer to reduce recruitment and maintain the herd within targeted levels.

The Refuge offered the following hunts to meet that goal: four 5-day, early archery hunts; five 2-day, special shotgun hunts (non-ambulatory, youth and general); six 2-day, muzzleloader hunts; and three 5-day, late archery hunts. A total of 945 permits were issued, with 70 percent of the permits issued for antlerless deer and 30 percent for either sex.

By agreement, the MI-DNR handled the application procedure. This included printing the applications and regulations, as well as distribution of the information sheets throughout the State. This was the second year the state went to a computer automated system for the applications. The state required a \$3 fee with each application, to defray costs. Around 4,000 applications were received. After selection, the Refuge received a list of successful

applicants and a packet of antlerless deer tags for the hunters. The Refuge notified the successful applicants by mail. Permittee submitted a \$10 user fee to receive a packet containing a permit, kill tag, map, and Refuge regulations. The Refuge set November 1 as the permit pick-up deadline. Permits not picked up were forfeited. Failure to comply with any of the Refuge regulations resulted in forfeiture of future hunting privileges.

Shiawassee NWR once again operated the non-ambulatory and youth deer hunt programs. Special regulations and restrictions are in place for these hunts to ensure a safe, quality hunting experience with high potential for success. Youth hunters are required to attend an orientation class and be supervised by a non-hunting adult while on the refuge. Non-hunting partners are required to assist non-ambulatory hunt participants. These special programs are well received by participants and the general public.

Harvest figures for the 1996 season on Shiawassee NWR showed hunters taking home 246 deer. The population structure of the harvested deer was composed of 56 adult bucks, 24 fawn bucks, 142 adult does and 24 fawn does. This year's harvest was 24 deer below the projected goal of 270 deer.

9. Fishing

Fishing is not allowed from dikes, banks, or shorelines on Shiawassee NWR. The navigable rivers and drains which intersect the Refuge are legal for fishing from boats, and attract many fishing enthusiasts.

The Tittabawassee and Saginaw Rivers continue to uphold their national reputations for being exceptional walleye fishing locales. Except for the short, closed season during the spring spawning period, walleye fishing is popular year-round. Other gamefish species which frequent Refuge waterways include bass, channel catfish, northern pike, and crappie. Catfish are the main summer target on the Shiawassee River, while sucker runs and white bass migrations attract a great deal of fishing interest during the spring and fall, respectively.

On June 8, the Shiawassee NWR partnered with the Saginaw Field and Stream Club to host its fifth annual Kids Fishing Day Event. A total of 206 children registered for the event held at the Saginaw Field and Stream Club Lake. A total of \$2,014.00 worth of merchandise, gifts, donated items and services were received and distributed for this event. Prizes including bicycles, fishing equipment, life jackets, toys, and sporting goods were given away over



Several large 22-inch channel catfish were caught by young anglers during Kids Fishing Day. (EPD)

the course of four hours. Children younger than six years old "fished" in a carnival-type "PeeWee Pond" for prizes such as plastic toys and games. These items were donated by sporting goods stores, a lumber company and an automobile dealership, among others.

A total of 22 Club volunteers, plus 5 refuge staff and 2 Refuge volunteers assisted with the event. A number of live crappie and catfish were donated by Imlay City Fish Farms and released into the lake with the kids' assistance. Good numbers of large bass and catfish were caught, including a 31-inch northern pike and a 26-inch channel catfish, along with assorted panfish. A total of 521 people attended the event on what turned out to be a perfect day for fishing.

10. Trapping

Despite an active outreach program, only three trappers submitted bids to trap on Shiawassee NWR IN 1996. With the lack of interested bidders, the Refuge combined trapping units into two areas. Each trapping unit went to the highest bidder, with a \$200 per unit minimum bid. Trapping effort and harvest were up nearly 40% from last year. Trappers harvested 499 muskrats, 48 raccoons, 5 beaver, 39 opossum, and 3 mink. This was a reflection of better trapping conditions and better water levels. Most forbearer populations responded positively to the improved water conditions. Muskrats, however, were at low levels throughout the region. No ready explanation could be found for this phenomenon.

11. Wildlife Observation

In January, Green Point ELC had a special visitor. A Carolina wren made frequent afternoon appearances at the feeder. The bird definitely had a preference for safflower hearts. Some of the local birders were fortunate enough to see this rare visitor.

17. Law Enforcement

With the completion of Becky Goche's Federal Law Enforcement training in April, Shiawassee NWR now has three commissioned law enforcement officers on the staff. A total of 10 Notices of Violation were issued in 1996 for a variety of offenses, including refuge trespass, vandalism, and hunting violations.

Cooperation with local law enforcement agencies, coupled with increased presence in traditional problem areas, has curtailed many of the problems experienced in past years with teen-agers using the Refuge for after-hours parties. Contacts made with local high school counselors this year,



An Eagle Scout candidate built a photo blind overlooking a major waterfowl congregating area along the Ferguson Bayou Trail off of Curtis Road. (EPD)

prior to the prom/graduation season, probably also aided in discouraging the use of the Refuge for celebrations.

Vandalism continues to be a periodic problem. Vehicles rammed into several entrance gates. Trail signs and portable restrooms were shot at, and parts of the Green Point photo blind was destroyed. In one case, an individual who had used the Green Point nature trail guide signs as pistol targets, was apprehended by local police soon after he left the parking lot. He was cited for destruction of federal property and unauthorized possession of a firearm on a national wildlife refuge.

On December 23, 1996, a homicide victim was discovered lying near his truck in the hunter access parking lot on Evon Road. Michigan State police, Saginaw City police, the state police crime lab, refuge officers, and two FBI agents responded to the discovery by a local resident. No refuge hunts were going on during this period, and the deceased was clad in normal street clothes, not typical "outdoor recreation" garb. He had been shot once in the face with a small caliber bullet. Nothing had been taken from him. His truck keys and wallet were still on his person. No weapon was found and witnesses and details have been sketchy. The FBI and Michigan State Police are still investigating the case.

Refuge officers Spencer and De Vries attended LE refresher training March 25-29, in Des Moines, IA.

I. EQUIPMENT AND FACILITIES

1. New Construction

A new split rail fence line was installed along the Maple Street frontage at Green Point Environmental Learning Center. The fenceline was constructed with YCC, refuge staff, and volunteer assistance.

2. Rehabilitation

Renovation of the headquarters building was completed by Griffiths Construction of Lakeview, Michigan, in August, at a cost of \$312,000.00. The renovation has completely renewed and changed the interior and exterior of the building. The reception area has been expanded, and staff and public restrooms have been added. The interior hallways, individual offices, and work areas are carpeted, and the windows, walls and doors have been replaced. The building has a new entryway and roof, and an exterior of vinyl siding with stone masonry veneer along the base. There is also a sidewalk along the front of the building. What once was a shop/garage facility has now been transformed into a comfortable and attractive office space.

The office/garage building at the maintenance area received new roof shingles in April.

The entrance gate at Houlihan Road was replaced in February.

The Pool 2 dike was raised in places with the addition of material along the dike and road top. The screwgate on the east dike was repaired and water management of this historically productive pool was again possible this fall.

A new 36-inch diameter water control structure was installed between MSU 1 and 2, along the west boundary of the unit. Riprap was placed around the culvert.

This structure replaced a screwgate which was damaged and had leakage problems.

Bartel Road received 907 tons of truck spread limestone gravel for resurfacing.

3. Maintenance

Vehicle and equipment maintenance included: transmission system and electrical repair on the International 884 tractor; replacement of a seized bearing on the Houlihan Road pump, and also bearing replacement on one of the Trinklein pumps.

Muskrats continued to create problems along the new Trinklein conversion dike, especially near structures, which required dike resloping and the addition of filter fabric and riprap. Refuge roads, trails, landscaping, and parking lots were maintained throughout the year by grading, mowing, gravel replacement, and snowplowing, dependant upon the season.

A broken water line under the foundation of the check station was discovered on August 16, after we noticed a light flow of water from under one of the garage doors and out into the parking lot. The rupture was repaired after the pipe was exposed under the restroom area of the building.

4. Equipment Utilization and Replacement

A small lot sale of obsolete computer equipment and surplus personal property was held on March 15.

5. Communications Systems

Three Motorola Micro TAC cellular phones were purchased for use by refuge officers, as the Saginaw County Sheriff's Dept. and the Michigan State Police changed their radio frequencies. The ability to reach local law enforcement agencies after hours and on weekends is especially important, as that is when many refuge violations occur, and Refuge Headquarters personnel are usually not available to respond to radio dispatches.

A desktop Motorola MaxTrac 300 mobile radio and antenna was purchased at a cost of \$1,235.00 installed, for use as a base station in the headquarters office. This unit is a replacement for the base station which was formerly in the H.Q. The new unit is compact, and a great improvement on the old system which had a continual, irritating, meeting-disturbing, squelch problem despite several attempts by repairmen to fix it.

6. Computer Systems

On February 14, the Shiawassee NWR became an informational site on the Internet with it's addition to the Service Homepage.

