OTTAWA NATIONAL WILDLIFE REFUGE COMPLEX

(OTTAWA, CEDAR POINT, WEST SISTER ISLAND NWR'S)

Oak Harbor, Ohio

ANNUAL NARRATIVE REPORT

Calendar Year 1993

B. Ross Adams — Refuge Manager — 3-24-94 — Date

Matthias A. Kuschta — Refuge Supervisor Review — 3.30.94 — Date

Susan Hazeltine — Regional Office Approval — 4-24-94 — Date

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Vacant	Ref. Ops. Specialist	PFT	GS-485-11
Stan Cornelius	Moist Soil Coordinator	PFT	GS-485-11
VACANTt	Park Ranger	PFT	GS-025
Robert Reynolds	Maintenance Worker	PFT	WG-4749-8
Kenneth McConahay	Eng Equip Oper	TFT	WG-5716-8
David Day	Eng Equip Oper	PFT	WG-5716-8
Tom Roster	Refuge Ops Spec	PFT	GS-485-9
Marjorie Miller	Administrative Assist	PFT	GS-303-6
Jeffrey Jaeger	Maintenance Worker	PFT	WG-4749-5
Joseph Robb	Ref. Ops. Specialist	PINT	GS-485-7
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DESCRIPTION: The Ottawa National Wildlife Refuge Complex, located in Lucas and Ottawa Counties, is made up of three refuges and five separate units: the Ottawa Refuge has three units - Ottawa, Navarre and Darby; Cedar Point Refuge; and West Sister Island Refuge. The Ottawa Division was established in July, 1961 under the authority of the Migratory Bird Conservation Act; West Sister Island Refuge was established on August 2, 1937, by Executive Order 7937; Cedar Point Refuge was donated to the Service in 1964; Darby was acquired in 1966 in exchange for Navarre, with the agreement that most of Navarre would remain under management for wildlife by the Service. The total Refuge acreage is 8,318, part of a once 300,000 acre Lake Erie Marshes.

WILDLIFE: The Complex has three active bald eagle nests and Peregrine falcons are also seen during migration. The Refuge is host to 312 species of birds, 30 species of mammals, 16 species of reptiles and amphibians, and 43 species of fish. West Sister Island Refuge is a rookery for black-crowned nigh herons, great blue herons and great egrets. The Complex is famous for excellent birding during the spring inigration.

HABITAT: The Refuge habitat consists of 5,350 acres of open pools, marsh or moist soil units, 236 acres of croplands, the remaining 2,730 acres is a mixture of grasslands and forests. The 77 acre West Sister Island Refuge is designated a wilderness area.

PUBLIC USE: The Refuge is within the driving range of 8 million people. The average visitation rate is approximately 60,000 per year. Activities include: environmental education, interpretive foot trails, hunting, fishing, trapping, and wildlife observation.

MANAGEMENT EMPHASIS: The Ottawa National Wildlife Refuge is a major resting, feeding and wintering area for migratory birds. The preservation of a portion of the Lake Erie

marshes is an important objective. Impoundments, moist soil units, grassland and cropland all add to this objective. The Refuge is a major wintering area for black ducks. Neotropical bird migration in the area (especially warblers) is spectacular.

CONGRESSIONAL DISTRICTS AND CONGRESSMAN/CONGRESSWOMAN

Marcy Kaptur, 9th District
Paul Gillmore, 5th District

LOCAL HOTELS

Comfort Inn, Oregon, Oh. PH: 419-691-8911
Econo Lodge, Curtice, Oh. PH: 419-836-2822

A new addition to Ottawa is welcomed by his mother. (JF)

INTRODUCTION

The Ottawa National Wildlife Refuge Complex is made up of three refuges: the Ottawa Refuge which has three divisions: Ottawa, Navarre, and Darby; Cedar Point Refuge; and West Sister Island Refuge.

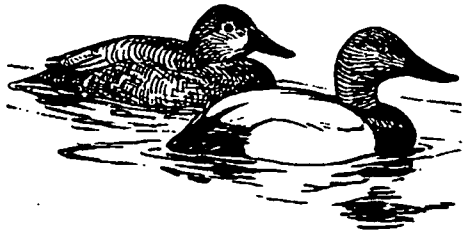
The Ottawa Division was established in July 1961 with land acquired under the authority of the Migratory Bird Conservation Act to preserve a portion of the remaining Lake Erie marshes. West Sister Island was established as a refuge in August 1938 by Presidential Order. Ceder Point was donated to the Service and accepted by the Interior in December 1964. Darby was acquired in 1966 in exchange for Navarre, with the agreement that most of Navarre would remain under management for wildlife under conditions of a 25- and 50-year lease.

The cities of Toledo, Detroit, and Ann Arbor are within 2 hours drive of Ottawa National Wildlife Refuge (NWR). At between 2 to 3 hours driving distance are Cleveland, Akron, Columbus, and Dayton. The refuge is within the bounds of an 8 million person megalopolis. Currently, it is receiving about 70,000 visitors per year who primarily visit the refuge for bird watching and wildlife observation.

The total refuge acreage is 8,318 acres of which 5,350 acres are either open pools, marsh, or moist soil units. Water levels in 3,306 acres of wetland and 794 acres of moist soil units are controlled by pumping. The remaining acreage of 2,968 is a mixture of grassland, forest, cropland, and administrative areas.

Wildlife use of the refuge is high and is approximately as follows; (use days) ducks, 1 to 5 million; Canada geese, 1 to 2 million; marsh and water birds, 1 million; shorebirds, gulls, and terns, over 1 million. Production is: ducks and geese 500 to 2,000 each; marsh and water birds, 4,000 to 6,000; shorebirds, gulls, and terns, up to 500; bald eagle, 2 to 5, and wetland mammals 6,000 to 10,000.

West Sister Island, located 9 miles out in Lake Erie, is a wilderness area and is the site of the largest colonial nesting bird colony in the Great Lakes chain.



*NTR - Nothing To Report

Page

F. HABITAT MANAGEMENT (Continued)

G. WILDLIFE

H. PUBLIC USE

*NTR - Nothing To Report

Page

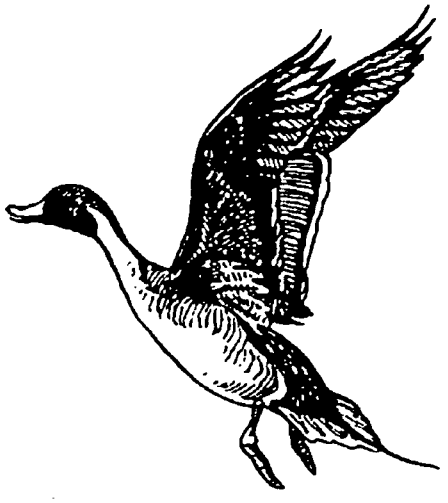
H. PUBLIC USE (Continued)

I. EQUIPMENT AND FACILITIES

J. OTHER ITEMS

*NTR - Nothing To Report

A. HIGHLIGHTS



- Metzgers Marsh restoration and Ottawa Additions continued to be main objectives (Sections C3 and D3-4).
- The number of research projects on the refuge doubled this year (Section D5).
- Project Leader Adams reported for duty (Section E1).
- Biologist Coppen reported for duty as the first refuge biologist at Ottawa (Section E1).
- Partners for Cultural Diversity efforts continued (Section E2).
- Partners for Wildlife program restored 90 wetlands this year (Section F14).
- Record year for bald eagle use and production (Section G2).
- The first Annual Migratory Bird Day was held (Section H6).
- A successful year for completion of many refuge construction and maintenance projects (Section I).

B. CLIMATIC CONDITIONS

TABLE 1. Annual Precipitation and Temperatures, CY 1993

	Precipitation		Snowfall		Temperature			
Month	CY-1993	Average	CY-1993	Average	Max.	Min.	Ave. Max.	Ave. Min.
January	2.81	1.62	7.50	9.10	57	10	50	- 4
February	1.37	1.55	13.00	8.35	49	2	53	- 1
March	4.00	2.50	14.30	6.60	58	12	69	10
April	3.23	2.85	0.00	1.56	77	29	82	22
May	1.85	3.12			84	43	87	34
June	2.79	3.53			93	43	93	45
July	2.04	3.35			99	58	94	51
August	0.85	3.70			98	49	92	47
September	3.79	3.36			92	39	89	38
October	1.83	2.34			84	33	80	26
November	1.71	2.98	0.10	3.21	63	25	68	18
December	1.57	2.85	2.00	6.78	55	5	57	3
TOTALS	27.84	33.75	36.90	29.74				
EXTREMES					99	2	94	- 1

* Averages were calculated by averaging data from 1964 through 1993.
\+ Precipitation includes melted snow.

An official National Weather Service station is located at the refuge headquarters and is monitored daily for precipitation and temperature. An automatic temperature recorder has lessened the need for recording temperatures daily.

Overall, 1993 was slightly below average in precipitation and average according to temperatures. The only month with any great deviance from the norm was August, which saw a deficit of 2.85" from the normal precipitation. Snowfall was above normal with the majority falling in February and March. No major snow storms occurred, however, flurries depositing 2-3" of snow occurred often.

Temperatures for the year can be characterized as mild. During the winter months the lowest recorded temperature was 10 degrees in January and 2 degrees in February, which are well above the registered minimum for those months. July, August, September, and October had temperatures ranging higher than the average maximum for that month.

C. LAND ACQUISITIONS

1. Fee Title

In, July 1991, the Service requested fee title transfer of a Farmers Home Administration (FmHA) property. This property is the Schoonover tract, Lenawee County, Michigan which totals 94 acres of fee title with an additional 20 acre FmHA conservation easement. The Service received the deed on October 25, 1991 and the discharge of lien occurred on August 28, 1992. We are pleased to report that the Quitclaim Deed was officially recorded on May 13, 1993.

3. Other

The Howard Farm was purchased by a local developer in 1993 and, therefore, is no longer available for purchase by the Service. The $2,700,000 appropriated for acquisition of the Farm was converted to construction funds for the restoration of Metzger Marsh.

Project Leader Adams along with representatives from Migratory Birds, Wildlife Associate Manager 2 (WAM 2), Ascertainment and Planning, Ecological Services of the U. S. Fish and Wildlife Service, and the Ohio Division of Wildlife, Ducks Unlimited, Audubon Society, and the Nature Conservancy investigated the potential for a new national wildlife refuge in Ohio. The final recommendation was to pursue acquisition of the Marion Prairie/Upper Scioto and the Edge of Appalachia areas as new wildlife refuges. Prudential Farms owns 4500 acres of flood plain and restorable prairie and wetlands in the Marion Prairie area and this land is for sell. Acquisition of Prudential Farms would provide a good base from which to start a new refuge with a potential 10,000 acres total. The Marion Prairie is in the Lower Great Lakes Joint Venture area and would provide substantial benefits for waterfowl and other wildlife. The Edge of Appalachia would be a non-traditional refuge providing habitat for rare plants and forest dependent birds in the hills of the Ohio River. The 10,000 acre refuge would link valuable habitat owned by the Ohio Division of Forestry and the Nature Conservancy. The team also looked at the Oak Openings area near Toledo but decided that any lands purchased in this area would be easily managed as a Division of the Ottawa Complex.

4. Farmers Home Administration Conservation Easements

FmHA properties were reviewed in 1993. The Cline and the Dusseau properties in Monroe County, Michigan and the Campbell property in Lenawee County, Michigan. The Dusseau and the Campbell properties were denied because of lack of quality restorable habitat. The Cline property (5.2 acres) was the only easement recommended for recording. The 20-acre easement on the Schoonover property was finally recorded, which will be a nice addition, since it is adjacent to the 94 acre Schoonover Fee Title.

D. PLANNING

2. Management Plans

Several Ottawa NWR management plans were updated in 1993. Wildlife Biologist Coppen prepared a forest management plan including a bottomland hardwood reforestation project and potential bald eagle nesting tree characteristic inventory. The second draft of the 1993 wildlife inventory plan for Ottawa NWR is currently being edited for submission of a final draft for review by WAM-2. Water management and moist soil management plans were also updated following productive management plan team meetings in November.

3. Public Participation

Tom Magnuson, Ascertainment and Planning, spearheaded the public meetings on the Ottawa Additions and the Metzger Marsh restoration projects. Two public meetings on the Ottawa Additions Environmental Assessment identified no opposition to the project. Attendance at the meetings was light with a few land owners inquiring about Service interest in buying their land. In contrast a wide variety of special interests were represented at two public meetings on the Metzger Marsh restoration project. The Lake Erie sport and commercial fishing interests, environmental groups and Senator Metzenbaum's District Manager expressed strong concern about the effects of diking the marsh on the fisheries resources in Lake Erie. As a result of the public participation the project concept was modified to restore the marsh in a manner that would mimic a natural coastal marsh system providing habitat for numerous fish and wildlife species as well as providing water, fish, and nutrient exchange with the Lake Erie.

4. Compliance with Environmental and Cultural Resources Mandates

Refuge staff applied for a 404 Permit to construct 7700 feet of lake front dike for the Metzger Marsh project. Because of the public controversy associated with the project, the Corps appeared overly cautious requiring copies of management plans and cooperative agreements between the Division of Wildlife and the Fish and Wildlife Service, contingency plans and research proposals associated with the project.

A Phase I archeological survey will be conducted on the Metzger Marsh project to evaluate the potential for archeological and cultural resources on the site.

Tom Magnuson prepared the environmental assessments for the Ottawa Additions and the Metzger Marsh restoration projects. The refuge staff sincerely appreciate all of the frustration, aggravation, and stress along with the associated headaches, and heartburn endured by Tom during this process. Tom was highly professional in the preparation of the documents and in the presentation of the projects at the public meetings. He expended a tremendous amount of energy and effort in the process and his participation influenced the position of several "team" members who had their minds made up when the process was started. The completed projects should be greatly enhanced because of Tom's involvement.

5. Research and Investigations

Ottawa WMS16 - "Woodcock Habitat Study on Ottawa National Wildlife Refuge, Ohio" Mark Shieldcastle, Ohio Dept. Natural Resources Experiment Station.