Two Dell Optiplex GXM 5133 desktop computer systems with Intel 133 MHz Pentium processors were purchased in September to replace IBM 286 and 386 systems.

A Micron Millennia desktop with an Intel 166 MHz Pentium processor was delivered in late October for use as a "walk up" computer in the office work room. This system allows the use of cc:mail for four staff members, as well as computer-generated forms and reports.

7. Energy Conservation

The Headquarters building remodeling included a number of measures taken and included to conserve energy. Blanket-type insulation was installed in the ceilings, walls and raised floors, and 3 inch thick, fiberglass sound attenuation blankets were placed in the interior walls. The insulation R value is R-19 for the exterior walls, R-49 for the ceilings, and R-25 for the floors. The entry doors are hollow steel, and the two entry ways are sealed off by a second steel door. The windows are hermetically sealed, double-pane, insulated casement units, with an R-value of 3. The entire office, except for the entry ways, restrooms and storage areas, is carpeted. The building is heated and cooled by a gas-fired boiler which provides a minimum of 75,775 BTU's of cooling and 79,600 BTU's of heating.

J. OTHER ITEMS

1. Cooperative Programs

a. Beekeeping

Two Refuge Special Use Permits are in effect for beekeeping. The colonies are limited to 25 hives and are assessed a fee of \$25.00 per colony. One of the colonies is owned by the Michigan Beekeepers Association, and is located along the Spaulding Drain, while the other colony is owned by a commercial honey producer and is situated at the southwest corner of Pool 2. The 14 hives near Pool 2 produced a total of 1,070 lbs. of honey in 1996, compared to 936 lbs. in 1995. The 25 hives along the Spaulding Drain produced a total of 3,250 lbs. of honey in 1996, which is the same exact amount produced in 1995.

Tracheal mite problems in the bee colonies seem to have leveled off, while verrea mites, cold temperatures, and dysentery continue to contribute to bee losses each year.

b. Mosquito Abatement

A Special Use Permit was issued to the Saginaw County Mosquito Abatement Commission for the aerial application of Bacillus thuringiensis var. israelensis (B.t.i.) larvicide on the northeast portion of the Refuge. This biological control formulation is only used on breeding sites (flooded woodlots) and was restricted to a 920 acre to be treated during the period of March 15 to June 15. The B.t.i. is Sero-type 14, applied as a corn cob granular material, or applied as a water-based liquid. The target species for these applications is the early spring Aedes species of mosquitoes.

3. Items of Interest

The year began with a continuation of the federal shutdown/furlough. The entire Refuge was closed to the public until January 6.

Chris and Brenda Wyrick were blessed with the birth of their second child; Shane Christopher, on January 24.

Ed De Vries received a certificate for 20 years of federal government service completed in January.

Jim and Mildred Clark from The Refuge Reporter visited the Refuge on September 11 to interview staff and take photos for a future edition of their publication.

4. Credits

Personnel responsible for narrative sections were as follows:

Edward De Vries	Introduction; Highlights; C-1,3; D-2,; E-1,2,3,4,5; F-12; H-9,17; I; J; M-2 and editing
James Hazelman	C-4; F-14,15 and editing
James Dastyck	B; E-6; F 1-10; H-8,10
David Peters	A; D-5; G; M-1
Rebecca Goche	H 1-7; H-11,12,16

M. WILDERNESS AND SPECIAL AREAS ADMINISTERED BY SHIAWASSEE NWR

1. Michigan Islands NWR

The Michigan Islands National Wildlife Refuge was established by Executive Order in 1943 as a refuge and breeding ground for migratory birds and other wildlife. Shoe and Pismire Islands in Lake Michigan, and Scarecrow Island in Lake Huron, islands of two, three, and seven acres in size respectively, were the first acquired. Thunder Bay Island in Lake Huron was added in 1965, by a U.S. Coast Guard/FWS agreement under a revocable permit with five-year renewal periods, for secondary FWS jurisdiction on 121 of the island's 168 acres. Lastly, Lake Michigan's 230 acre Gull Island was ceded to the FWS by the U.S.C.G. in 1969. In 1970, PL 91-504, Stat.1104, designated the original three small islands as Wilderness Areas.

A sixth island was added to the Refuge in 1995, when Hat Island was transferred to the Service by the Nature Conservancy. Ten acres in size, it is located in Lake Michigan, to the north of Shoe Island.

Due to the geographic location of the islands, the management of Michigan Islands NWR is split between the two staffed Michigan Refuges. Thunder Bay and Scarecrow are administered by Shiawassee NWR; Gull, Shoe, Pismire, and Hat by Seney NWR.

Scarecrow Island is characterized as limestone bedrock covered with boulders, rock, gravel and sand, with a minimal soil layer supporting shrubbery, scattered forbs, and ash trees, which are now dead due to cormorant use. The significantly larger Thunder Bay Island is limestone bedrock as well, but with a more substantial layer of soil. Shoreline types include cobble beach, varying limestone pavement, limestone flats, and freshwater coastal wetlands. Dense stands of white cedar with an American yew understory occur inshore. Region 3 Realty is currently working with the Bureau of Land Management on Service acquisition of Thunder Bay Island. Both islands lie within the waters of the proposed Thunder Bay National Marine Sanctuary, currently proposed by the National Oceanic and Atmospheric Administration.

The Refuge was contacted by a real estate agent representative concerning potential for FWS interest in acquiring Black River Island, Alcona County, in Lake Huron, approximately seven miles south of Scarecrow Island. This is a small, rocky island with some shrubs, and an acreage size dependent on existing lake levels.

Staff from Shiawassee NWR visited Thunder Bay Island on two occasions in 1996. On a June 14 visit, assisted by a staffer from the Michigan Chapter of The Nature Conservancy (TNC), Manager Spencer and Co-op student Adams were able to locate the small colony of federally listed dwarf lake iris that occurs on this island. Though flowers are no longer produced by this colony due to shading, TNC did not advise any management activities for this site due to the more extensive colonies that occur elsewhere along the shores of the adjacent mainland.

During an August 19 visit, staff members observed a variety of migratory songbird species, including over 30 white-crowned sparrows (90% immatures). A melanistic garter snake and a false hemlock looper moth were among the other interesting wildlife found on the island.



Ken Adams in the middle of a ring-billed gull colony on Thunder Bay Island. (DGS)

2. Wyandotte NWR

Wyandotte NWR was established by an act of Congress--Public Law 87-119, 75 Stat. 243, 87th Congress, H.R. 1182, dated August 3, 1961 "...to be maintained as a refuge and breeding place for migratory birds and other wildlife...". From 1948 to 1961, the islands were administered by the U.S. Coast Guard. The Refuge consists of two islands, Grassy and Mamajuda, and adjacent shallow water areas. It totals 304 acres and is located in the Detroit River, off shore from Wyandotte, Michigan, from which it takes its name. Wyandotte is named for a Native American tribe that once dwelled in the area. Public access is not permitted on either island, although Mamajuda Island no longer has significant land above the waterline.

The Refuge is situated in what was once one of the most significant migratory staging areas in the United States for diving ducks. Extensive beds of aquatic vegetation, particularly wild celery, attracted large concentrations of divers--primarily canvasback and scaup. However, in the past 100 years, discharges from the steel and chemical industry, and municipal sewage effluent, along with the effects of large, deep-draft vessels, have degraded the lower Detroit River ecosystem. This has contributed to the substantial decline of preferred foods and habitat. Today, only remnant numbers of the once vast rafts of migratory waterfowl are seen at Wyandotte NWR. Grassy

Island was also used as a confined disposal facility for contaminated dredge spoil in the 60's and 70's. Due to this activity, Grassy Island is primarily colonized by phragmites (common reed), and resident wildlife are low in number.

In early March, Refuge Manager Douglas Spencer, Biologist Jim Dastyck, R-3 Engineer/Contaminants Specialist Patrick McDermott, Dave Best (Contaminants Biologist - ELFO), and Bruce Manny (BRD-Ann Arbor) met to begin planning preliminary procedures for contaminants sampling on Grassy Island.

On November 18, Spencer and Mike Sweat (USGS-Hydrologist), conducted bedrock surveys on Grassy Island as part of the contaminants survey. Results of the survey determined extent and depth of bedrock for planning 1997 placement of data collection instruments.