Woodcock breeding habitat remains marginal at Ottawa NWR. Prairie grass fields that have faired poorly due to water inundation have become increasingly important as singing grounds. Higher elevations of some marsh units also provide habitat. Diurnal habitat appears sufficient to hold resident breeders and act as stopover sites for migrants. Twelve singing males were recorded in 1993 (a 25% decrease from

1992). Incorporation of the U. S. Fish and Wildlife Service's North American Woodcock Management Plan should be considered where practical on refuge grounds.

Ottawa WMS19 - "Migrational Movements and Habitat Usage of Passerines on the Ottawa National Wildlife Refuge, Ohio" Mark Shieldcastle, Ohio Dept. Natural Resources Experiment Station.

The long term study to monitor the status of neotropical migrant populations was continued on both Darby and Navarre Divisions at Ottawa NWR. Breeding bird monitoring was conducted in conjunction with the national Monitoring Avian Productivity and Survivorship (MAPS) program. The purpose of this national program is to gather information on passerine reproductive success and survivorship.

In Spring, the Navarre and Darby banding station handled 9,982 and 654 birds, respectively. A total of 105 and 63 species were banded at Navarre and Darby Divisions, respectively. The top 10 species banded included: myrtle warbler (799); magnolia warbler (647); white-throated sparrow (630); yellow warbler (471); American redstart (411); common yellowthroat (343); gray catbird (254); ruby-crowned kinglet (247); Traill's flycatcher (244); and Swainson's thrush (240), all at Navarre Division. Eighty-two individuals of 8 species of shorebirds were banded at Darby Division including dunlins (35), semipalmated sandpiper (26), semipalmated plover (8), and least sandpiper (7). In breeding season, a total of 254 birds were handled with 32 species banded at the MAPS station.

During the fall migration, a total of 3,696 birds were handled and 80 species were banded at Navarre Division. Additional nets were operated at a new beach ridge just outside the lakefront dike near the main study site. Fifty-six species were banded including: myrtle warbler (99); warbling vireo (83); house finch (67); American goldfinch (52); blackpoll warbler (35); gray catbird (29); Cape May warbler (24); red-winged blackbird (22); and common yellowthoat, ruby-crowned kinglet, and Swainson's thrush. At Darby Division, a total of 431 birds were handled and 51 species were banded in 1993. The top 10 species banded included: Swainson's thrush (81); white-throated sparrow (28); magnolia warbler (27); blackpoll warbler (25); hermit thrush (23); golden-crowned kinglet (22); ruby-crowned kinglet (22); Ovenbird and Gray catbird (15 each), and northern cardinal (14). Additional nets were placed in the interior marshes at Darby Division where 212 birds of 38 species were captured and banded. The top 6 species banded were white-throated sparrow and indigo bunting (26 each); gray catbird (20); myrtle warbler (11); and northern cardinal and magnolia warbler (10 each).

A combined total of 121 species of 17,130 birds were captured at Ottawa NWR in 1993. A total of 14,516 new birds were banded this year. A secondary goal of the project is to advise the general public on avian migration, research, habitat management, and ecosystems. Project personnel entertained 500 participants including 18 and 4 groups at Navarre and Darby Divisions, respectively. In addition, 7 presentations were made to 350 people on avian ecology and migration.

Ottawa WMS28 - "Movement and Habitat Use of Black-Crowned Night Herons of West Sister Island Rookery" Mark Shieldcastle, Ohio Dept. Natural Resources Experiment Station.

This study monitors the nesting habitat usage and population status of various colonial nesting birds of West Sister Island. Two to 3 annual nest counts are conducted between June and July to count active nests (15% of island is surveyed). The number of breeding birds by species are then estimated by extrapolation. Black-crowned night herons (population estimate = 750) continue to compress towards the western end of the island. The great egret colony (population estimate = 750) continued to expand and appears to be a generalist in selecting tree size for nesting. The great blue heron colony (population estimate = 2,400) appears to remain static but possibly expanding slowly to the northwest. A 67% population increase was recorded for double-crested cormorants (population estimate = 300) for this second year of cormorant nesting activity. This species will be monitored closely to determine if any effects occur on nesting heron colonies. Snowy egrets (population estimate = 8) continue to nest on the island

but the status of the little blue heron is less clear (no nests were found for as second year in a row). Ground nesting herring gulls were estimated at 600 in 1993.

Double-crested cormorants have invaded the shoreline areas of West Sister Island NWR and established a nesting colony of approximately 300 individuals (JLC).

Ottawa WMS40 - "Physioecology of Fall Migrating American Black Ducks in the Lake Erie Marshes" Joseph R. Robb, Ohio State University, Doctoral Thesis.

Black ducks and mallards were trapped bimonthly from October through December in 1990-92 with a swim-in trap located at Ottawa NWR. We tried to measure at least 60 birds from each sex-age class each month. A total of 2,765 birds were banded between 1989-93. Ducks were held for 6-20 hours before weighing, and measuring total body, wing chord, culmen, and tarsus lengths. Backpack and some collar radio transmitters were attached to 116 and 114 HY female mallards and black ducks, respectively in 1990-92.

A 5-cc blood sample was collected for testing lead levels, disease exposure, and blood parasites by the National Wildlife Health Research Center. Lead exposure rates for radio-marked mallards and black ducks were 10% and 3%, respectively in 1990 and 3% and 8%, respectively in 1991. Toxic levels were observed in 6% of the radio-marked black ducks in 1990. Blood parasites were found in 15% and 14% of black ducks and mallards, respectively in 1990.

Joe Robb trapped black ducks and mallards on December 22, 1993. His crew banded, weighed, and measured 107 black ducks and 18 mallards (JLC).

Status, movements, and habitat use of radio-marked ducks were monitored from mid-October through early January. Hunters who shot radio-marked (and some non-radioed birds) were surveyed concerning behavior and physical condition of their birds. A comparison can be made between radio-marked and control birds.

Gut samples from 423 ducks collected from hunter check stations in 1989-90 were analyzed to estimate physiological condition. We collected 110 black ducks and 97 mallards during 1989-92 for whole body lipid content analysis.

Black ducks had higher site fidelity for the Lake Erie marshes than mallards, and black ducks seemed to have had slower emigration rates. Although statistical analyses are not complete, habitat use was sometimes identical for some mallards and black ducks, but some black ducks preferred areas dominated by scrub-shrub wetland habitats (eg., western portion of Crane Creek at Ottawa NWR) and areas affected by seiches more than mallards. Black ducks and mallards dispersed after leaving the Lake Erie marshes using the Scioto River and Maumee River watersheds as migration routes. Wintering sites as depicted by hunter returns were concentrated in Kentucky, Tennessee, and Alabama in the Mississippi Flyway, and in Virginia in the Atlantic Flyway.

Survival estimates and the influence of body condition on hunting and non-hunting mortality can offer insights on black duck population dynamics and comparisons with increasing sympatric mallard populations. Migration strategies also can be quantified and correlated with changes in body condition. Autumn and early winter body conditions differences, if any, can also affect over-winter survival and reproductive success during breeding, which might have a greater impact on the more k-selected black

duck population that nests in the lower-productive taiga forest region. Data obtained from this study can provide critical information for black duck conservation on local, regional, and flyway levels.

Ottawa WMS41 - "Feeder Use and Winter Movements of Wintering Passerine Population on Ottawa NWR" Mark Shieldcastle, Ohio Dept. Natural Resources Experiment Station.

No progress was made on this study in 1993 because efforts were placed on analyzing previous data concerning annual return and site fidelity. Investigators are analyzing movements between feeders during the winter season to determine winter territories. Annual return analysis will determine winter homing to individual feeders as well as to the region. No time table has been established for completion of the project.

Ottawa WMS42 - "Spring Migrational Movements of Raptors on the Ottawa NWR and Surrounding Lake Erie Marshes, Ohio" Mark Shieldcastle, Ohio Dept. Natural Resources Experiment Station.

The objectives of this study are: 1.) to monitor long term trends in migrating raptors utilizing the region and to examine for spatial and temporal differences in migration among various age and sex classes of individual species and between species; 2.) to analyze energetic condition of a sample of raptors to assess habitat quality; 3.) to allow for environmental education to improve the public's perception of these avian predators.

Raptor counts were conducted on 81 days with 245 individual trips involving 611.25 hours. A team of 1,062 volunteers counted 7,642 raptors. Banding took a minor role in 1993 (only 1 cooper's hawk captured). One educational program and 2 workshops were conducted in 1993. The Black Swamp Bird Observatory conducted a seminar for 150 participants on raptor identification in February. Workshops were a valuable and informative tool that improved accuracy of data collection. The workshops were designed to give volunteers information on raptor movements, identification, and procedural guidance. The 1993 field season continued in making strides in count procedure improvements and results. A valuable team of volunteer observers has been established and the prioritized observation site list appears to be functional but will be evaluated each year. It is hoped that additional sites can be manned for more hours next season as long as the tower (the most productive site) receives top priority. The banding station needs to be more fully operated and plans are being made to fulfill that endeavor. It is still expected to take several years to fully implement the project.

Ottawa WMS44 - "Common Tern Study" Nathaniel Stricker, Ohio State University, Master's Thesis.

Objectives for this study were 1.) Identify influences on nesting success of common terns in Ohio, especially interactions with nesting gull neighbors. 2.) To document nesting habits of common terns, including nest placement and rate of feeding. 3.) Design and monitor success of artificial nesting island platforms.

Seven pairs of common terns arrived at Ottawa NWR in 1993 but only 2 pairs remained to nest; no eggs hatched from 3 nesting attempts. In 1992, 25 pairs of common terns nested at Ottawa. Approximately 75 pairs made a total of 165 nesting attempts at the only other known nesting site this year. Predation by raccoons, fox snakes, and great horned owls as well as competition and predation by gulls appear to significantly contribute to nest failure. Sixteen, 8-foot-square nesting platforms modules will be deployed next spring. Continued observations of the 2 tern colonies are planned for next year as well.

Ottawa WMS45 - "Population Structure in Passerine Birds" Nidia A. Arguedas, Ohio State University, Doctoral Thesis.

Objectives for this study are: 1.) to determine the relationship between extreme vagility as represented by migratory birds and the degree/distribution of genetic variation; 2.) to make interspecific comparisons

with the goal of isolating species and habitat-specific factors in search of general patterns in genetic structure across taxa.

Progress in 1993 included capture and banding of yellow warblers, house wrens, and grasshopper sparrows using a mist-netting operation. Blood samples were acquired from 149 captured individuals for the genetic studies. Forty-three yellow warbler samples were obtained from Ottawa and Navarre divisions of Ottawa NWR (18 adult males, 14 adult females, and 11 immature or unknowns). Lab testing being carried out at present will determine the suitability of each of these species for the purpose of this project. Sampling will be completed by the end of the 1994 breeding season.

Ottawa WMS46 - "Migrational Survey and Habitat Usage of Shorebirds in the Lake Erie Marsh Region" Mark Shieldcastle, Ohio Dept. Natural Resources Experiment Station and John Szantos, Ottawa NWR volunteer.

Objectives for this study are: 1.) to survey the populations of shorebirds along the southwestern coast of Lake Erie during spring and fall migration; 2.) to explore the effects of weather on migration and year to year differences; 3.) to relate migrational data to habitat conditions; 4.) to relate migrational data to management of marsh units; 5.) to utilize project data to fulfill requirements for site identification of the Western Hemisphere Shorebird Reserve Network.

The 1993 field season was utilized as a pilot to test study procedures for technical problems. Data was collected during spring and fall migration on Ottawa NWR, Erie Marsh Wildlife Area in Michigan, and incidentally flooded fields in Lucas County, Ohio. Additional fall data was collected on Darby and Navarre units of Ottawa NWR, Winous Point Shooting Club, Metzger Marsh Wildlife Area, and Cedar Point NWR. A total of 43,682 birds of 34 species were counted during 106 trips utilizing 221.25 volunteer hours. The top 10 species counted were dunlin (24,021), semipalmated sandpiper (3,460), least sandpiper (3,317), killdeer (2,955), Short-billed dowitcher (2,714), semipalmated plover (2,130), lesser yellowlegs (1,586), pectoral sandpiper (831), black-bellied plover (782), and greater yellowlegs (450).

The 1993 data set, although not inclusive of the entire marsh region, provides a starting point for establishing migrational phenology of shorebirds through this region. Spring migration chronology appears to commence with pectoral sandpipers in early April followed by late-April peaks of both yellowlegs species. Peaks occurred for Dunlin, semipalmated plover, and black-bellied plover in early May, for least sandpiper and short-billed dowitcher in mid-May, and for semipalmated sandpiper in late-May.

Fall migration commences in early July and runs into November. As in the spring, a peak for killdeer has not been determined due to the local breeding birds. For the other 9 species, the first to peak in 1993 was the short-billed dowitcher in mid-to-late July followed by the least sandpiper in late July to early August. Semipalmated sandpiper and semipalmated plover both showed peaks in early August. Semipalmated plovers, black-bellied plovers, and lesser yellowlegs showed a late-September peak. Greater yellowlegs and pectoral sandpipers peaked in early October. The dunlin were the latest migrator peaking in late October.

Habitat use will be assessed by observation of characteristics of marsh units receiving shorebird utilization. Preferred habitats appeared to be extremely transitory. Bird use picked up when conditions of moist soil to 1-2 inches of water were present. As the mudflat surface dried, or water increased over several inches, shorebird use practically ceased. More in-depth monitoring of unit management will occur in 1994 to fine-tune preferred habitat requirements.

Ottawa WMS47 - "Using Predators to Control Carp in Diked Wetlands: Biotic and Abiotic Factors" Dr. David L. Johnson and William E. Lynch, Jr.

The objectives of this study include: 1.) to monitor and compare selected water quality parameters between 3 predator treatments; 2.) to quantify and compare zooplankton and phytoplankton populations, primary productivity, and fish community structures; 3.) to evaluate the survival, growth, reproduction, and importance of various food items (with emphasis on carp) of stocked largemouth bass and northern pike in diked wetlands along Lake Erie.

While the 18 plastic enclosures were not delivered in time to prepare treatment cells for the study in 1993, investigators monitored weekly zooplankton abundances in Pool 1. Zooplankton peaked in early June as a result of high Cladoceran densities but crashed by first week of July. Because cells must be installed at least 4 weeks before the peak, 1994 installation should begin in late April.