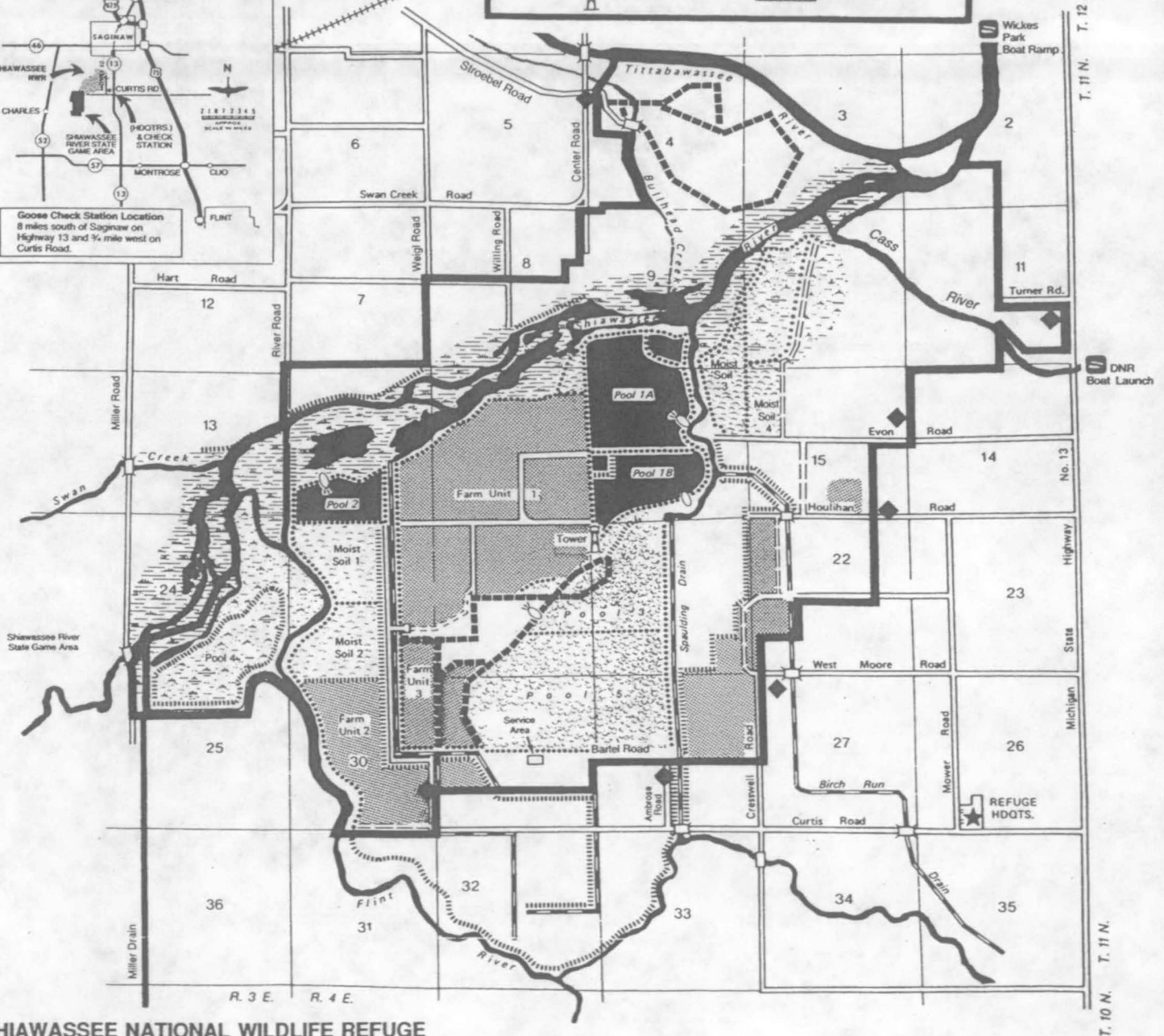
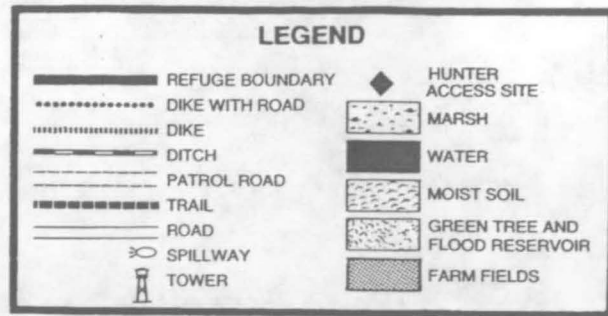
USGS bedrock sampling equipment in Refuge boat at Grassy Island, Wyandotte NWR. (DGS)

Public Use is restricted to the nature trails.

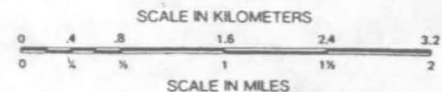
SHIAWASSEE NATIONAL WILDLIFE REFUGE

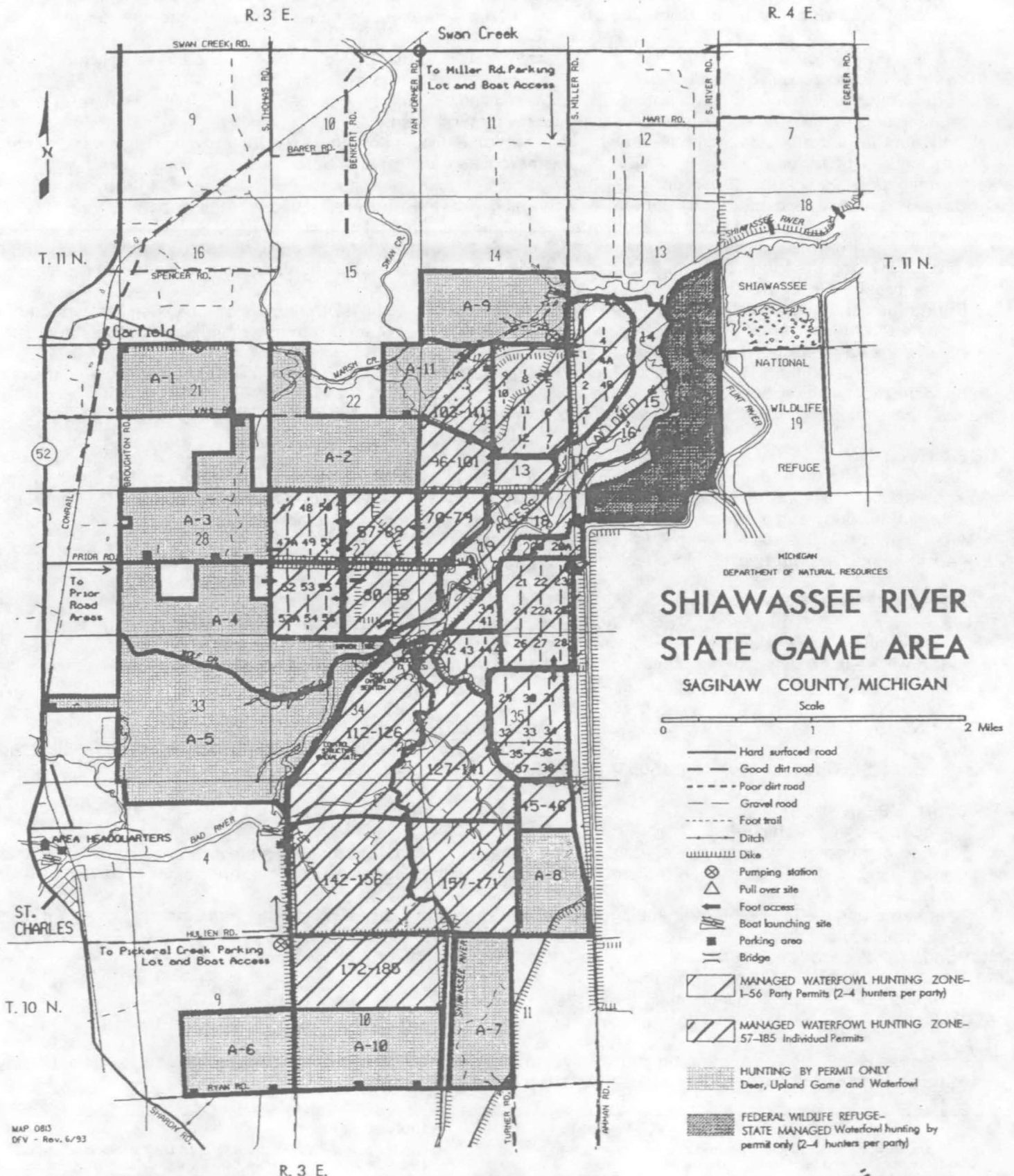
DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE

Refuge Location



SHIAWASSEE NATIONAL WILDLIFE REFUGE
6975 MOWER ROAD, RR #1
SAGINAW, MICHIGAN 48601
PHONE: (517-777-5930)





Hunter Monies Made This Area Possible **DNR**

SHIAWASSEE RIVER STATE GAME AREA SPECIAL USE AND HUNTING RULES

WATERFOWL HUNTING

1. Reservations by mail are required to hunt during the first weekend of goose season and the first weekend of the regular waterfowl season. Contact your local DNR office between August 15 and September 5 for information.
2. On all other dates the check station is open from 4:30 a.m. to 4:00 p.m. to check game and issue hunting permits. Drawings will be held each day at 5:00 a.m. and 11:00 a.m.
3. Parties of 2 to 4 hunters may choose all areas and individuals may choose areas 57-185. Parties of 2 may register one or two absentee members with those hunters' licenses.
4. Only hunters not participating in the drawing may join an individual or party after the drawing. Registered hunters that passed or forfeited their draw will be considered as having participated in the drawing.
5. Morning permits will be issued until 10:00 a.m. and afternoon permits will be issued until 4:00 p.m.
6. On any day that you have participated in a morning drawing and are issued a hunting permit, you may not participate in the afternoon drawing, but may be issued an unused permit.
7. Parties must hunt at their chosen post or strip, and leave only to retrieve downed game. Permit holders must return their permits to the designated location within two hours after their hunt. All game taken must be reported and/or presented for examination.
8. During the regular waterfowl season, each hunter is limited to 25 shells. During goose-only season, each hunter is limited to 15 shells. It is unlawful to possess or use shot shells loaded with any material other than steel shot; BBB is the largest shot size permitted.
9. Canada goose hunting is permitted during morning and afternoon hunts on weekends, but during weekdays is restricted to morning hours only.
10. A \$3 daily or \$10 seasonal managed waterfowl area permit is required to hunt waterfowl on the area.