Three enclosure were installed in 1993 to test their integrity and ability to retain fish. Minor damage occurring during installation allowing stocked carp to escape. Enclosures will be designed to reduce damage potential during installation in 1994. Muskrat damage has been limited to small holes above the water line.

In 1994, the installed enclosures will be stocked with carp only because the investigators primary interest is in how carp density affects lower trophic levels and macrophyte communities. Planktivore enclosure studies will be conducted in 1995.

Ottawa WMS48 - "Evaluation of Wetland Restoration Projects in Ohio and Southern Michigan" Jonathan Bart, Ohio Cooperative Fish and Wildlife Research Unit, William Hegge, U. S. Fish and Wildlife Service - Reynoldsburg Ecological Services, Jorge Coppen and Thomas Cox, Ottawa NWR.

A proposal to study nongame wildlife use of restored wetland basins in Ohio and Southern Michigan was submitted to Steve Lewis, Nongame Bird Coordinator for Region 3 of U. S. Fish and Wildlife Service. Strategies for baseline data collection were addressed. Study objectives include: 1.) Preparation of comprehensive GIS-referenced database describing the wetland restoration projects completed to date; 2.) Characterize the physical and vegetative features of the restored wetlands to determine how well they meet the requirements of nongame birds of special concern in Ohio, of waterfowl, and of other taxa as feasible; 3.) Determine use of wetlands by nongame birds, game birds, other animals, and plants of special concern. Use during breeding, migration, and wintering periods will be assessed, and use of restored wetlands will be compared with use of natural wetlands; 4.) Investigate how use of these wetlands by nongame birds, waterfowl, and other taxa is affected by habitat on surrounding uplands; 5.) Compare the biodiversity in these wetlands with that of natural wetlands of similar size and configuration; 6.) Develop an educational leaflet encouraging voluntary habitat management efforts for nongame birds and other species on restored wetlands.

A basin inventory including physical and historical features and brief survey of 50-60 sites of the vegetation and fauna will occur in 1994 with subsequent surveys in 1995 and 1996. The results will clarify the contribution the restored wetlands are making in both absolute and relative terms.

Ottawa WMS49 - "1993 moist soil seed yield estimation" Jorge L. Coppen, Ottawa NWR.

The procedures established in the Waterfowl Management Handbook as Fish and Wildlife Leaflet 13.4.5 were used to estimate moist soil seed production at individual units managed under drawdown during the 1993 growing season. A companion computer software package containing statistical procedures was utilized in the analysis. Heterogeneous habitats were sampled by plant association zones as recommended (stratified sampling). Estimates for all species measured were weighted by the acreage per zone of the total for all zones within a unit to arrive at average dry weight of seed in pounds per acre and estimated

total weight for the unit. We measured parameters of mature stems and inflorescence of barnyardgrasses (Echinocloa spp.), rice cutgrass (Leersia oryzoides), yellow nutsedge (Cyperus strigosus), smartweeds (Polygonum spp.), and mild water pepper (Polygonum hydropiperoides). No measurements were made on stems stripped of seed because the yield estimated would not reflect availability to waterfowl and hampers accuracy when predicting waterfowl use days available.

Wildlife Biologist Coppen sampled representative seed heads for the Moist Soil Seed Yield Estimation program. (JS)

The maximum production will depend on an average best production because inflorescence configuration and genetic phenotypes in general will vary. Maximum average weight (pounds per acre) for each species was estimated from the 5 greatest measurements (i.e., those with the greatest number of seed heads). If 2 samples had the same number of seed heads, the subject with the largest volume measurements (seed head diameter and length) was used. Time limitations forced the use of largest samples from the data set rather than collecting a separate data set to estimate maximum yields. Therefore, it is important to be cautious in the interpretation of the results because if 5 or less measurements were taken for a species

in the estimation procedure within an impoundment, the maximum average yield should approximate the actual yield as a result of low sample size.

Ottawa - WMS50 - "Avian Use of Crane Creek Estuary at Ottawa NWR" Jorge L. Coppen, Ottawa NWR

The southwestern Lake Erie marshes of Ohio are an important staging area for autumn-migrating waterfowl and shorebirds using both the Mississippi and Atlantic flyways. This area is also important for breeding and migratory bald eagles. Recent local studies on bald eagles and waterfowl have elucidated information on the behavioral ecology and habitat use of these taxa in this open water habitat type. Unusually high foraging rates have been observed for black ducks, mallards, and most recently by gadwalls using the estuary and other open water areas affected by seiche occurrences. Shieldcastle (1993) reported on the importance of the Crane Creek estuary to fledgling, locally bred bald eagles for foraging and loafing. Information on general waterfowl behavior in moist soil and open water areas during seiche occurrences and normal water levels, and telemetry information on bald eagle habitat use in the estuary is required to develop an understanding of the importance of this unique habitat component to avian communities. This information will allow assessment of the best use of habitat area for important migratory avifauna using the mouth of Crane Creek and adjacent habitat affected by water level fluctuations of Lake Erie.

Waterfowl and Shorebird Observations

A scan sampling technique will be employed to collect behavioral information of ducks and shorebirds using the Crane Creek estuary. Project completion is expected by 31 December 1995. Behavioral data will be summarized in a time budget and expressed as percent of time spent performing each broad activity category for each observation. T-tests of calculated grand mean percentages will be used to investigate if significant behavioral differences occur between habitat types given different water level ranges in the open water roost habitat types. Mean abundances of waterfowl and shorebirds will be compared between habitats overall. To evaluate the importance of the area for resting waterfowl during hunting season, mean number of birds will be compared for hunting and non-hunting interval periods within and between years.

Bald Eagle Habitat Use

Bald eagle occurrence will be documented during each observation period. Eagles present will be observed for a ten minute period and instantaneous behaviors will be recorded every 10 seconds. Time-budgets constructed will provide insight to significant uses of the estuary habitat. Supplementary information from monitoring activities conducted by Ohio Division of Wildlife personnel will be used to assess habitat use within the open water habitats.

General Survey of Avifauna

To document use by other groups of important avian species using the estuary, counts of gulls, cormorants, and geese encountered while scanning will be conducted. Averages will be calculated to compare relative use of the habitat.

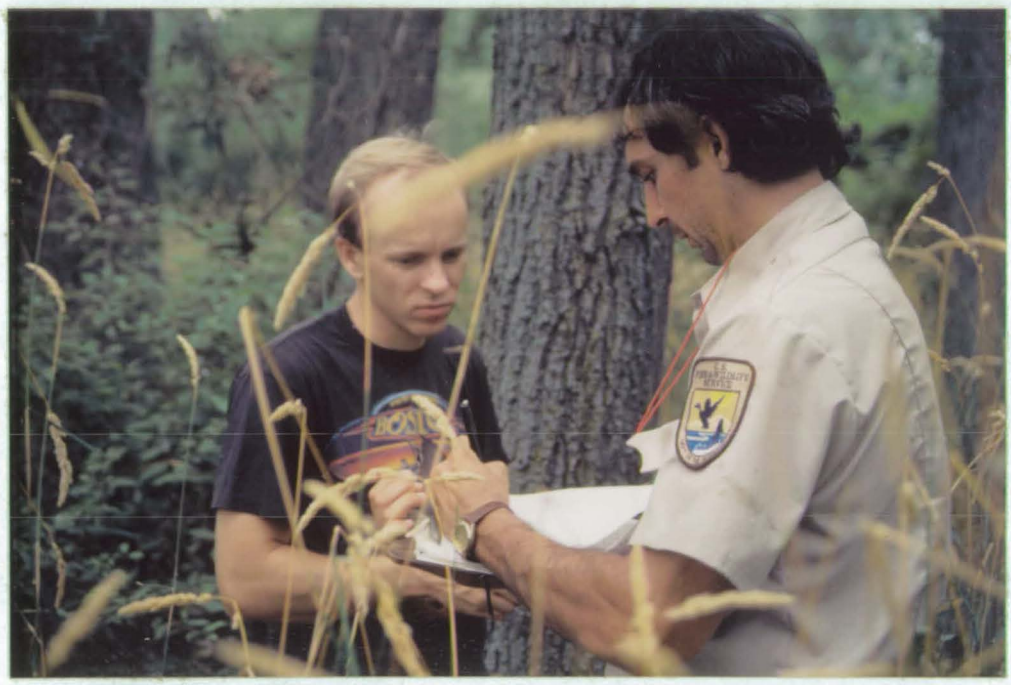
Progress

The 1993 pilot season has been completed and problems with sampling design have been addressed and the proposal modified to reflect changes necessary.

6. **Other**

"Potential Bald Eagle Nesting Tree Characteristics Inventory" Jorge L. Coppen, Ottawa NWR

In Ohio, bald eagles are recognized as federally and state endangered birds. Currently, 16 of the 22 nest sites in Ohio occur in the Lake Erie marshes. The Ottawa and Cedar Point National Wildlife Refuges presently contain nesting sites at 4 locations. On the Lake Erie marshes, the majority of nest establishment has occurred on either federal or state-owned land. Numbers of Ohio nesting bald eagles have steadily increased from 5 nest sites in 1980 to a current 22 statewide. To maintain this positive trend, an inventory of potential nest trees needs to be conducted on refuge grounds.



Wildlife Biologist Coppen and refuge volunteer Dave Hardman collected data in all refuge woodlots to compare with parameters of bald eagle trees containing nest structures. (KO)

To establish a baseline data set for Ottawa NWR, all trees containing bald eagle nests on refuge grounds were sampled for the following parameters: species; percent canopy closure; dbh; crown height; nest structure height at base; distance to nearest water body; distance to nearest tree in each cardinal quadrant (and species, dbh, and crown height measurements for nearest trees). Similar measurements were recorded for sampled trees in the inventory. We recorded basal area measurements. Trees in the tally were identified to species and measured for dbh and crown height. Also, a point-centered quarter method was employed at each point to determine the percent canopy closure and species, dbh, and crown height for the nearest tree in each cardinal quadrant. This should provide a representative sample of existing habitat conditions in woodlots to compare with actual nest site characteristics. Student t-tests will be employed to test for differences between actual nest tree sites and existing inventory. Management recommendations will be generated from this information.

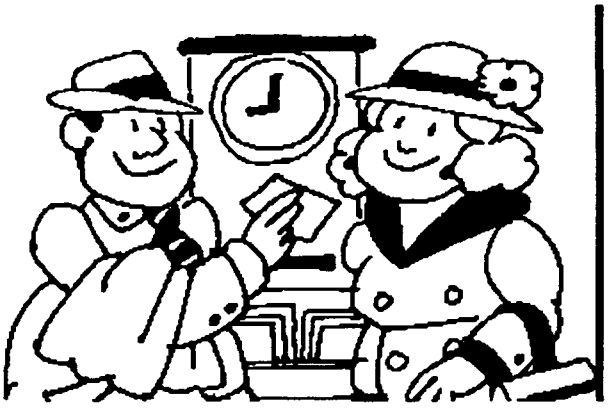
The habitat suitability index model for bald eagles (breeding season) will be used to determine the suitability index for only the reproduction component of all refuge units (percent of potential nesting area covered by mature timber).

Wildlife Biologist Coppen attended the Oil Spill Response For Wildlife Rehabilitation Training session sponsored by Ohio Wildlife Rehabilitator Association and hosted by the BP oil refinery in Oregon, Ohio on December 4. The agenda included information on the effects of oil on birds, operations control, field management and cleaning of birds, facility management, and a discussion on medical care. Other highlights included worker safety training, and an on-site demonstration of a cleaning procedure on a domestic duck. He received a certificate of training at the close of the session.

The National Biological Survey under the guidance of Doug Wilcox will conduct the studies necessary to evaluate the success of the Metzger Marsh Project. He contracted with Ohio State University for a study of the effects of predators on carp populations as a possible measure for controlling nuisance carp in wetland restoration projects.

E. ADMINISTRATION

1. Personnel



N. Ross Adams, GS-12, PFT, EOD 03/21/93 ..... Project Leader

Steven J. Lenz, GS-11, PFT, EOD 03/24/91 ..... Supervisory Refuge Operations Specialist (ROS)

Stanley S. Cornelius, GS-11, PFT, EOD 06/10/84 ..... Refuge Operations Specialist (ROS)

Thomas P. Roster, GS-9, PFT, EOD 01/27/91 ..... Refuge Operations Specialist (ROS)

Charles E. Marshall, GS-9, PFT, EOD 02/28/88 ..... Outdoor Recreation Planner (ORP)

Marjorie L. Miller, GS-6, PFT, EOD 02/06/89 ..... Administrative Technician

David L. Day, WG-8, PFT, EOD 04/10/83 ..... Engineering Equipment Operator

Robert Reynolds, WG-8, PFT, EOD 03/03/86 ..... Maintenance Worker

Jeffrey A. Jaeger, WG-5, PFT, EOD 06/24/91 ..... Maintenance Worker

Thomas A. Cox, GS-5, PFT, EOD 01/27/91 ..... Biological Science Technician (Private Lands)

Laurie A. Miller, GS-5, TPT, EOD 05/31/92 ..... Office Assistant (OA)

James A. Schott, GS-5, TFT, EOD 06/13/93 ..... Biological Science Technician (Wildlife)

Kenneth L. McConahay, WG-8, TFT, EOD 07/12/92 ..... Engineering Equipment Operator

Jorge L. Coppen, GS-7, PFT, EOD 04/04/93 ..... Wildlife Biologist

Tracy L. Engle, GS-5, TFT, EOD 06/28/92 ..... Terminated 03/05/93, Bio Science Tech. (Wildlife)

Mark D. Witt, GS-5, TFT, EOD 06/28/92 ..... Terminated 03/05/93, Bio Science Tech. (Wildlife)

Judy A. Flood, GS-4, TFT, EOD 06/13/93 ..... Terminated 08/06/93 Social Services Aid

Ottawa Refuge Staff, left to right - front row: Ross Adams, Tom Roster, Steve Lenz, Jorge Coppen. Back row: Marge Miller, Stan Cornelius, Charles Marshall, and Laurie Miller. (TC)

Maintenance and Biological Technicians, left to right: Tom Cox, Dave Day, Jeff Jaeger, Bob Reynolds, Jim Schott, and Ken McConahay. (CM)

Biological Science Technicians Mark Witt and Tracy Engle completed their 180-day appointments on March 5.