DEER HUNTING

1. Deer hunting is by permit only. From October 1 to the end of waterfowl season, deer hunting is permitted only in areas A1-A11. The entire game area is open from the end of waterfowl season to January 1. For permit information, contact your local DNR office between August 15 and September 5.
2. A \$3 daily or \$10 seasonal permit is required to hunt deer on the area.
3. Permits must be returned during check station hours and within 24 hours of harvesting deer.

SMALL GAME HUNTING

Small game hunting is permitted in areas A1-A11 only during the waterfowl season. All hunting is by permit only. (Special permits will be issued for raccoon hunting during evening hours.) No small game hunting until the opening of waterfowl season. The area is closed to small game hunting November 15-30 and during the muzzleloader season.

TRAPPING

Trapping of furbearers is by permit only. Information may be obtained by contacting St. Charles Field Office, 225 East Spruce, St. Charles, Michigan 48655, (517-865-6211).

SPECIAL USE RULES

These activities are prohibited:

1. Hunting or shooting from any dike, road, or trail, safety zone, buffer zone or retriever zone.
2. Constructing a shooting pit or permanent blind. Portable blinds permitted, but must be removed at end of each hunt.
3. Using an amphibious or all-terrain vehicle or other motor-driven vehicle while in the game area. Outboard motors are permitted, but they must be operated at a safe, no-wake speed.
4. Parking outside of designated parking areas. (See map for parking lot locations.)
5. Trapping, except under written permit.
6. Camping during April 1 - December 31.
7. Taking cans or glass bottles into game area.

BE A SAFE HUNTER — A safe hunter obeys laws governing hunting and boating and is alert to any conditions hazardous to personal safety of the hunters and others.

7/26/94

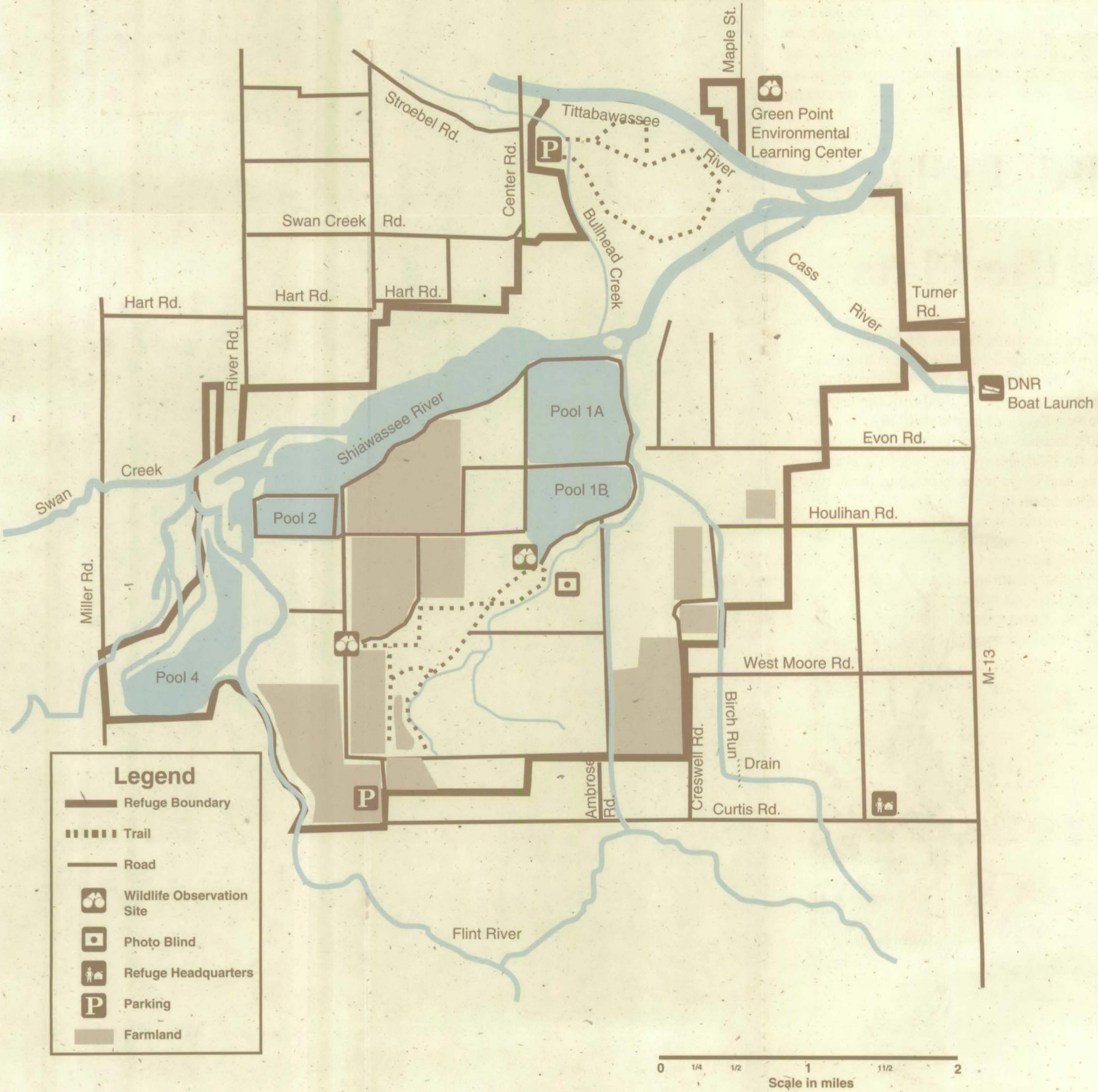
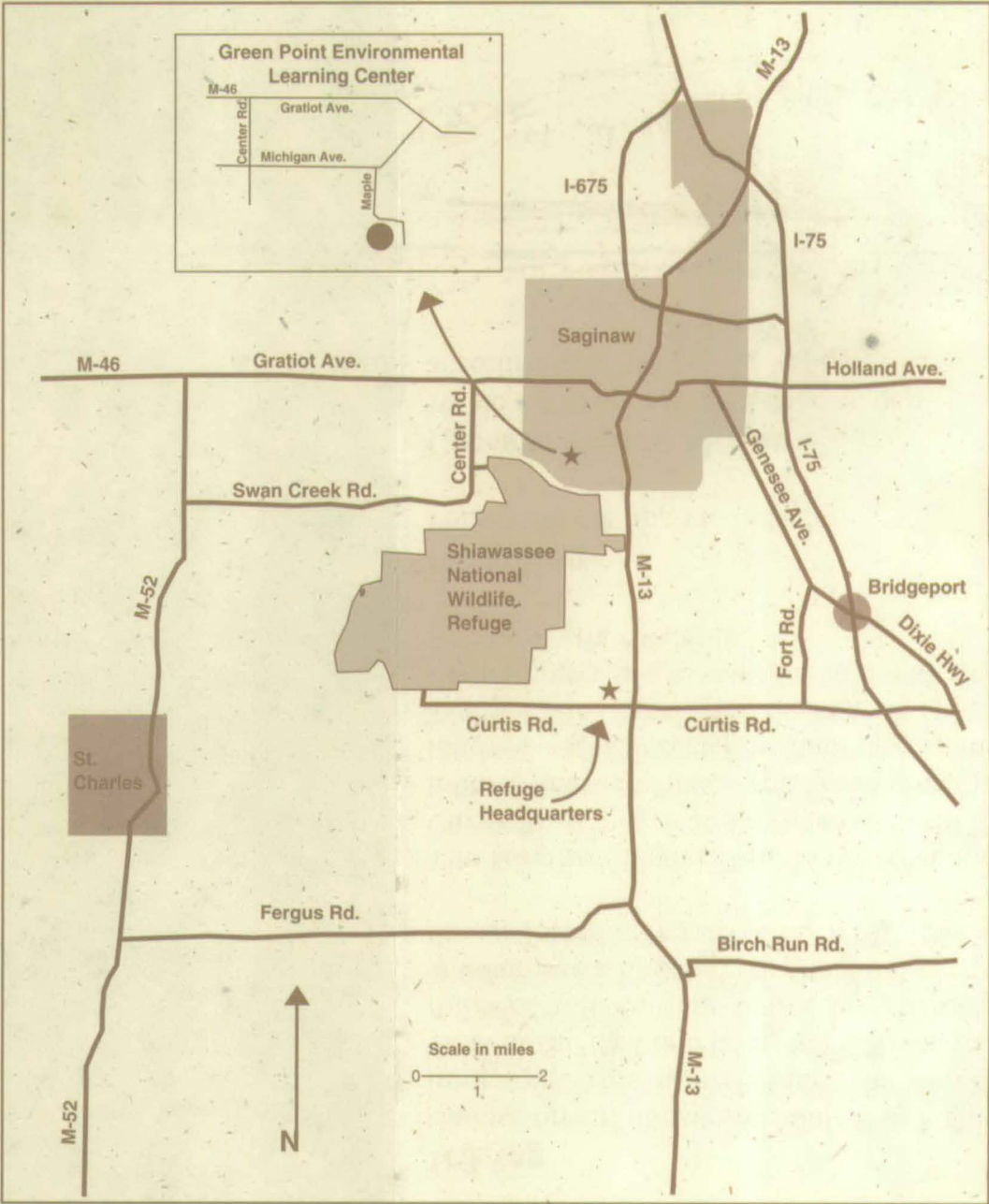
EQUAL RIGHTS FOR NATURAL RESOURCE USERS