Project Leader N. Ross Adams entered on duty March 21 from the Mark Twain National Wildlife Refuge, Annada District.

Jorge Coppen entered on duty April 4 as a Wildlife Biologist. His position is the first biologist position at Ottawa. He was a cooperative student at The Ohio State University and was previously stationed at Tennessee NWR.

Judy Flood entered on duty June 13 as a Social Services Aid. She was hired locally to be in charge of the YCC summer program.

James Schott entered on duty June 13 as a Biological Science Technician (Wildlife). His primary duties have been to assist in the Private Lands Initiative Program.

ORP Marshall receives performance award and Maintenance Worker Reynolds receives on-the-spot award. (SL)

TABLE 2. Staffing Levels

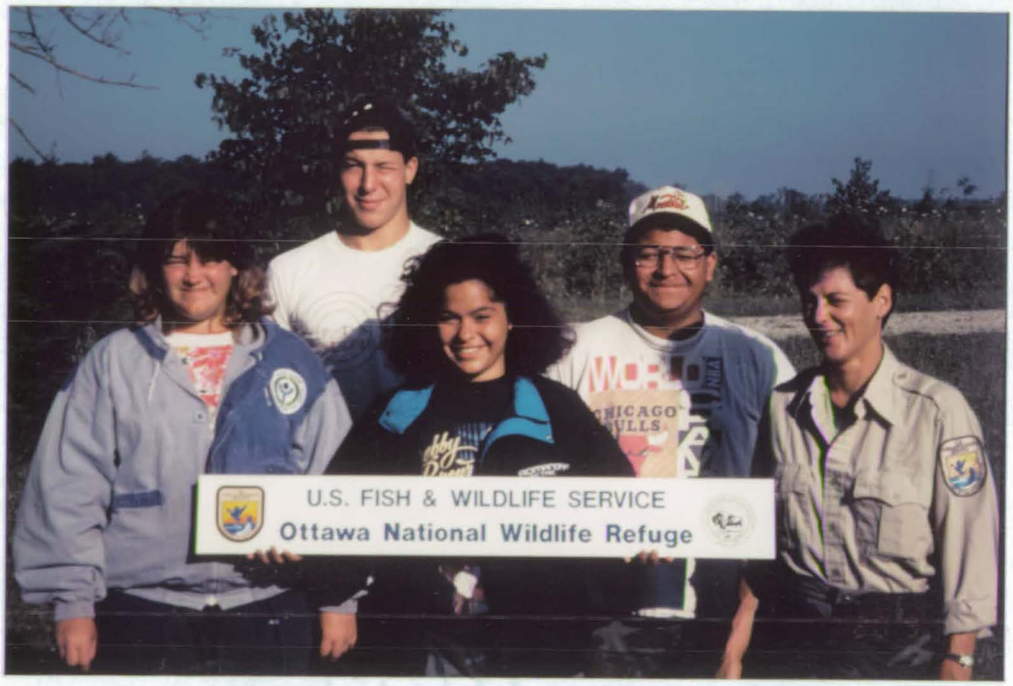
	Permanent	Part-Time	Temporary	FTE's
FY 1989	7	0	2	7.9
FY 1990	7	0	2	7.9
FY 1991	9	0	1	10.0
FY 1992	11	0	5	14.2
FY 1993	11	0	5	13.25

2. Youth Programs

YCC

The Ottawa National Wildlife Refuge 1993 Youth Conservation Corps (YCC) camp began on June 14. Ottawa's YCC program was non-residentially coordinated for 8 weeks and ended on August 6. Four enrollees were selected for this year's camp. Two enrollees were selected from Gibsonburg High School who were participating in the Partners for Cultural Diversity program. A random drawing was conducted from applications for the selection of two other additional positions. Participant interest was high as 15 male and 14 female applications were received for the drawing. Recruitment was coordinated through local high school counselors and with news releases. A crew leader was hired to direct field supervision of the enrollees. Refuge staff assisted the crew leader as projects warranted. One enrollee (Holly Hanson), encountered work related problems midway through the summer and finally resigned on July 20. The position remained vacant for the remaining camp work weeks.

Enrollees selected for the 1993 camp included: Belinda Arriaga 17, of Gibsonburg and Holly Hanson 15, of Clay Center, Manuel Salazar 17, of Gibsonburg and Kevin Smith 16, of Oak Harbor. Judy Flood of Oak Harbor was the crew leader.



YCC crew left to right: Holly Hanson, Kevin Smith, Belinda Arriaga, Manuel Salazar, and Group Leader Judy Flood. (CM)

Work Accomplishments

Sixteen work projects for the 1993 YCC program were submitted for new or on-going approval. Projects included: bird banding, boundary sign posting, facility and vehicle maintenance cleaning, vegetation clearing from water control structures, facility painting, and mowing. Most of these projects are on-going and comprised the majority of the enrollees work hours.

An orientation was conducted with the enrollees and parents prior to the start of the program. This orientation included an overview of the U.S. Fish and Wildlife Service as well as the Youth Conservation Corps. Work requirements were also outlined to the enrollees. Environmental Education field trips were taken to expose enrollees to other methods of conservation management. A field tour of the refuge was conducted for YCC parents by ORP Marshall with good attendance. A cookout and certificate presentation was held for the group the last day of the program in recognition of enrollee work accomplishments.

Looks good! Everyone is doing a great job! (JAF)

There was a total of 1145.5 paid hours for the 8-week period, with four enrollees participating in the work program. Salary cost for the camp was $5,240.79. Other cost and materials totalled $789.67. Crew Leader cost totalled $2,732.08 with 320 paid hours. Total 1993 YCC camp cost was $8,762.54; however, on-hand materials and equipment are not reported in this total. General funding allocated from the Regional Office for Ottawa's FY93 YCC camp totalled $9,700.

Environmental Education

In addition to the Ottawa Refuge, enrollees visited six sites for educational purposes. Those areas included: Winous Point Shooting Club, Port Clinton; Oak Openings Metropark, Toledo; Crane Creek Wildlife Research Station Museum, Oak Harbor; Maumee Bay State Park Nature Center, Oregon; National Park Service-Perry Victory Monument and Division of Wildlife Fish Hatchery, both on the Bass Islands. A Bald Eagle banding site project was visited as part of the field education experiences. Enrollees gained much information by working with staff and other professionals in daily work projects.

Safety

No serious accidents or incidents resulting in lost work time occurred during the eight-week camp. Belinda Arriaga encountered a wild domestic cat and received a fang puncture to the right index finger (See

safety). Three enrollees and crew leader participated in CPR certification training including limited first aid refresher. The group traveled to Perrysburg Fire Department for the training instruction from Volunteer Jeff Steffanelli through the American Heart Association. Enrollees also attended staff safety meetings.

Summary

Ottawa's Youth Conservation Corps program operated successfully with Judy Flood as the crew leader this year. ORP Marshall acted as camp director coordinating work efforts with the crew leader. The group's enthusiasm contributed to many beneficial work projects being started and completed.

The YCC program was identified again this year as a means to introduce the natural resource management field to high school students of color. The Refuge again coordinated efforts to encourage and provide students of color from Gibsonburg High School the opportunity to learn about the natural resources field as a career.

The refuge continues to benefit greatly from the efforts put forth by the young people participating in the YCC summer program. Benefits are mutual for both parties. Recommendations are being considered in the age requirement for Ottawa's YCC program.

Partners for Cultural Diversity Program

ROS Lenz and ORP Marshall traveled to the University of Michigan on the January 18 to participate in Martin Luther King Jr. Day at the university. Gibsonburg students and teacher Tom Kashmer accompanied Lenz and Marshall in attending the celebration. Mamie Parker from the Regional Office, Black Affairs Program was the Keynote Speaker during scheduled events.

Project Leader Adams, WAM 2 Kerschbaum, and ORP Marshall participated in a meeting of the Partners for Cultural Diversity in May. The group stressed the need for a coordinator at the University of Michigan to seek out needed grants to make the program successful. A meeting was held again in October to recap progress in the program. Project Leader Adams and department representatives Debbie Solowczuk and Jane Leu from the University of Michigan, School of Natural Resources met with the newly selected principal of Gibsonburg High School, Ms. Kathleen Reed, in June. The purpose of the meeting was to review and update Ms. Reed to the Partners for Cultural Diversity program. Tom Kashmer continued to be very instrumental in coordinating Cultural Diversity student/refuge activities. However, failed referendums in the school system had imposed the superintendent and principal to limit Kashmer's participation at the end of the year.

The following Cultural Diversity accomplishments occurred in 1993:

- Gibsonburg students participated in the annual Lake Erie shoreline clean-up.
- Two students, Manuel Salazar and Belinda Arriaga completed summer work positions in the YCC program for eight weeks.
- An orientation was held for YCC enrollees and parents. ORP Marshall toured YCC parents on the refuge in June.
- YCC enrolees completed several educational field trips to natural resource managed sites in the area.
- Invitations were given to Gibsonburg school students to participate in National Fishing Day activities in June.
- Gibsonburg school students were invited to participate in the refuge open house held in October.
- Volunteer Tom Kashmer from Gibsonburg High School continued bird banding activities that provided Cultural Diversity students hands on participation.
- Jessica Asneiss, a student from Gibsonburg, attended the University of Michigan's week long summer institute program.

- Belinda Arriaga applied for admission to the University of Michigan and was accepted, however financial limitations required Arriaga to reconsider the University of Michigan and accept the University of Toledo.

Bowling Green State University Multi-Cultural Affairs Program students visit Ottawa Refuge. (CM)

Boy and Girl Scout Programs

ORP Marshall led 9 scouts and parents on a tour of the refuge on April 3. The theme "endangered species" was given as a discussion topic.

ORP Marshall gave a slide presentation on April 7 to boy scout leaders of the Toledo Area Council. Marshall outlined projects on the refuge available for eagle scout and service merit badge requirement.

John Loth contacted the refuge to coordinate an eagle scout project for his troop from Oak Harbor, Ohio. The scouts assisted with International Migratory Bird Day events held on May 8. Trail rehabilitation is the scope of work duties for John's troop.

Scout troop 117 from Toledo, Ohio volunteered a full day on June 14 collecting trash from the Crane Creek beach and preparing Q-3 residence for painting.

Boy Scout troop 382 from Barberton, Ohio visited the refuge for wildlife observation on August 20.

Boy Scout troop 333 from Rocky Ridge, Ohio visited the refuge on August 16 to complete requirements for wildlife merit badges.

Boy scout troop 333 from Rocky Ridge, Ohio visited the refuge on September 16 to assist ORP Marshall prepare for the Ottawa County 5th grade conservation tour. Five scouts volunteered for two hours.

A local boy scout troop visited the refuge on October 28. ORP Marshall discussed the refuge system and Ottawa's wetlands.

Three high school students from Clay High School in Oregon, Ohio visited the refuge on May 12 to participate in a career shadow day. The three students were given the opportunity to speak to staff and monitor personnel in daily work duties.

Rocky Ridge Boy Scout Troop 333 Take time out for photo. (CM)

4. <u>Volunteer Program</u>

Volunteers continued assisting refuge staff with many management programs during the year. Volunteers helped coordinate International Migratory Bird Day activities, open house, lead tours, assisted staff with environmental education programs, and conducted various maintenance duties.

ROS Roster met with volunteers in February to plan work priorities to monitor the common tern nesting site.

Three students from the University of Toledo assisted refuge staff in interpretive, biological, and general maintenance projects. Ray Paterra finished 400 hours, Rob Rotz 100 hours, and Steve Martin 100 hours. Volunteer field experiences were started by the three students in January and completed volunteer duties in March. Volunteers Dave Hardman from Bowling Green State University and Kevin Osbourne from Arkansas State University began volunteer duties in June and completed summer work assignments in August. Dave Hardman accepted another field position in Washington, DC and Kevin Osbourne returned to school.

A volunteer meeting was held on April 18. The new Project Leader, Ross Adams attended the meeting to introduce himself. Attendance was small with only 12 of approximately 35 active volunteers participating.

Frank and K.C. Cousins installed purple martin houses on April 10. The houses were immediately examined for occupation by returning purple martins.

Volunteer Mike Crofts traveled to Seney NWR during the week of May 8-12 to coordinate a tern project similar to Ottawa's project.

TABLE 3. 1993 Volunteer Hours

Volunteer	Hours	Volunteer	Hours
Allen Cornelius	88	Arnold Sutter	54
Frank Cousins	9	Boy Scout Troop 333	244
KC Cousins	19	John Szanto	60
Chris Crofts	113	Mike Bolton	60
Jim Fuehrer	100	Oak Harbor Conservation	8
Alfred Kahl	199	Club	
Joe Komorowski	80	Kevin Osbourne	84
Linda Marshall	57	Terry Hanson	24
Julie Schieldcastle	30	Boy Scout Troop 117	70
Scott Crofts	84	Jason Bleam	5
Mary Gloer	4	Boy/Girl Scout Beach	200
Al Schlecht	8	Clean-up	
Chris Ashley	72	Tom Kashmer	438
Jim Quinlivan	6	Rex Miller	10
Ray Paterra	324	Sheila Miller	10
Ed Pierce	103	Janet St. Clair	7
Rob Rotz	63	Dan Lucas	56
John Redman	62	Jerry Klug	72
Jeff Steffanelli	8	Dawn Hendricks	5
Mike Crofts	164	Tom Koedam	16
Jeff Lammie	38	John Loth	6
Steve Martin	103	Jim Berlin	6
Dave Hardman	377	Mark Schieldcastle	6
Chris Kaufman	4	Eric Rayburn	13
TOTAL VOLUNTEER HOURS			**3,569**

ORP Marshall, and volunteers Mike and Chris Crofts attended a Maumee Bay Carver Association meeting on March 14 to accept 20 tern decoys donated to the refuge. Mike and Chris have volunteered for dual assignments to coordinate Ottawa's and initiate Seney NWR's tern project.