The Department of Natural Resources provides equal opportunities for employment and for access to Michigan's natural resources. Both State and federal laws prohibit discrimination on the basis of race, color, national origin, religion, disability, age, marital status or sex under the Civil Rights Acts of 1964 as amended, MI PA 453 and MI PA 220, Title V of the Rehabilitation Act of 1973 as Amended, and Americans with Disabilities Act. If you believe that you have been discriminated against in any program, activity, or facility, or if you desire additional information, please write the Office of Human Resources, U.S. Fish and Wildlife Service, Washington, D.C. 20240, or the Michigan Department of Civil Rights, State of Michigan, Plaza Building, 1200 6th Avenue, Detroit, MI 48826.

For information or assistance on this publication, contact Michigan Department of Natural Resources, Wildlife Division, P.O. Box 30028, Lansing, MI 48909.



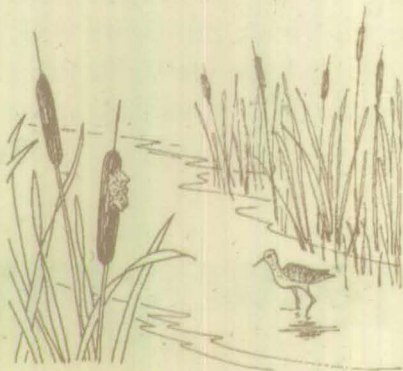
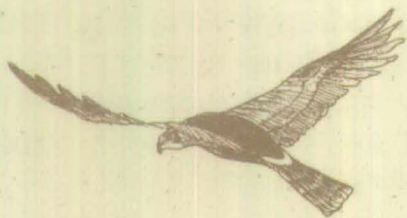
Shiawassee National Wildlife Refuge



Rules and Regulations

Protect your Refuge's natural resources and make your visit safe and enjoyable by following these rules and regulations.

- Stay on established roads or trails.
- Observe "Closed Area" signs.
- Snowmobiles, ATV's, and other motorized vehicles destroy fragile habitat and therefore are not allowed on the Refuge.
- Spotighting wildlife, bank fishing, camping, fires, horses, and dogs are not permitted.
- Hunting and trapping are allowed only with the possession of a Refuge permit.
- Please take your litter with you.



Farming is an important wildlife management tool on the Refuge. Refuge staff use dikes, pumps, and gravity-flow structures to flood and drain marshes and forested areas. This "wet farming" promotes the growth of invertebrates and seeds which waterfowl and other animals use for food.

Farming for Wildlife

The Refuge's diverse habitats provide resting and feeding areas for over 250 species of migratory birds, including bald eagles, shore and wading birds, more than 100 songbird species, and waterfowl. During peak populations, the Refuge hosts 25,000 Canada geese, 30,000 ducks, 1,000 swans, and many wading and waterbirds. Other animals that live here include deer, beaver, muskrat, Blandings' turtles, green frogs, and green darners.

Top Birding Area

Shiawassee National Wildlife Refuge (NWR) was established in 1953 to restore and enhance this historically significant wetland area for migratory waterfowl. The Refuge contains over 9,000 acres of bottomland-hardwood forests, marshes, pools, grasslands, and croplands. Four rivers meet on the Refuge - the Tittabawassee, Flint, Cass, and Shiawassee Rivers.

Where Waters Meet

Shiawassee National Wildlife Refuge



Saginaw, Michigan

Shiawassee National Wildlife Refuge
6975 Mower Road
Saginaw, MI 48601

Hours

The Refuge headquarters, located on Curtis Road, is open 7:30 a.m. to 4:00 p.m., Monday through Friday throughout the year. Refuge visitors are welcome to stop by if they have questions or need assistance. Visitors to Green Point Environmental Learning Center should call ahead for hours.

For More Information Contact:

Shiawassee National Wildlife Refuge
6975 Mower Road
Saginaw, MI 48601
Phone: (517) 777-5930
Internet Url:
<http://www.fws.gov/~r3paO/r3home.html>

Equal opportunity to participate in, and benefit from, programs of the U. S. Fish and Wildlife Service is available to all individuals regardless of age, race, color, national origin, religion, sex, or disability. Persons who believe they have been discriminated against in any program, activity, or facility operated by the U.S. Fish and Wildlife Service should contact:

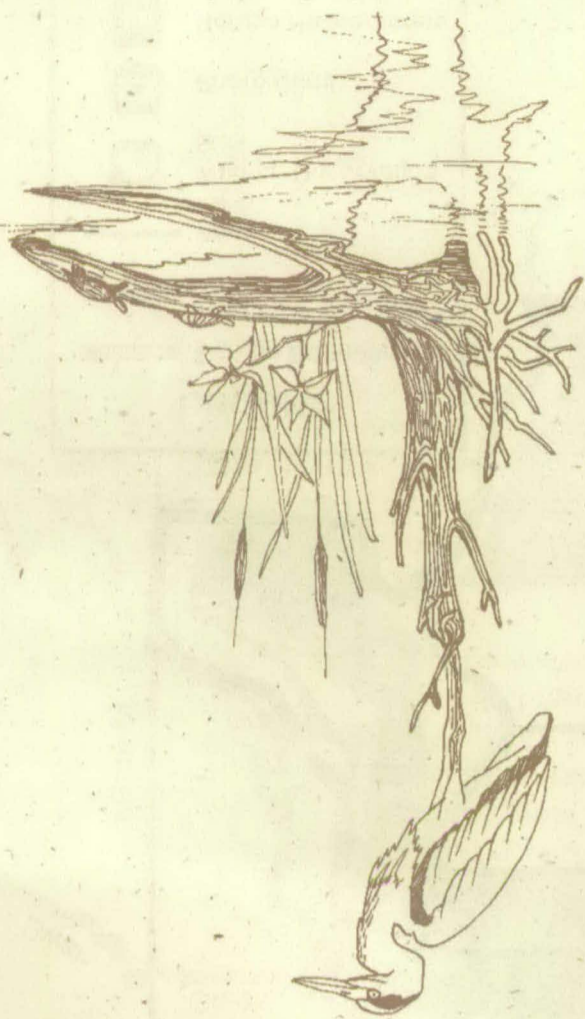
U.S. Department of the Interior
Office of Equal Opportunity
1849 C Street, N.W.
Washington, D.C. 20240



December 1996



Saginaw, Michigan



Shiawassee National Wildlife Refuge

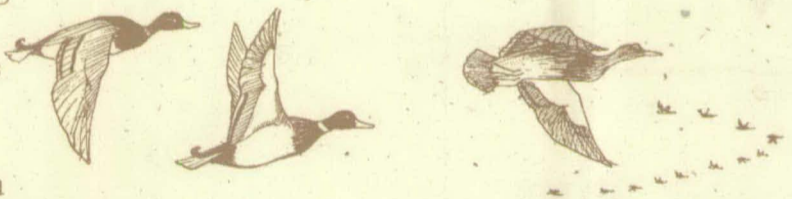
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Farming is an important wildlife management tool on the Refuge. Refuge staff use dikes, pumps, and gravity-flow structures to flood and drain marshes and forested areas. This "wet farming" promotes the growth of invertebrates and seeds which waterfowl and other animals use for food.

Local farmers also sharecrop some of the Refuge land. They take certain percentages of the crop, leaving the rest in the field for wildlife. These leftover crops provide wildlife with a winter food source.



A Look Back at the Flats

The Public Is Welcome!

Shiawassee NWR is open year-round, seven days a week, during daylight hours only. (During hunt periods, hours and access may be limited.) There are a number of activities you can do throughout the year at the Refuge.

Hiking

Choose one of our nature trails that highlight unique features of the Refuge. The Woodland Trail, at the east end of Stroebel Road, offers 4.5 miles of trails through bottomland hardwoods. You can see a huge pile of shale left over from the coal mining period of the early 1900's.

The Ferguson Bayou Trail, at the west end of Curtis Road, has over 4.5 miles of trails. This trail follows dikes and gives you views of agricultural lands, sloughs, forested wetland areas, and pools. Two wildlife observation decks with spotting scopes give you a closer look at ducks, geese, deer, and other wildlife.