The 7th annual Lake Erie Watering Clean-Up was conducted on June 5. Volunteers collected trash and debris from Ottawa's lake front dike. Inclement weather limited the turnout of participants to only 40 scouts and parents. The Lake Erie Marine Watercraft organized the annual project.

Volunteer recognition cookouts were held on the refuge at the Butternut site for eagle and raptor monitors. Mark Shieldcastle from the Crane Creek Wildlife Research Station and Julie Shieldcastle from

the Black Swamp Bird Observatory coordinated activities. Activities were conducted on July 10 and 11 for approximately 20 people each day.

A volunteer recognition program was held on October 24 at the office to acknowledge efforts put forth by volunteers during the past year. Program activities included an afternoon meal followed with an awards presentation. Mr. Tom Kashmer received the 1993 Volunteer of the Year award for his outstanding efforts and involvement in various programs at the refuge.

5. Funding

TABLE 4. Funding Breakdown for the Last Five Year Fiscal Period

	FY 90	FY 91	FY 92	FY 93	FY 94*
Oper.& Maint	236,000	396,824	356,500	352,573	409,512
Core Maint.	87,372	80,000	80,000	77,683	80,000
Base Funds	323,372	476,824	450,256	430,256	489,512
Flex/Maint Mgmt	124,800	308,000	105,000	154,500	50,000
Fire Mgmt	22,000	400	1,000	6,200	1,500
Private Lands	96,750	117,500	159,000	107,000	100,000
Threat/Conf.(1)		0	0	0	0
Special Proj.(2)	198,000	0	0	0	0
Drug Intervention		1,010	3,500		0
Non-Game		3,000	0	4,500	4,000
Special Funding(3)			52,500	15,000	5,000
Totals	764,922	906,734	757,500	717,456	650,012

* Not yet final
(1) Threats & Conflicts - Includes contaminants and purple loosestrife control.
(2) These are special funds for the study of Lake Erie Wetlands from a special congressional appropriation.
(3) Generally 1260 funds for watchable wildlife, wetland education, cultural diversity, etc.

6. Safety

Staff completed audio testing on February 18 and 19 at the St. Charles Hospital in Toledo. Staff member tested were Witt, McConahay, Cox, Reynolds, Day, Jaeger, and Engle.

YCC'ers Smith, Salazar, Arriaga, and Group Leader Flood completed CPR requirements instructed by volunteer Jeff Steffanelli at the Perrysburg's Fire Department in July.

Refuge staff participated in a trial emergency evacuation drill for the surrounding areas near the Davis Besse Nuclear Power Plant on September 15.

Refuge staff completed end of the year lyme disease testing on December 7. Staff that participated included: Cornelius, Cox, Roster, Coppen, Schott, Marshall, Day, Reynolds, and McConahay.

Thirteen safety meetings were presented by staff members on a rotational basis. Topics for the meetings included: Lyme disease recognition and prevention, Practical use of fire extinguishers, Nutritional habits, Vehicle safety checks, Drunk driving, Hunter safety, and Hypothermia.

Office Assistant Laurie Miller displays fire training skills. (CM)

Safety Items of Interest

An accident report was completed for YCC enrollee Belinda Arriaga who was bitten by a stray cat on July 26 while she and other YCC enrollees were sign posting on refuge property. A stray domestic/feral cat was encountered and handled in curiosity. The curiosity resulted in a cat bite wound to her index finger. Precautions were taken through medical treatment to prevent any sickness from the animal bite. Treatment was received and no complications resulted from the incident.

Biological Technician Jim Schott, was involved in a motor vehicle accident on August 20. Schott was returning from farmbill work in Northeastern Ohio on I-271 southbound when the accident occurred. Schott was traveling the highway in a 1/2 ton pickup during rush-hour traffic outside of Cleveland. He was unable to stop when traffic slowed in front of him and inevitably impacted the right rear panel of another vehicle. The driver of the other car was examined, but no injuries were sustained. Although there were damages to the other vehicle, Schott avoided injuries to himself and to the government vehicle.

Number of accidents reported for the year - 2 (Those listed above in safety items of interest)

Safety films shown during the year included: Car Jacks; Beating A Blowout; Watch Your Load; Charging Up On Battery Safety; Fire Extinguishers; Safety Check Your Car; Alcohol And Driving; Hunter Firearm Safety; Wet, Cold, And Alive; and Lyme Disease.

7. Technical Assistance

Project Leader Adams was fortunate to have been selected to participate in an exchange of scientists with the Peoples Republic of China. Adams, Dr. Thomas Eley of the Yukon Flats Refuge, and Dr. Dale Bruns of Wilkes University traveled to Fanjingshan National Biological Preserve in Guizhou Province to consult

with Chinese managers and biologists on their wildlife programs. Fanjingshan is an "island" of 419 square kilometers of semitropical cloud forests and is truly a world class treasure of both biological and religious significance. Over 500 years ago Buddhist leaders identified Fanjingshan as a sacred area and protected the plants and wildlife. Today the Preserve supports numerous unique plant and animal species. Threatened and endangered animals include Assamese Macaque, Stumptailed Macaque, Guizhou Golden Monkey, Clouded Leapord, Francois' Langur, Chinese Pangolin, Asian Otter, Gem-faced Civet, Asiatic Black Bear, Serow, Musk Deer, and Chinese Giant Salamander.

Problems facing managers of the Chinese preserves are amazingly similar to those facing American refuge managers. Fanjingshan has excellent facilities to accommodate research projects but lacks modern equipment, technology and training for preserve staff to generate information needed to safeguard the unique plant and animal communities on the preserve. The American team worked closely with Fanjingshan staff in sampling invertebrates and water chemistry in Fanjingshan streams. Monitoring water quality is important because many families and industries in China now use high sulfur coal for their energy needs so acid rain is a real threat to the Preserve.

Poaching is still a threat to the natural resources of the Preserve. Preserve staff try to visit each of the 2000 neighboring families annually to discuss the value of Preserve resources and investigate depredation problems by monkeys and bears. Poachers are dealt with quite severely when caught by Preserve law enforcement officials. The Guizhou Ministry of Forestry recently produced two high quality videos on poaching and the resources of Fanjingshan. Educating the public about the value of natural resources is quite difficult in Guizhou Province because so few residents have radios, televisions, or newspapers.

Dr. Thomas Eley demonstrating a Global Positioning System to Fanjingshan staff as Buddhist monks observe with interest. (NRA)

With the worldwide explosion of the human population and the resulting degradation of natural systems, resource managers face tremendous challenges in preserving and restoring these valuable resources. International exchange programs of scientists and resource managers not only provide an insight into

natural resource problems and possible solutions but also provide a great opportunity for participants to learn and understand cultures so vastly different from our own. Such exchanges enhance the understanding and management of wildlife resources of participating countries as well as enhance the understanding and cooperation between the different cultures. These programs should remain a high priority in the Fish and Wildlife Service.

8. Other

ROS Lenz and ORP Marshall traveled to the University of Michigan on January 18 to participate in Martin Luther King Day at the University. Partners for Cultural Diversity from Ottawa, Shiawassee, Regional Office 3, National Fisheries Research Center-Great Lakes, Law Enforcement-Ann Arbor, Buena Vista High School-Michigan, and Gibsonburg High School-Ohio, attended the celebration. Mamie Parker was the keynote speaker during scheduled events.

Project Leader Adams traveled to Twin Cities, MN to attend the Project Leaders' WAMJAM during August 24-27.

Regional Director Sam Marler and Assistant Sue Haseltine visited the refuge on October 2. Both officials met with Project Leader Adams to discuss management concerns and receive a briefing on the Metzger Marsh project. A tour was conducted to show the area's wetlands and resources. Mr. Marler and Ms. Haseltine later attended the dedication of the Pickerel Creek Wetlands Restoration Project, an Ohio Division of Wildlife Management Area.

Wildlife Biologist Coppen attended an Endangered Species and Wildlife Diversity Conference in Columbus, Ohio on October 30 with other members of the Ohio Working Group of Partners in Flight to observe and gather information useful to the management technical committee of the Ohio Working Group.

Maintenance Worker Jaeger was part of a Maintenance Action Team that traveled to Mingo Job Corps to assist with several work projects during November 14-19.

F. HABITAT MANAGEMENT

1. General

Habitat at Ottawa NWR consists of a variety of wetland types (65%), grasslands (20%), cropland (8%), forest and brush lands (4%), and dikes and roads (3%). Marshes are managed to provide year-round food, cover, and nesting habitat for waterfowl and other migratory water birds. Moist soil and cropland units provide food for migrating waterfowl and grasslands supports nesting cover for waterfowl, feeding areas for raptors and food and cover for resident species.

2. Wetlands

Ottawa Refuge contains approximately 3,500 acres of marsh and 800 acres of moist soil areas which are managed for a wide range of food, cover, and nesting needs. Ottawa's wetland complex is managed to provide a variety of wetland types throughout the year. The individual units are manipulated to maintain emergent marshes and to produce moist soil plants.

A series of pools are established throughout the refuge and intermixed with moist soil units. The pools are maintained as emergent marshes and drawn down as needed to reestablish vegetation. The pools provide a variety of habitat from shallow water areas for shorebirds to deep pools utilized by diving ducks.

Moist soil units are managed to provide annual growth to early successional mud flat species, such as smartweeds, millets, etc. Annual drawdowns cause the unit to progress through a series of successional stages from the early smartweed/millet stage through the beggars tick/perennial stage, to the woody vegetation or cattail stage. The early stages are the most productive and can be maintained by tilling the soil or flooding for prolonged periods.

This year numerous wetlands were drawn down for renovation of the facilities or moist soil/emergent plant production or enhancement. A seed yield analysis was conducted to evaluate moist soil seed production. The units evaluated include 2A, 2B, 2C, Mini-Marsh, MSU 4, 5, 7B and 8B, and Darby pools 2, 3, and 4. A complete description of procedures can be reviewed under the Ottawa WMS49 in section D.

Wetland Units

Ottawa - Pool 1

Water levels were at a deep marsh stage throughout the year. The impoundment had open areas in the middle with cattail surrounding the edges. Smartweeds were prevalent in the impoundments northern and western edges. Waterfowl use was constant during the year and increased during the fall especially during the hunting season.

Ottawa - Pool 2A

This unit was drawn down fast in early April after being maintained as a semi-permanent marsh for several years. Lake Erie storms (early 70's and 1980's) that breached the dikes and subsequent wave action and carp activity seem to be implicated in the loss of organic matter over a large portion of the unit. Only 5% and 22% of the estimated maximum seed yield was realized for barnyardgrass and smartweed, respectively. Plant response was poor in the east end. Large, robust velvetleaf stands dominated the majority of the area. Some good smartweed production occurred on the west end and slightly more than the average yield across all units was realized as a result. The xeric soil conditions and fast drawdown probably promoted the extensive velvetleaf stands, and poor response by

barnyardgrass. Releasing water back in to the unit to stress the velvetleaf may have controlled it but may not have improved moist soil plant response because of a poor seedbank or poor soil conditions.

Ottawa - Pool 2B

This unit was drawn down in late March. Extensive stands of eurasian water milfoil had dominated the open water areas of the unit which had been managed as a semi-permanent marsh for several years. The domination was almost complete resulting in very low submergent plant diversity. All species produced below the average seed yield across all units sampled. Only 13%, 18%, 15%, and 4% of the estimated maximum seed yield was realized for barnyardgrass, nutsedge, smartweed, and water pepper, respectively. Waterfowl use was extensive during fall flooding when peak numbers reached 8-9,000 ducks and 4,000 geese.

Ottawa - Pool 2C

This unit was drawn down in mid-March after having been managed as a semi-permanent marsh for several years. The pool is still dominated by perennial aquatic plants. Smartweeds responded well to the mud flat conditions and soil moisture and produced 1.8 times the average weight across all units (mean = 148 lb./ac.). Only 19%, 22%, and 26% of the estimated maximum seed yield was realized for barnyardgrass, nutsedge, and smartweed, respectively.

Ottawa - Pool 3

The unit was at full capacity during the winter and water was released in the spring. Water elevation slowly dropped from evaporation. Elevation drop through the unit is too extensive to adequately manage this unit. The western side is higher and choked with cattail while the eastern side is lower and tends to remain in open water. This pool is a major loafing/resting area during the fall migration.

Ottawa - Pool 6

The pool fluctuates with Lake Erie water levels, precipitation, and evaporation. This unit consists mainly of open water and cattail zones. Waterfowl and other marsh bird use has been limited. The dikes are riddled with muskrat holes and in dire need of renovation.

Ottawa - Pool 9

Pool 9 is almost a solid stand of cattails with some sedge areas. Water levels slowly evaporated during the summer and not replaced, inducing more vegetation growth in areas opened up by muskrats in 1992. Waterfowl use was confined to the shallow sedge areas.

Ottawa - Entrance Pool

Water levels were slowly decreased starting in April and slowly decreased through spring. Some mud flats were exposed in late June and the remainder in July. Moist soil plant response was minor with stunted plants producing small seed heads. This unit still has cattail surrounding the units eastern third and open water dominating the balance. Shorebird use was excellent during the drawdown and flooding stages. Fall waterfowl use was good with ducks feeding on the seeds produced and geese grazing on the flooded green sprouts.

Ottawa - Show

This pool has an island/remnant dike in the middle which most times is a moist meadow. The openwater areas are devoid of vegetative growth. Cattail and phragmites dominate with sections of

purpleloosestrife. Some smartweed grew amongst the cattail. Pool had limited use by ducks, geese, and herons.

Ottawa - Mini-Marsh

Cattail and smartweeds were common. A total of 25%, 75%, and 25% of the estimated maximum seed yield was realized for barnyardgrass, smartweed, and water pepper, respectively. Average weight was lower than the average across all units sampled for all species except for smartweed and water pepper (Mean = 148 and 9.5 lb./ac., respectively). This unit was dewatered beginning in late April, exposing mud flats in May. Soil moisture appears to have limited velvetleaf density.

Ottawa - MSU 3

MSU 3 has been plagued with a reed-canarygrass problem for several years. The unit was drained in spring with the intention of disking it several times and then keeping it in a dry condition for a prolonged period to stress the reed-canarygrass. Control measures did not take place because resources were expended elsewhere. A sparse stand of wild millet germinated in the northeast corner and was flooded in early fall. Waterfowl depleted the area of seed in a few days.

Ottawa - MSU 4

MSU 4 was drawn down fast and early (late winter drawdown) to mechanically control severe reed canarygrass problems. Despite several passes with a disk, these xeric conditions resulted in a dominant coverage of velvetleaf over most of the unit. We sampled only the southeast corner of the unit where late disturbance by multiple diskings coupled with irrigation to water the failed crop of sorghum produced good barnyardgrass response. In the sampled portion of this unit 68% and 37% of the estimated maximum seed yield of barnyardgrass and smartweed was realized, respectively. The relatively large percentage value for barnyardgrass resulted from a small sample size, forcing the use of similar values for estimating maximum seed yield. The irrigation promoted 2.4 times the average weight of barnyardgrass across all units (mean = 130.1 lb./ac.). Greater production of smartweed may have occurred if soil moisture would have been maintained during the dry summer. Many stems were large in size but were dead or had shriveled leaves and no seed as a result of the stress from xeric conditions. Shorebird use was considerable during the spring migration. Duck use amounted to a couple of days directly after fall flooding. Geese used the unit for loafing/roosting during the fall.

Ottawa - MSU 5

Only 41%, 1%, 5%, and 10% of the estimated maximum seed yield was realized for barnyardgrass, rice cutgrass, nutsedge, and smartweed, respectively. Barnyardgrass produced slightly more than the average weight across all units (mean = 130.1 lb./ac.). Management activities to control a severe willow problem in the unit were not successful. Mowing and disking reduced the stem sizes but increased the number of new stems dramatically in some areas. Perhaps a combination treatment of mowing and stressing with high water levels will be required. Drilled millet was planted too late to produce seed heads but may have provided browse for geese. Waterfowl did not concentrate in any large numbers during fall, however, use was constant.

Ottawa - MSU 6

The dike rehabilitation work was completed in 1992 permitting water control over the unit. This unit received heavy disking during the summer for control of willow and cattail. The first disking took place with the 750 dozer and Rome disk. The second was accomplished with an offset disk and White tractor. The unit was dry for essentially the whole year.

Ottawa - MSU 7A

Water was retained through late-winter and then dropped for placement of rip-rap. Weather did not cooperate and rip-rap was not laid. The early drawdown enhanced the already dominate upland vegetation. A small amount of moist soil plants were available in low areas. The vegetation was mowed around the hunting blind in September and waterfowl started using these mowed areas when flooded in the fall.

Ottawa - MSU 7B

The majority of this 44-acre unit is dominated by upland vegetation due to its elevation. Only 6 acres (where stands of millet and smartweed occurred) were sampled. Smartweed stands would probably have produced greater than the average seed yield across all units if not for drought stress resulting in extensive reduction of seed production. Barnyardgrasses produced 1.5 times the average seed yield across all units in this stand. A total of 71% and 47% of the estimated maximum seed yield was realized for barnyardgrass and smartweed, respectively in the areas sampled. The relatively large percentage value for barnyardgrass resulted from a small sample size, forcing the use of similar values for estimating maximum seed yield.

Ottawa - MSU 8A

This unit was again dewatered for the third straight year to complete renovation of the dike and ditch system. Vegetation composition was mainly upland such as aster, milkweed, sweetclover and willow and cottonwood seedlings. Small patches of bidens were also present. Biden plants were stunted and produced small amounts of seed. Waterfowl use was minimal during fall flooding.

Ottawa - MSU 8B

A slow drawdown was initiated in early May and soils were exposed by late May. This unit might have produced more than the actual 2.1 times the average yield of barnyardgrasses if not for severe blackbird depredation. Many of the stems were stripped soon after maturation. No measurements were made on stems stripped of seed because the yield estimated would not reflect availability to waterfowl and hampers accuracy when predicting waterfowl use days available. Stands on the west end of the unit were excellent. Only 39%, 11%, and 4% of the estimated maximum yield was realized for barnyardgrass, smartweed, and water pepper, respectively. Waterfowl use was excellent during flooding stages in early October.

Ottawa - LL

Dike rehabilitation was completed in 1992 allowing this unit to be functional in 1993. Being in a drought condition for many years this unit is dominated by upland plants. Water levels were brought up in late winter to flood the higher elevations. Waterfowl responded to the newly flooded area which received a couple of days use by 2-3,000 birds. Area gradually dewatered through a sub-surface drainage tile. Upland vegetation still persists, however, biden did germinate and produce small amount of seed. Waterfowl congregated in 2-300 birds during the fall migration.

Cedar Point - Pool 1

Water levels were high during the winter and removed starting in March. Water was not pulled off fast enough to expose soil during the growing season to germinate moist soil and emergent vegetation. Water continued to drain during seiche events of the Lake Erie and from evaporation. Substantial amount of mud flats were exposed during the late summer and early fall. Shorebird use

was excellent during this time frame. Vegetation cover has changed dramatically and the unit has more open water areas. The muskrat population continues to be high, contributing to the reduced vegetation cover.

Cedar Point - Pool 2

Pool 2 water levels are directly related to pool 1 through a water control structure, however, this unit is slightly higher in elevation. The higher elevation reduced water depth and the emergent vegetation was maintained. Vegetation covers the majority of the unit and muskrats have opened up small pockets throughout the area.

Cedar Point - Pheasant Farm

Water levels remained somewhat stable during the year. This unit has no pumping facilities, so water was moved, either by gravity drainage or portable pumps. The Composition of the unit has not changed over the past few years. Cattail dominates one-third and open water is the remainder. This unit was scheduled for a drawdown and dike repair, however, other higher priority assignments were done.

Darby - Pool 1

This unit has been managed as a semi-permanent marsh. During the last two years this unit has been important because the other three units were in a drawdown state for rehab work. A good hemi-marsh was maintained with emergents, submergents, floating emergents, and some moist soil plants. Waterfowl use was consistent during the year as a loafing/roosting area.

Darby - Pool 2

The unit was managed as a semi-permanent marsh for several years before this year's drawdown. Resulting mud flat conditions enhanced smartweed and rice cutgrass response. Estimates for rice cutgrass in this unit were severely underestimated by late blooming characteristics and drought conditions that delayed blooming until after sampling occurred when sufficient precipitation occurred. The need to complete sampling efforts before onset of the waterfowl migration complicated matters. The unit was dominated by large beds of rice cutgrass, and inflorescence response was excellent after the rains. Only 30% of the estimated maximum weight was achieved for smartweed in this unit. Perhaps a mechanical soil disturbance after drawdown would have improved the response of smartweeds. However, the unit produced greater than the average weight of smartweed across all units (mean = 148.0 lb./ac.).

Darby - Pool 3

The unit was managed as a semi-permanent marsh for several years before this year's drawdown. Resulting mud flat conditions enhanced smartweed, barnyardgrass, and rice cutgrass response. Rice cutgrass, cattail, and smartweeds dominated the unit. Again, estimates for rice cutgrass in this unit were severely underestimated by late blooming characteristics and drought conditions that delayed blooming until after sufficient precipitation occurred. Only 15%, 8%, 42%, and 19% of the estimated maximum yield was realized for barnyardgrass, rice cutgrass, smartweed, and water pepper, respectively. Again, a soil disturbance after drawdown may have improved vegetative response. Barnyardgrass and water pepper in this unit produced better than the average weight across all units (mean = 130.1 and 9.5, respectively).

Darby - Pool 4

Yellow nutsedge and smartweeds were common in the unit in 1993. The unit had been under high water conditions for several years resulting in mud flat conditions dominating the unit after drawdown. Only 1%, 9%, 46%, 10% of the estimated maximum seed yield for barnyardgrass, rice cutgrass, nutsedge, and smartweed was realized, respectively. Yellow nutsedge produced 3.6 times the average weight across all units (mean = 1,601.2 lb./ac.). Rice Cutgrass and smartweed produced 2.6 and 2.2 times the average weight across all units, respectively (mean = 10.2 and 148 lb./ac., respectively). Slow evaporation of shallow pools in the low center of the unit created favorable conditions for the nutsedge. Overall, plant response appeared excellent throughout the unit and smartweed stems were large and robust. Estimated maximum yields for smartweed are therefore probably not realistic for this unit because only 10% of maximum seed yield was realized. The shallow water during spring created ideal conditions for shorebirds. During the spring migration up to 1,000 birds could be observed feeding. Waterfowl use was superb when food resources were gradually flooded in fall.

Navarre - Pool 1

This unit is managed as a semi-permanent marsh. High water levels during the growing season has hampered vegetation growth, decreasing the interspersion. The area is used by waterfowl during the migration periods and to a large extent during the winter because the power station operations keeps some open water accessible to the birds.

Navarre - Pool 2

This unit is managed as a semi-permanent marsh. Water levels were decreased in spring and vegetation composition is good. Emergents and floating plants (water lilies) comprise the bulk of desirable vegetation. Some moist soil plants were also present. Waterfowl use is mainly associated with the migration periods and during winter because small pockets of water remain open from warm water discharge.

Navarre - Pool 3

This unit is also managed as a semi-permanent marsh. High water during the growing season and a high muskrat population have decimated the vegetation to where the area is almost 100 percent open water. No on-site pumping facilities are available for this unit making management difficult.

3. Forests

A bottomland hardwood forest restoration project was initiated in late April associated with planned re-establishment of "great black swamp" ecosystem vegetation. Two hundred and nine American sycamore (Platanus occidentalis) tree seedlings provided free by Ohio Division of Forestry personnel were planted in area "K" of the forest management plan as an experimental plot to assess mortality and browsing effects on seedlings. Evaluations made in early October indicated survival was very low due to significant deer and rodent browsing activity. It will be necessary to provide tree tubes or greatly increase the size or number of seedlings planted to increase success. Some browsing related mortality will apparently have to be tolerated.

TABLE 5. Number of Browsed Trees According to Browse Category

Transect	Good Health	Weakened	Dead/Missing	Total
Transect A	5	12	53	70
Transect B	11	17	44	72
Transect C	3	11	53	67
Totals	19	40	150	209

In December Wildlife Biologist Coppen attended the Ohio's Treesource American Free Tree Program, Inc. meeting focusing on the Ottawa County Free Tree initiative. He discussed the potential for receipt of up to 108,000 free seedlings of indigenous species to plant a major reforestation project totaling approximately 247 acres next spring. Jeff Peters, Regional Volunteer Coordinator, will investigate opportunities to involve large numbers of volunteers and arrange for the use of a tree planter. A letter was sent to Mr. Peters concerning the planning of the event and to identify potential logistical problems. A response was expected from Mr. Peters in Winter 1994.

4. Croplands

Ottawa's cropland program is administered to support migrating and wintering waterfowl by providing high energy foods during the colder weather and before spring migration as well as supporting the refuge hunting program and providing some rotational crops in the moist soil areas.

TABLE 6. Crops Planted by Farm Unit - 1993

Crop	Unit 1	Unit 2	Unit 6	Unit 9	Unit 10	Unit 11	Total
Corn			19.0	11.4	20.0	15	65.4
Wheat			6.0	39.7	6.5		52.2
Legume	20.0	52.0		22.0	19.7	52.3	166.0
Soybeans	11.0	41.0	13.0				65.0
Total	31.0	93.0	38.0	73.1	46.2	67.3	348.6

Corn and Soybeans in farming units 2 and 6 were again farmed via cooperative farmer with refuge personnel farming units 9, 10 and 11.

We again attempted to find a cooperative farmer for a portion of the refuge farming program. One person was interested in taking the soybean areas, but only if he was allowed to keep the first 25 bushel/acre, and then split to the 2/3-1/3. This was essentially giving him the crop with little or no risk and we were assuming all the risk. Under this type of agreement, the cooperator could effectively plant and fertilize to reach the 25 bu/acre yield and he would get all the crop at a minimum cost and we would get nothing. His offer was turned down and we proceeded to do this portion of the farming program via refuge personnel.

Approximately 80 acres of plowdown clover was disked and seeded in units 1,2,10,&11 in early May. The plowdown clover consists of 40% sweet clover and 60% mammoth red clover and is drilled with a nurse crop of oats. However, the sweet clover planted in 1992 did not produce, while the red clover did well. Apparently the sweet clover did not take the wet weather as well. If this continues, perhaps we should use

only red clover seed. Refuge personnel are putting in all clover fields because of past problems with cooperative farmers in doing this work.

Corn preparation started on May 14 with the plowing of 45 acres of clover fields. Refuge personnel were used to provide the tillage. The 45 acres required approximately four days to plow and an additional two days to disk and finish. Planting was done by a coop farmer on May 22. A commercial applicator is used to apply a herbicide and some liquid nitrogen. The refuge receives 100% of this crop. In most years, much of the crop costs are paid for by our share of the soybean crop, however, the complete soybean crop loss in 1992 did not allow for this.

Cropland costs for corn have been reduced considerably by the use of clover fields which has reduced the nitrogen requirements and eliminated the side dressing of nitrogen. A starter fertilizer, 200 lbs of 8-24-13, is applied with the planter and 50 pounds of nitrogen is applied with the herbicide. The normal second application of nitrogen (50-70 lbs/acre) is eliminated.

Summer precipitation levels remained below the ideal range, but came just often enough to give us a satisfactory crop. Yields were considered low and stayed in the 70-80 bu/acre range. Refuge crops were similar and in some case better than those on private or coop-farmed areas. Soybean yields in farm units 2 and 6 were approximately 40 bushels/acre which is considered excellent for refuge soil.

Some second year clover fields were mowed in July and August to allow the foliage to rot down for next years nitrogen. Some regrowth occurred, but not as expected or desired. It appears that this mowing does not really produce any additional growth and nitrogen benefit, and probably only beneficial if substantial weed growth is present. Some of the first year clover fields (newly planted) were mowed in before hunting season to provide goose browse in front of the hunting blinds. This is also beneficial for reducing weed growth.