Bicycling

Both trails are open to bicycles.

Cross Country Skiing

We do not groom trails, but most can accommodate skiers.

Hunting

Portions of the Refuge may be open to goose and deer hunting by special permit. Maps showing open areas and details on Refuge hunting programs are available at the headquarters.

Environmental Education

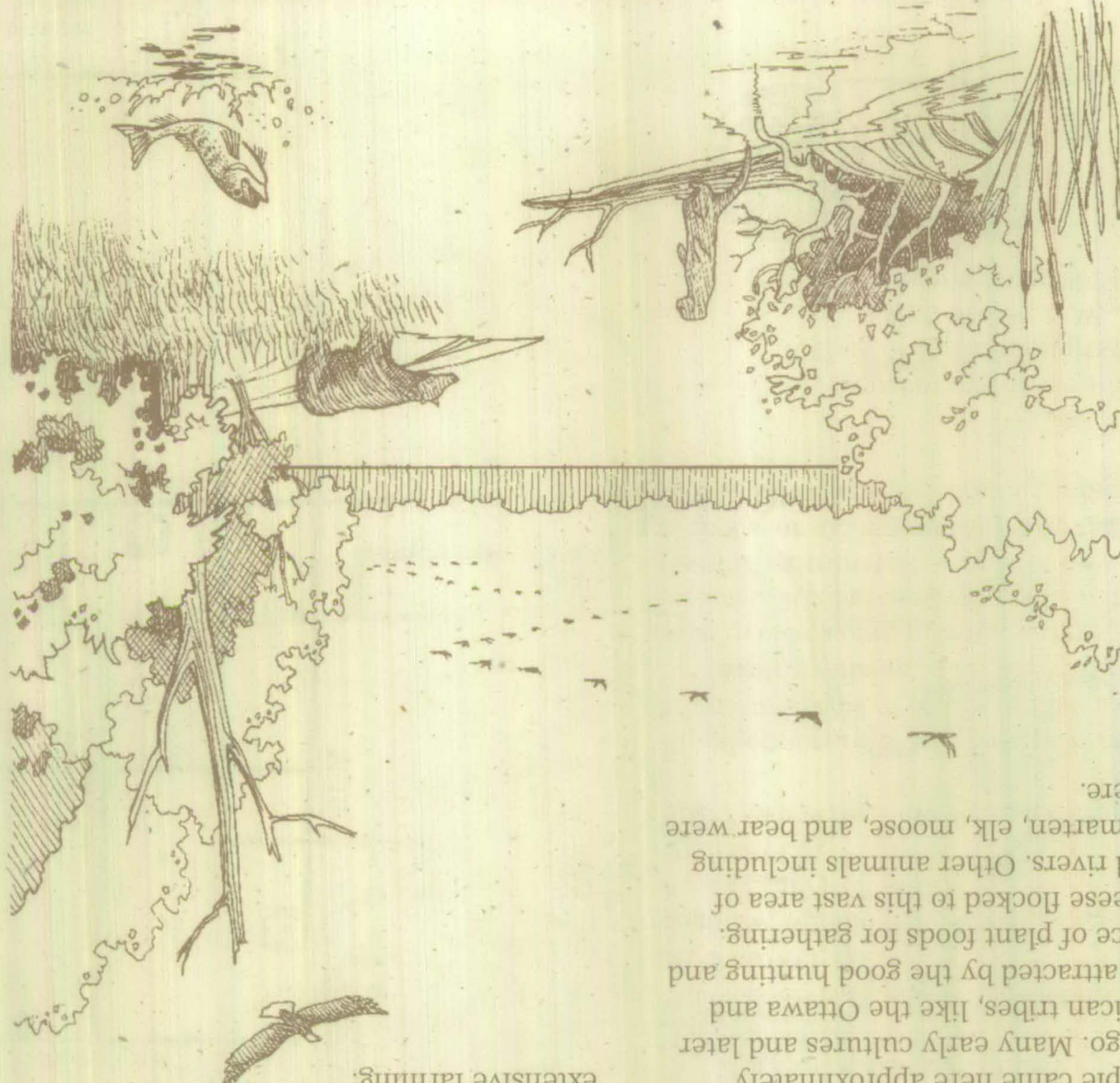
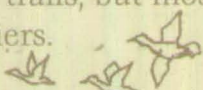
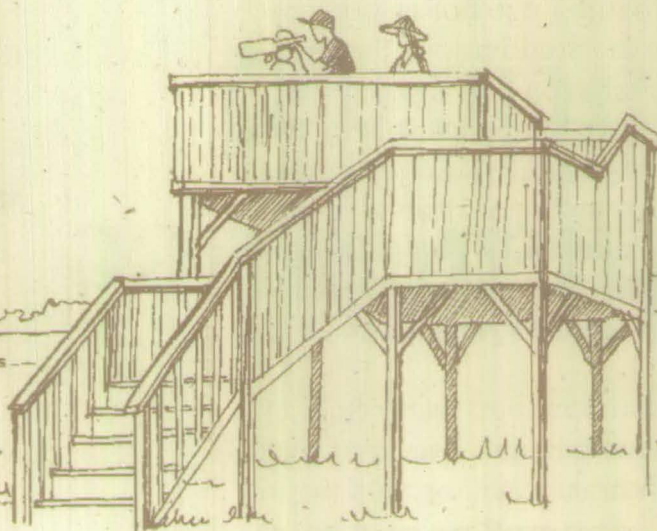
Our Green Point Environmental Learning Center, located at 3010 Maple Street in Saginaw, provides programs for children and adults. You can hike the trails or view a variety of displays inside the interpretive building. Hours vary seasonally, so call ahead.

Volunteer

Share your special talents and skills. You could collect biological data, perform light maintenance, or help out with special events. If you are interested, contact the Refuge.

The Flats was thought of as a swampy wilderness and received little human impact until the late 1800's when the lumber industry expanded into the area. Coal mining began in the early 1900's and lasted until the late 1930's. In 1903, farmers began draining the land for crops. By 1950, pumps, drainage tile, elaborate ditches, and dikes were in place to make way for extensive farming.

Over 10,000 years ago, much of east-central Michigan, including the present day Shiawassee NWR, was covered by a large glacial lake. You can still see the evidence of this ancient lakebed as you look across the landscape. The terrain is very flat, hence the reason many people call this area "The Flats". The first people came here approximately 5,000 years ago. Many early cultures and later Native American tribes, like the Ottawa and Ojibwa were attracted by the good hunting and the abundance of plant foods for gathering. Ducks and geese flocked to this vast area of wetlands and rivers. Other animals including otter, fisher, marten, elk, moose, and bear were also found here.



Birding at Shiawassee NWR

Welcome to Shiawassee National Wildlife Refuge (NWR). About 9,000 acres of marsh, bottomland hardwood, grassland and agricultural lands are protected here. Four rivers cross the Refuge to form Michigan's largest tributary, the Saginaw River. Frequent flooding and diverse habitat make this an excellent spot for viewing waterfowl, shore birds, wading birds, songbirds and raptors. Bird activity on the Refuge is highlighted by the large waterfowl concentrations during the spring and fall.

You will find 246 species of birds listed in this brochure, 29 of which, are considered incidental to this area and are listed separately.

This list is in accordance with the Sixth American Ornithologists' Union Checklist as amended.

Symbols used are as follows:

Season	
S - Spring	March - May
s - Summer	June - August
F - Fall	September - November
W - Winter	December - February

Status	
a - abundant:	a common species which 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

* Indicates nesting on the Refuge has recently occurred

Common Name	S	s	F	W
Loons - Grebes				
..... Pied-billed Grebe*	u	u	u	
..... Horned Grebe	r		r	
Pelicans - Cormorants				
..... American White Pelican	r	r		
..... Double-crested Cormorant	c		c	
Bitterns - Herons				
..... American Bittern	r	r		
..... Least Bittern*	r	o	r	
..... Great Blue Heron	a	a	a	u
..... Great Egret	u	c	c	
..... Cattle Egret	r	r		
..... Green-backed Heron*	u	u	u	
..... Black-crowned Night-Heron	u	u	u	
Swans - Geese - Ducks				
..... Tundra Swan	u		u	
..... Greater White-fronted Goose			r	
..... Snow Goose	u		u	o
..... Canada Goose*	a	c	a	a
..... Wood Duck*	c	c	c	
..... Green-winged Teal	c	o	c	
..... American Black Duck	c	u	c	c
..... Mallard*	a	c	a	c
..... Northern Pintail	u		u	
..... Blue-winged Teal*	c	u	c	
..... Northern Shoveler	u		u	
..... Gadwall	o		o	
..... American Wigeon	u		u	
..... Canvasback	o		o	
..... Redhead*	o	r	o	
..... Ring-necked Duck	u		u	
..... Greater Scaup	r		r	
..... Lesser Scaup	u		u	
..... Common Goldeneye	o		o	o
..... Bufflehead	u		u	
..... Hooded Merganser*	u	o	u	
..... Common Merganser	c	r	a	c
..... Red-breasted Merganser	r		r	
..... Ruddy Duck	u		u	
Vultures - Eagles - Hawks - Falcons				
..... Turkey Vulture	u	u	u	
..... Osprey	r	r	r	
..... Bald Eagle*	u	u	u	u
..... Northern Harrier	u	o	u	u
..... Sharp-shinned Hawk	o	r	o	r
..... Cooper's Hawk	o	r	o	r
..... Northern Goshawk		r	r	