Mowing of corn was started immediately after the close of waterfowl seasons in late November and continued throughout December. The refuge share of the cooperative farmed areas (25% in 6-12 row strips) in unit 2 were mowed first and then two fields in unit 10. Approximately 10-15,000 ducks stayed on the refuge during December and utilized these fields on a daily basis, especially after the major marsh and moist soil areas froze over in early December. The croplands contributed to over 500,000 waterfowl use days during December as waterfowl used the mowed cornfields. Near the first of the year, extremely cold weather arrived and all water areas froze. Duck populations completely left but 3-5,000 geese continued to use standing cornfields during January.

The farming by refuge personnel, while increasing refuge costs, does have some very substantial benefits. The 50 acres of refuge standing corn represents the first year in the past 10+years that any substantial amount of corn will be available for late fall/early spring migrants or for wintering waterfowl. An estimated 3,500 bushel or nearly 200,000 pounds of corn should be available. Cooperative farming could provide only 20-25 percent of this if we could even find cooperators willing to plant corn. Clover fields also receive excellent goose use.

The croplands contributed to over 500,000 waterfowl use days on the refuge during December as waterfowl used the mowed corn fields. (SC)

10. Pest Control

A. Gypsy moth

Wildlife Biologist Coppen deployed 7 gypsy moth traps across Ottawa unit at designated sites and all traps remained in place until mid-August when moth traps were retrieved, boxed, and mailed back to the Forest Health Protection office of USDA Forest Service for evaluation. All seven traps contained male gypsy moths. Forty-three moths were counted with an average of only six moths per trap. This is the highest number caught since the trapping program began in 1983. The table below shows trends since 1990. The moth population should not have any significant on forest resources in the immediate future at these sites.

TABLE 7. Gypsy Moth Trapping Trends

YEAR	NO. OF TRAPS	TOTAL CAUGHT	NO. TRAPS W/ CATCH
1990	7	28	all
1991	7	15	all
1992	7	19	all
1993	7	43	all

B. Purple Loostrife

Locations of purple loostrife and common reed outbreaks on refuge grounds were mapped by the wildlife biologist. These maps were submitted to Ohio DNR Wildlife Division staff along with rodeo herbicide for treatment of refuge areas by helicopter in late July. Mapped areas included 12 acres at Cedar Point NWR and 20 acres at Darby Unit. Eighteen gallons of 5% rodeo solution were sprayed on these areas in the eradication procedure. A second map of purple loostrife locations on refuge grounds was constructed for Ohio Division of Wildlife personnel to be used during eradication efforts on August 30. Mapped areas included ten acres at Cedar Point NWR, two acres at Ottawa unit, and eight acres at Darby unit. Ten gallons of 5% rodeo solution were used in the eradication. Some spot spraying with hand-sprayers was conducted by refuge staff at Darby and Ottawa units. Pesticide Spraying reports for calendar year 1992 were filled out for Ottawa, Cedar Point, and West Sister National Wildlife Refuges.

12. Wilderness and Special Areas

West Sister Island is a designated wilderness area located nine miles off the Lake Erie shoreline. This island was visited several times during the summer by researchers. For more information about West Sister Island see the separate section at the back of the narrative.

14. Private Wetland Restoration (Farm Bill Activities)

This is one of two 5' x 7' signs erected in Williams County to promote the "Partners For Wildlife" program. (TC)

During the 1993 field season refuge staff were again involved with the Partners for Wildlife Program restoring wetlands on private lands. Working in a total of 2 states and 11 counties we were able to restore 81 wetlands for 314.0 acres with our own crew and equipment. Ottawa NWR cost shared on 9 other wetland restoration projects for 149 acres (see section F15) increasing the total to 90 wetlands restored for 463.0 acres.

In the past Ottawa NWR has received much needed assistance from other refuges in the form of equipment operators. With the FY 93 budget limitations and the constraints on travel this made it impossible for other refuges to help. This forced Ottawa NWR to use all of our own maintenance men and equipment operators but they answered the call. The field crew did receive help in the form of an additional Bio-Tech which helped reduce the number of overtime hours spent making landowner contacts and surveying wetlands.

Ottawa NWR began working in a new county this year (Hillsdale Michigan), with a few contacts we were able to restore 10 wetlands for 40 acres. Hillsdale county will prove more successful in FY 94 because the number of landowner contacts has increased to 40 as of January 1994.

With the increasing number of restorations each year our Management District must also deal with the occasional problems such as dike repair, searching for additional tile or correcting adverse water effects on adjoining landowner's property. These are all time consuming events. Ten previously restored sites needed repair and this added to an already busy work schedule. One repair resulted in the landowner allowing us to increase the water level and add an additional 2 acres to the site. Ottawa NWR already has a list of over 100 landowners interested in restoring wetlands in FY 94.

On-The-Spot awards for farm bill participation. Left to right - front row: Ken McConahay, Laurie Miller, Marge Miller, Tom Cox. Back row: Dave Day, Jim Schott, Jeff Jaeger, and Bob Reynolds. (CM)

TABLE 9. Hillsdale County Wetland Restorations - 1993

NAME	CRP	SITES	ACRES
Brown, David	N	5	12.0
Mullin, Ken	Y	3	24.0
Roden, James	N	1	0.5
Steinfeldt, Tom	Y	1	4.0
TOTAL		10	40.5

TABLE 8. Lenawee County Wetland Restoration - 1993

NAME	CRP	SITES	ACRES
Aebersold, Larry	Y	1	4.0
Armstrong, Richard	Y	1	4.0
Blaesing, Gary	N	1	6.0
Cleveland, Gary	Y	2	6.0
Davis, Howard	N	1	2.5
Fike, Marv	Y	2	8.0
Griffin, Richard	Y	2	6.0
Gustafason, Phil	Y	3	12.0
Harrington, Aurthur	Y	2	4.5
Osworth, Doug	N	2	2.5
Parkhurst/Jewell	Y	1	3.0
Pennington, Howard	Y	1	2.0
Schultz, Anita	Y	2	15.0
Stange, Ken	Y	1	2.0
Votzke, John	Y	5	12.0
Walters, Robert	N	1	2.5
TOTAL		28	92.0

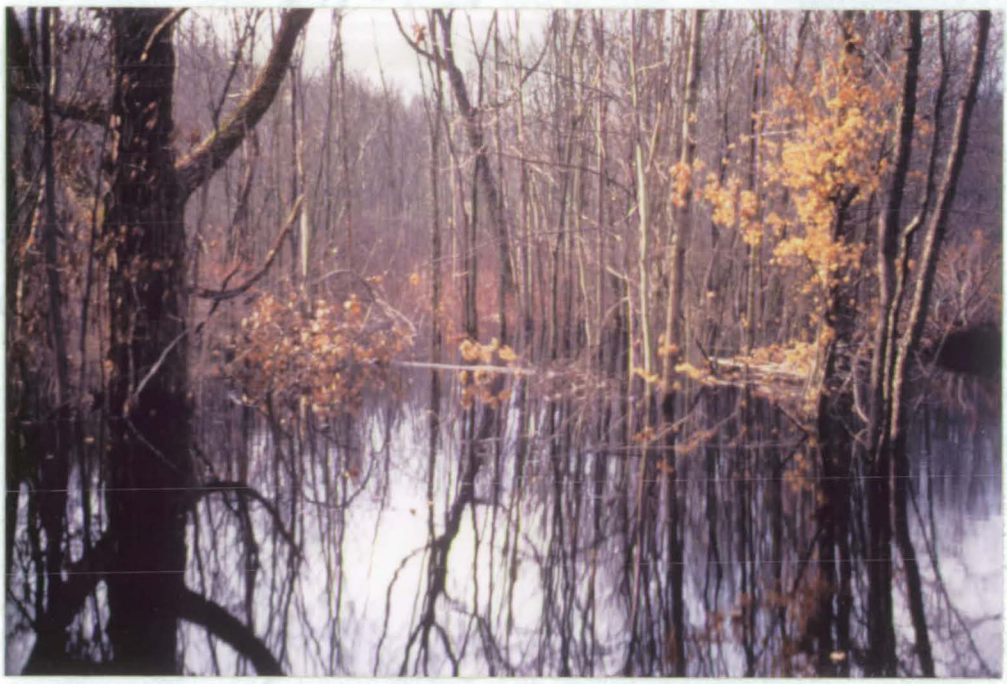
Bio Tech Cox and E.O. Day restore a ten-acre basin in Hillsdale County. (TC)

TABLE 10. Jackson County Wetland Restorations - 1993

NAME	CRP	SITES	ACRES
John, Merz	N	1	2.0
TOTAL		1	2.0

TABLE 11. Williams County Wetland Restorations - 1993

NAME	CRP	SITES	ACRES
Carlin, Tim	Y	2	9.0
Hofbauer, Robert	N	1	2.5
Keller, Mike	Y	1	7.0
La Su An (ODNR)	N	5	21.5
Nonemann, Tom	Y	1	5.0
Trippey, John	Y	2	7.0
TOTAL		12	52.0



This 20-acre green tree in Williams County was restored in September and full by November. (TC)

TABLE 12. Defiance County Wetland Restorations - 1993

NAME	CRP	SITES	ACRES
Hanna, Gerald	Y	1	5.0
TOTAL		1	5.0

This four-acre basin is the first one Ottawa has restored in Defiance County. (TC)

TABLE 13. Sandusky County Wetland Restorations - 1993

NAME	CRP	SITES	ACRES
Johnson Earl	N	1	8.0
TOTAL		1	8.0

TABLE 14. Erie County Wetland Restorations - 1993

NAME	CRP	SITES	ACRES
Hawkins, Don	N	1	3.0
Huron Conservation Club	N	1	3.0
TOTAL		2	6.0

TABLE 15. Huron County Wetland Restorations - 1993

NAME	CRP	SITES	ACRES
Brown, Carl	Y	2	5.0
McNeal, Kathleen	N	4	9.0
Schaeffer, Victor	Y	1	2.0
Terveen, Todd	N	1	1.0
Willard Conser. Club	N	1	2.5
TOTAL		9	19.5

TABLE 16. Portage County Wetland Restorations - 1993

NAME	CRP	SITES	ACRES
Kohl, Jack	N	1	10.0
Ravenna Army Depot	N	5	45.0
TOTAL		6	55.0

Maintenance Worker Jaeger is constructing a dike for one of the five wetlands restored at the Ravenna Army Depot. (JS)

TABLE 17. Trumbull County Wetland Restorations - 1993

NAME	CRP	SITES	ACRES
Collier, Tom	Y	2	3.0
TOTAL		2	3.0

TABLE 18. Geauga County Wetland Restorations - 1993

NAME	CRP	SITES	ACRES
Rose, Mitchell	N	1	4.0
Whitney, Chris	N	4	10.0
TOTAL		5	14.0

TABLE 19. Ashtabula County Wetland Restorations - 1993

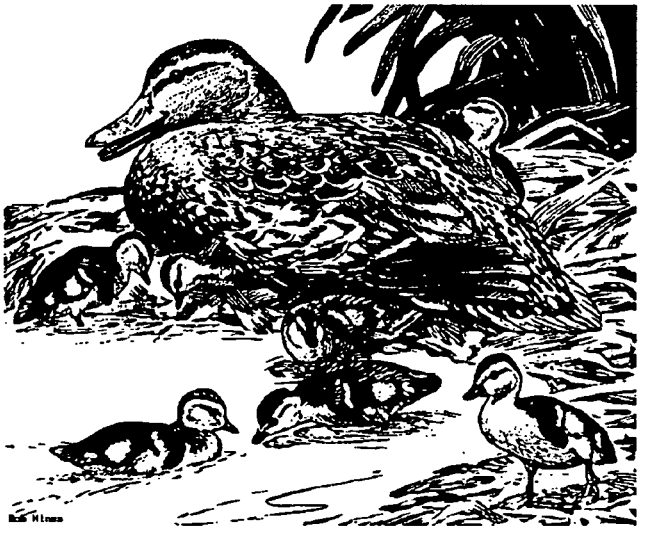
NAME	CRP	SITES	ACRES
Boggs, Robin	N	1	2.0
Byler, Dan	N	3	15.0
TOTAL		4	17.0

5. Challenge Grants

Cost Shares and Challenge Grants again played an important role restoring wetlands in Ottawa and Sandusky County. Wetlands restored through this program totalled 9 wetlands for 149 acres. The wetland restoration projects are all in Ottawa and Sandusky County and each one is within mile of Lake Erie Waters. These projects were completed with the cooperation of the Private Landowner, the U.S. Fish and Wildlife Service, the Ottawa County Soil & Water Conservation District, the Sandusky County ASCS and the Ohio Division of Wildlife. The Service contributed $22,400.00 and the cooperators contributed $112,400.00 to restore these wetlands. The number of sites, acreage, cooperators share and the Service share are included in table 20. There are already 10 potential projects being planned for FY 94 if funding is available.

TABLE 20. Cost Share "93"

NAME	COOPERATOR $	SERVICE $	SITES	ACRES
Castillo	11,000	3,000	1	13
Dellinger	17,600	2,400	1	22
Howarth	10,000	2,000	1	6
Metzger	31,000	3,000	1	45
N.E. Flyway	16,500	3,500	2	30
Rinas	8,500	4,500	1	18
Wieckart	8,000	2,000	1	7
Witt	8,500	2,000	1	8
TOTALS	112,400	22,400	9	149



G. WILDLIFE

1. Wildlife Diversity

The 8,318 acres of the refuge complex maintains a variety of habitat from croplands and grasslands to several types of wetlands. A wide range of species can be found. The bird list contains 267 normally observed species and an additional 45 that are accidentals. The refuge supports 32 mammal species along with 53 amphibian and reptile species. Volunteers conduct bird species counts on all the units once each month. Ohio DNR flies refuge units every week for waterfowl census in the fall and winter. Refuge personnel conduct an on-land waterfowl population census biweekly, and weekly during the spring and fall migrations.

2. Endangered and/or Threatened Species

A. Bald Eagles

Bald eagle use increased again for the fourth straight year (Figure 4). A couple of reasons contributed to this: 1) The mouth of the Crane Creek has traditionally been a staging area for young eagles migrating south, and 2) a record year for eagle nesting success in Ohio.