Common Name	S	s	F	W
..... Red-shouldered Hawk	r	r	r	r
..... Broad-winged Hawk	r	r	r	
..... Red-tailed Hawk*	c	c	c	c
..... Rough-legged Hawk	r		r	u
..... Golden Eagle	r		r	r
..... American Kestrel	o	r	o	o
..... Merlin			r	
..... Peregrine Falcon	r		r	
Grouse - Pheasant				
..... Ring-necked Pheasant*	u	u	u	u
..... Ruffed Grouse	r	r	r	r
Rails - Cranes				
..... Virginia Rail*	u	u	u	
..... Sora*	u	u	u	
..... Common Moorhen*	u	u	u	
..... American Coot*	u	u	u	
..... Sandhill Crane	r		r	
Plovers - Sandpipers				
..... Black-bellied Plover	o		o	
..... Lesser Golden-Plover	r		r	
..... Semipalmated Plover	u		u	
..... Killdeer*	c	c	c	
..... American Avocet	r		r	
..... Greater Yellowlegs	c		c	
..... Lesser Yellowlegs	c		c	
..... Solitary Sandpiper	u		u	
..... Spotted Sandpiper*	c	c	c	
..... Upland Sandpiper	r		r	
..... Hudsonian Godwit	r		r	
..... Marbled Godwit	r			
..... Red Knot			r	
..... Sanderling			r	
..... Semipalmated Sandpiper	u		u	
..... Least Sandpiper	u		u	
..... White-rumped Sandpiper	o		o	
..... Baird's Sandpiper	o		o	
..... Pectoral Sandpiper	u		u	
..... Dunlin	c		u	
..... Stilt Sandpiper	o		u	
..... Short-billed Dowitcher	u		u	
..... Long-billed Dowitcher	r		o	
..... Common Snipe	u		u	
..... American Woodcock	r	r	r	
..... Wilson's Phalarope	r		o	
..... Red-necked Phalarope	r		r	
Gulls - Terns				
..... Bonaparte's Gull	u		u	

Common Name	S	s	F	W
..... Ring-billed Gull	c	c	a	o
..... Herring Gull	u	u	c	u
..... Caspian Tern	u		u	
..... Common Tern	u		u	
..... Forster's Tern	r			
..... Black Tern	r	o	r	
Doves through Kingfishers				
..... Rock Dove	r	r	r	r
..... Mourning Dove*	c	c	c	c
..... Black-billed Cuckoo*	o	o	o	
..... Yellow-billed Cuckoo*	o	o	o	
..... Eastern Screech-Owl*	u	u	u	u
..... Great Horned Owl*	u	u	u	u
..... Snowy Owl			r	
..... Barred Owl*	u	u	u	u
..... Short-eared Owl			r	
..... Common Nighthawk	o		o	
..... Chimney Swift	o	o	o	
..... Ruby-throated Hummingbird	u	o	o	
..... Belted Kingfisher*	u	u	u	r
Woodpeckers - Flycatchers				
..... Red-headed Woodpecker*	u	u	u	
..... Red-bellied Woodpecker*	c	c	c	c
..... Yellow-bellied Sapsucker	r		r	
..... Downy Woodpecker*	c	c	c	c
..... Hairy Woodpecker*	u	u	u	u
..... Northern Flicker*	c	c	c	r
..... Pileated Woodpecker*	r	r	r	r
..... Olive-sided Flycatcher	r		r	
..... Eastern Wood-Pewee*	c	c	u	
..... Willow Flycatcher*	u	u	o	
..... Least Flycatcher*	u	u	o	
..... Eastern Phoebe*	u	u	u	
..... Great Crested Flycatcher*	c	c	u	
..... Eastern Kingbird*	u	u	u	
Larks - Swallows - Jays - Crows				
..... Horned Lark*	c	c	c	c
..... Tree Swallow*	a	c	a	
..... Northern Rough-winged Swallow*	c	u	c	
..... Bank Swallow	c	u	c	
..... Barn Swallow*	c	c	c	
..... Blue Jay*	c	c	c	c
..... American Crow*	c	c	c	c
Titmice - Nuthatches - Wrens				
..... Black-capped Chickadee*	a	a	a	a
..... Tufted Titmouse*	c	c	c	c
..... Red-breasted Nuthatch			r	

Common Name	S	s	F	W
..... White-breasted Nuthatch*	c	c	c	c
..... Brown Creeper*	c	u	u	u
..... House Wren*	c	c	c	
..... Winter Wren	r		r	
..... Sedge Wren*	r	r	r	
..... Marsh Wren*	c	c	c	
Kinglets - Thrushes - Thrashers				
..... Golden-crowned Kinglet	u		u	
..... Ruby-crowned Kinglet	u		u	
..... Blue-gray Gnatcatcher*	u	u	o	
..... Eastern Bluebird*	u	o	u	
..... Veery	r		r	
..... Gray-cheeked Thrush	o		o	
..... Swainson's Thrush	u		u	
..... Hermit Thrush	u		u	
..... Wood Thrush*	u	u	u	
..... American Robin*	a	a	a	r
..... Gray Catbird*	c	c	c	
..... Brown Thrasher*	o	o	o	
Waxwings - Shrikes - Starlings				
..... Water Pipit	r		r	
..... Cedar Waxwing*	u	u	u	u
..... Northern Shrike				o
..... European Starling*	c	c	c	c
Vireos - Warblers - Tanagers				
..... Solitary Vireo	r		r	
..... Yellow-throated Vireo*	o	o	r	
..... Warbling Vireo*	u	u	u	
..... Philadelphia Vireo	r		r	
..... Red-eyed Vireo*	u	u	u	
..... Blue-winged Warbler	r		r	
..... Golden-winged Warbler	r		r	
..... Tennessee Warbler	u		u	
..... Orange-crowned Warbler	r		r	
..... Nashville Warbler	u		u	
..... Northern Parula	r		r	
..... Yellow Warbler*	c	c	c	c
..... Chestnut-sided Warbler	u		u	
..... Magnolia Warbler	u		u	
..... Cape May Warbler	u		u	
..... Black-throated Blue Warbler	u		u	
..... Yellow-rumped Warbler	c		c	
..... Black-throated Green Warbler	u		u	
..... Blackburnian Warbler	u		u	
..... Palm Warbler	u		u	
..... Bay-breasted Warbler	u		u	
..... Blackpoll Warbler	o		o	

Common Name S s F W

..... Cerulean Warbler	r	r	r
..... Black-and-white Warbler	u	u	
..... American Redstart*	u	u	u
..... Prothonotary Warbler*	u	u	r
..... Ovenbird*	u	u	u
..... Northern Waterthrush	u	u	
..... Connecticut Warbler	r	r	
..... Mourning Warbler	o	o	
..... Common Yellowthroat*	c	c	c
..... Wilson's Warbler	u	u	
..... Canada Warbler	u	u	
..... Scarlet Tanager*	u	u	o

Sparrows

..... Northern Cardinal*	c	c	c	c
..... Rose-breasted Grosbeak*	c	u	u	
..... Indigo Bunting*	u	u	u	
..... Rufous-sided Towhee	o	r	o	
..... American Tree Sparrow	o			c
..... Chipping Sparrow*	u	u	u	
..... Field Sparrow*	r	r	r	
..... Vesper Sparrow*	u	u	u	
..... Savannah Sparrow*	c	c	c	
..... Fox Sparrow	o	o		
..... Song Sparrow*	a	a	a	o
..... Lincoln's Sparrow	o	o		
..... Swamp Sparrow*	o	o	o	
..... White-throated Sparrow	c	c		
..... White-crowned Sparrow	u	u		
..... Dark-eyed Junco	c	c	u	
..... Lapland Longspur	o		r	
..... Snow Bunting	o		u	

Blackbirds - Finches

..... Bobolink*	o	o	u	
..... Red-winged Blackbird*	a	a	a	r
..... Yellow-headed Blackbird*	r	r		
..... Eastern Meadowlark	o	r	r	
..... Rusty Blackbird	u	u		
..... Brewer's Blackbird	r	r		
..... Common Grackle*	c	c	c	
..... Brown-headed Cowbird*	c	c	c	r
..... Northern Oriole*	u	u	o	
..... Purple Finch				r
..... Common Redpoll				r
..... Pine Siskin				r
..... American Goldfinch*	a	a	a	a
..... Evening Grosbeak				r
..... House Sparrow	u	u	u	u

Incidental

Common Loon	Long-eared Owl
Snowy Egret	Whip-Poor-Will
White Ibis	Yellow-bellied Flycatcher
Glossy Ibis	Acadian Flycatcher
Mute Swan	Purple Martin
Ross' Goose	Cliff Swallow
Barnacle Goose	Carolina Wren
Oldsquaw	Northern Mockingbird
White-winged Scoter	Bohemian Waxwing
King Rail	Pine Warbler
Black-necked Stilt	Prairie Warbler
Willet	Yellow-breasted Chat
Buff-breasted Sandpiper	Dickcissel*
Glaucous Gull	Pine Grosbeak
Great Black-backed Gull	

Original artwork donated by
Sharon Griffes Tarr
Lansing, Michigan



Notes

Date_____ No. Species_____

Time_____

Observers_____

Weather_____

Remarks_____

The Service, Refuges and You

Shiawassee NWR is one of more than 470 refuges in the National Wildlife Refuge System administered by the U.S. Fish and Wildlife Service. The NWR System is a network of lands and waters managed specifically for the protection of wildlife and its habitat. Units of the system stretch across the United States from northern Alaska to the Florida Keys and include small islands in the Caribbean and South Pacific. The refuges are as diverse as the nation itself.

The U.S. Fish and Wildlife Service is the principal federal agency dedicated to the conservation and protection of migratory birds, certain marine mammals and threatened and endangered species. It also manages National Fish Hatcheries and provides leadership in habitat protection, fish and wildlife research, and technical assistance.

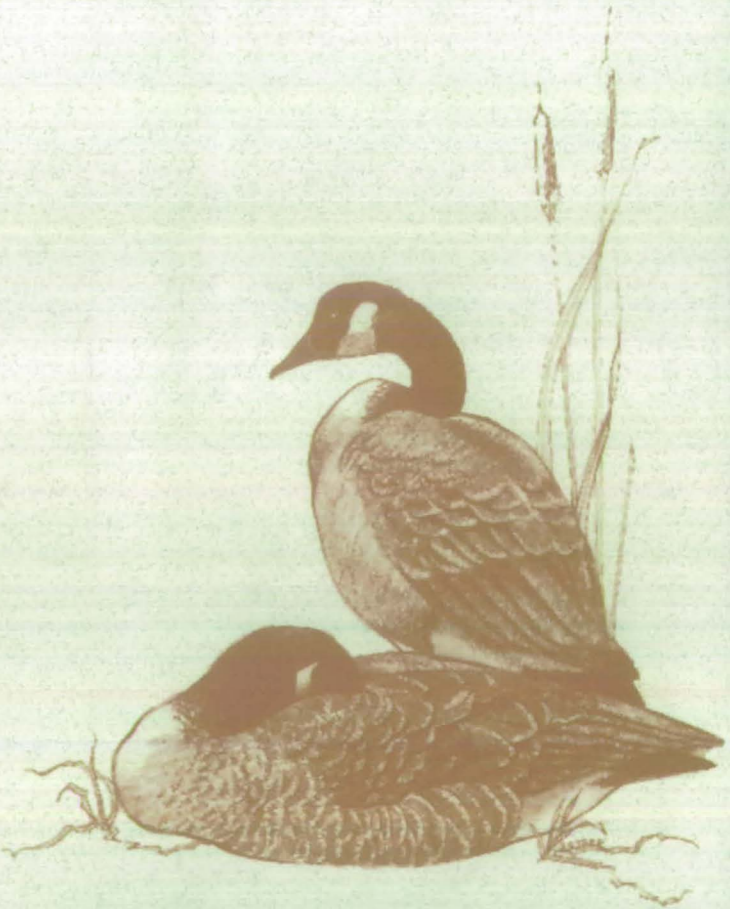
To help preserve our natural heritage, buy a Federal Duck Stamp. Proceeds from sales are used to acquire habitat for waterfowl and other wildlife.

Birdwatching is encouraged. Please report any unusual sightings to:

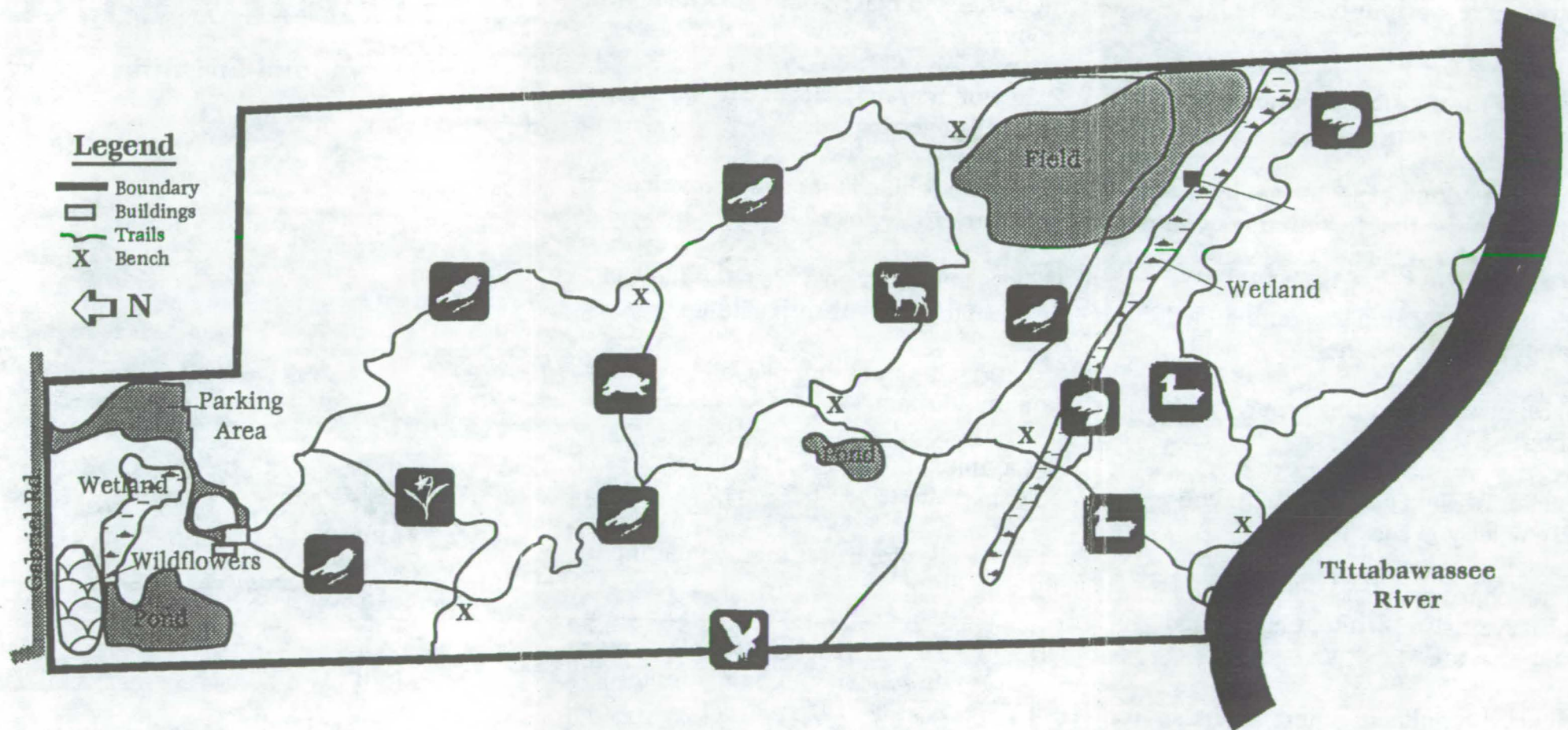
Shiawassee National Wildlife Refuge
6975 Mower Road
Saginaw, Michigan 48601
(517)777-5930



Birds of
Shiawassee
National Wildlife Refuge



Green Point Environmental Learning Center Saginaw, Michigan



All trails are marked with symbols. To follow the trails, just match the symbols on this map to the ones on the trail signs.

Wildlife Viewing Tips

Although there are no guarantees that you will see wildlife while hiking our 2.5 miles of trails, there are some things you can do to greatly increase your odds of being successful:

- Be quiet - animals can be scared off easily.
- Be patient - don't expect to see everything in the first few minutes you're here.
- Hike in the morning or evening - wildlife are much more active then.
- Use binoculars, spotting scopes, and cameras.
- Bring along field guides to help you identify what you see.
- Do not chase or harass wildlife - the goal is to observe nature without changing animal behavior.
- Respect the rights of others - don't spook wildlife being viewed by someone else.
- Be prepared for insect pests - bring along bug spray.

Rules and Regulations

You can hike or ski our trails year-round, seven days a week, during daylight hours only. Please follow these rules and regulations to make your visit safe and enjoyable.

- Stay on marked trails to cut down your chances of getting poison ivy.
- Park your bike in the rack provided - bikes are NOT allowed on the trails.
- Dogs and other pets are NOT allowed because they can disturb wildlife.
- Leave all plants, animals, and artifacts as you found them.
- Camping, hunting, and building fires is NOT permitted.
- Leave the site better than you found it - pick up litter.

Green Point
Environmental Learning Center
3010 Maple Street
Saginaw, Michigan 48602



Jan. 1996



Saginaw,
Michigan

Trail Map

Green Point

Environmental Learning Center