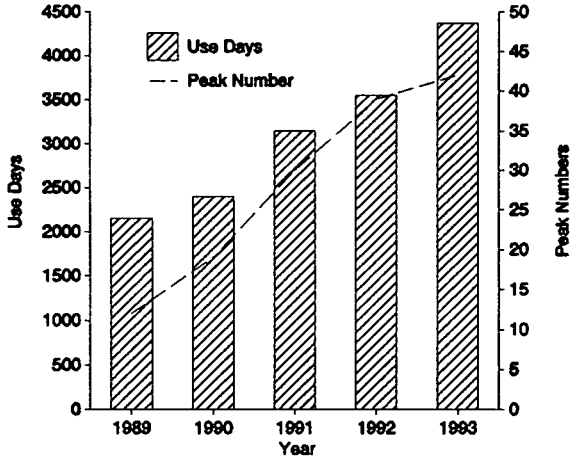


Figure 6. Bald eagle use days and peak number continue to increase.

A volunteer workshop on eagle monitoring was presented by the Ohio DNR Crane Creek Wildlife Research Station personnel in February. An excellent presentation was given on eagle behavior and management. Volunteers are used to monitor all eagle nests throughout Ohio to determine start of nesting and hatch dates. This information is then used to pin point the best time for banding eaglets. The 1993 nesting season was another excellent year for eagles in Ohio with 18 of the state's 24 nest successfully hatched 31 young. The refuge did not follow suite; however, and the only success story for the refuge is two young fledged from the Cedar Point nest.

The Ottawa pair has had considerable reproductive problems for the last several years. Incubation started in early March and expected hatch of mid-April. The nest was confirmed failed on April 3. It appeared that one of the two eggs had hatched with shell fragments found at the nest tree base. A second nest was discovered on Crane Creek within one mile south of the existing nest. Observations had shown that the male from the Ottawa nest also shared residence with this new Crane Creek nest. The 1994 breeding season maybe interesting.

The Darby nest was a late starter with incubation starting April 5 with an expected hatch date of May 5. The egg failed to hatch. Observations showed that a new male had paired up with the resident female. Reasons for the failure are unknown.

The Cedar Point nest started incubation on March 13-15 and hatched on April 19. Two eaglets were banded, measured, and bled for contaminant study June 10. Feathers were extracted for DNA study. The refuge fledged only these two eaglets this year.

Eagle activity has been very high during the fall not only with large numbers of birds being seen but also a lot of action getting ready for 1994. By years end, the pair at Darby had started construction on a new nest and the Ottawa pair had taken over a hawk nest in the southwest corner of Butternut Lodge woods. This new activity brings the total number of available refuge nests to eight, however, still only three eagle pairs present.

Wildlife Biologist Coppen initiated a potential bald eagle nesting habitat inventory in 20 refuge woodlots to measure several parameters for the inventory during the month of July (see Research and Investigations section for details). Measurements were taken at all trees on refuge grounds containing bald eagle nests. Measurements included diameter at breast height, crown height, percent canopy closure, distance to water, and distance to nearest tree in each cardinal quadrant. This baseline data set will be used to compare with similar measurements taken in the existing woodlot inventory on refuge grounds. Management recommendations will be generated from the results. The bald eagle HSI will be used to evaluate only the reproduction component for each woodlot (percent of wooded area in mature timber) and to rank woodlot.

Wildlife Biologist Coppen submitted a news release to local media concerning the potential bald eagle nesting habitat inventory to alert the public of efforts to inventory and project the availability of eagle nesting habitat on refuge grounds. Six bald eagles were observed during the mid-winter eagle survey conducted on January 7 1993.

3. Waterfowl

The Ottawa Complex is mainly a waterfowl migration resting and feeding area. However, the refuge maintains a small population of ducks (mainly mergansers, mallards, and black ducks) and few thousand geese throughout the winter. Waterfowl numbers peak in the fall with large concentrations of dabblers, especially mallards and black ducks. It is not uncommon to have 20,000 mallards and black ducks staging during the fall months.

The Complex's objective is to provide 4.2 million duck use days and 1.5 million goose use days. For 1993, a total of 3.3 million and 1.0 million use days were recorded for ducks and geese, respectively. Figure 5 shows the comparison of use days over the past ten years in relation to objectives. Peak numbers occurred in the fall when surveys recorded 34,700 ducks (11/15/93) and 8,700 geese (12/20/93).

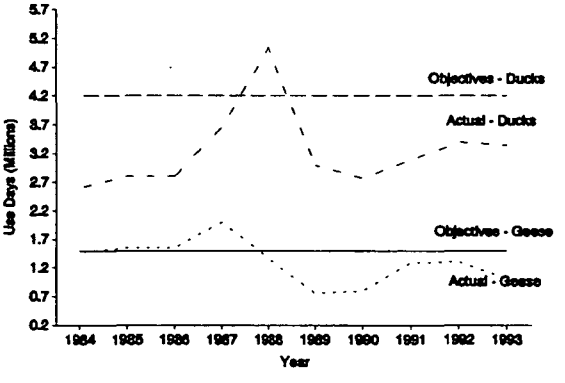


Figure 7. Refuge objectives versus recorded waterfowl numbers.

A. Ducks

Duck numbers started to increase for the spring migration by late February when approximately 2,000 birds (mainly mergansers and mallards) were finding small pockets of water in refuge impoundments and the dabblers feeding on waste grain in the surrounding farm fields. Spring migration was finished by late April when 3,500 scaup at Darby had departed. This years spring migration seemed to be drawn out longer than normal and without large concentrations of birds developing.

SPECIES	USE DAYS	PEAK NUMBER
Mallard	1,358,000	18,300
Black Duck	499,100	9,700
Gadwall	219,200	4,300
Wigeon	296,300	4,600
GW Teal	281,100	5,900
BW Teal	87,100	2,600
Shoveler	25,100	350
Pintail	179,000	3,300
Wood Duck	56,900	300
Com. Merganser	27,600	500
Red-B Merganser	4,700	100
Hooded Merganser	18,400	250
Redhead	1,500	30
Canvasback	340	10
Scaup	241,300	6,000
Ring-Necked	35,000	2,100
Com. Goldeneye	950	50
Bufflehead	3,500	50
Ruddy Duck	5,300	150
TOTAL UD'S 1993	3,340,390	

Water management during spring through summer is directed at generating foods from submergents and moist soil plants to supply high energy nourishment to waterfowl along their southward flight. The fall migration usually starts in late August with the teals moving through and then concludes in December with staging mallard and black ducks. Peak waterfowl time is from mid October to mid November. Approximately 72 percent of the Complex duck use occurs from September through December.

The 3.3 million use days is a slight decrease from 1992's 3.4 million recorded use days. This reduction could be attributed to the abnormally high number of water impoundments that were in a drawdown condition during the summer. The break down of use days by divisions is Ottawa Division 1.48 million; Navarre Division 0.17 million; Darby Division 0.42 million; and Cedar Point 1.26 million use days. Almost 40 percent of the use was from mallards. The following chart displays the year's recorded use days and peak numbers by species.

Wood duck boxes were inspected, repaired, and prepared for the nesting season in January. Nest boxes were checked once a month during May through July. Egg membranes were counted in some boxes when clutches were small but otherwise were not disturbed, and otherwise counted at the end of the season. Wood duck nest boxes containing late clutches were checked a final time to count egg membranes and unhatched eggs. This information was included in the production results for 1993. There were 53 boxes available in 1993 (2 were down). A total 25 successful nests from 34 attempts resulted in a nest success of 74%.

Canvasbacks and Scaup loafing at Cedar Point Refuge. (CA)

Twenty-five new cedar nest boxes are being constructed for replacement of some metal rocket-shaped boxes that are awkward to survey because they open from the top. This is especially problematic when surveys are conducted in Crane Creek from watercraft. Potential new wood duck nest box locations were identified at Cedar Point NWR. Up to 10 nest boxes may potentially be erected at this parcel, depending on replacements at Ottawa NWR. Replacement, maintenance, and nest box description database work is expected to be completed by end of February 1994.

To improve the database of wood duck population inventories and to evaluate survey techniques for monitoring populations, the Ottawa NWR initiated an experimental wood duck hen call survey and nest box check program as directed by the regional wood duck coordinator to investigate potential development of regional survey techniques. Results were mailed to the coordinator upon completion by September 9 and recommendations are pending analysis. Only 7 hens were heard in 9 surveys but 48 wood ducks have been seen during the 9 surveys. Ottawa NWR will participate in a new regional nest box monitoring program that has been initiated by the regional wood duck coordinator to improve regional productivity estimation. New software and data sheets are to be provided including detailed information to develop a regionally useful nest box description database and intensive box check database.

B. Geese

Canada goose use days were 1.01 million a decrease from 1992's use of 1.3 million and below refuge objectives of 1.5 million. This decrease is probably a direct result from geese migrating later than normal. The peak number did not occur until late-December. A population of 4-5,000 geese will stay year round even when most water impoundments are frozen. Navarre Division maintains some open water even during the coldest time from the Davis-Besse Nuclear Power Station operations. Geese are then able to locate enough waste grain feed on both the refuge and surrounding private croplands.

The 1.01 million use days was split between refuge areas with the majority occurring on the Ottawa Division, 0.74 million use days. The remainder is broken down to Navarre Division 0.12 million; Darby Division 0.07 million; and Cedar Point 0.07 million use days. The concentration of geese on Ottawa Division is due to the number of moist soil units and croplands located here.

The "resident" goose population seems to be slowly increasing year after year. The first Canada goose goslings were seen on the April 28. On May 17 and mid-June (14th and 18th) two Canada goose gosling counts were completed. A total of 430 and 483 goslings were counted, respectively (mean = 457 goslings). Annual trends in gosling productivity will be estimated from annual intensive ground counts.

Assistance was provided to Ohio DNR Division of Wildlife to conduct the annual giant Canada goose round-up on the last 2 days of June. The objectives of the round-up involve marking local giant Canada geese to develop a database on harvest and distribution. Well over 1,000 geese were banded on refuge grounds. Refuge staff and YCC crew members were involved in accomplishing the round-up.

Snow geese occur in small numbers during the fall migration. This year 7,554 use days were recorded. Occasionally, a snow goose maybe taken during the refuge's controlled waterfowl hunt.

C. Swans

Refuge use by swans varies from year to year. The majority of swan use occurs during October, November, and December. This year 9,797 use days were recorded. Peak population was 250 birds during fall. Spring migration brings small flocks of 5-15 birds whereas fall staging runs around 2-300 birds at the peak.

4. Marsh and Water Birds

Migrating cattle egrets visit the refuge. (CA)

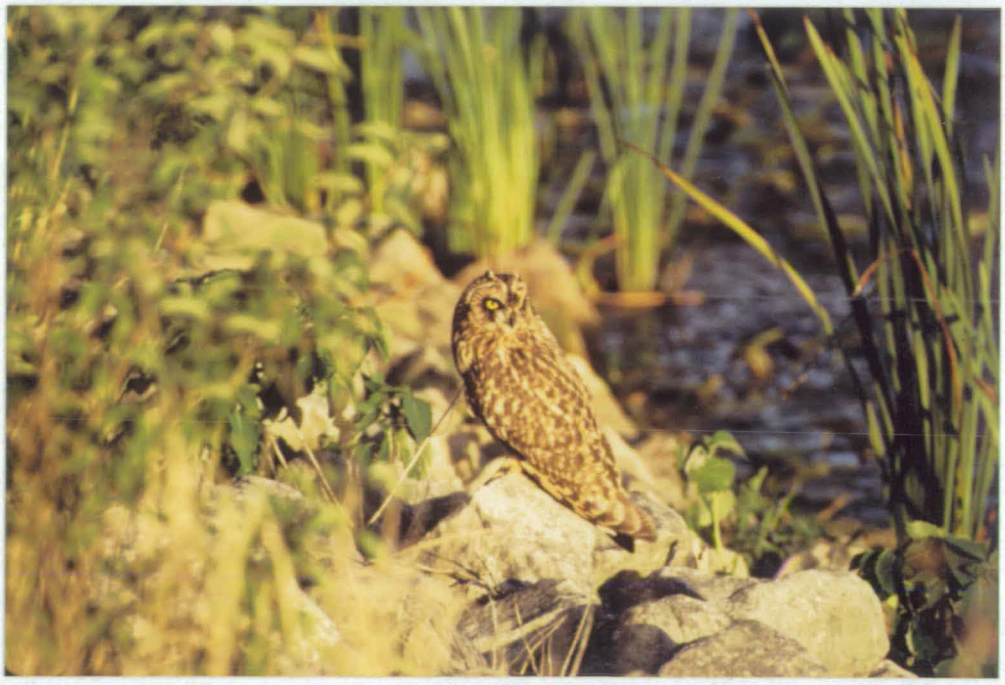
Great blue herons, great egrets, and black-crowned night herons are abundant throughout the spring, summer, and fall seasons. Ottawa and Cedar Point Refuges provide much of the feeding areas for the nesting colony on West Sister Island. The colony contains approximately 4,500 nests and is the largest heron/egret rookery on the Great Lakes chain. Studies have shown that these birds will fly 9 miles from the island to the main refuge complex several times a day to feed their young. Very heavy feeding occurs in the marshes, drawdown areas, and mud flats created by Lake Erie wind tides. Species found less common in the area include snowy and cattle egrets and little blue herons. Unusual sightings include a white-faced ibis and tri-colored heron observed in May. See research project WMS28, section D, for more information on banding and at West Sister Island.

5. Shorebirds, Gulls, Terns, and Allied Species.

A common tern restoration project initiated in 1987 to establish a colony within the refuge was again conducted this year. However, the project is know being investigated by a graduate student to determine why the colony is not producing any young. For more information check research number WMS44, in section D.

The refuge does not contribute much to shorebirds except for units in a drawdown state or tracts that are open to Lake Erie which expose mud flats with seiche events. The spring shorebird migration tends to be quick with many birds here during a short period of time (peak May 1-15). In contrast, the fall migration tends to be smaller numbers of birds but is more drawn out. Many of the refuge water impoundments were in a drawdown condition during the peak of shorebird migration. The pools that were not drawn down for several years and devoid of vegetation had mud flats exposed for the shorebirds to feed. The major contributor to use is the dunlin with as many as 4,000 birds observed at one time. A pilot study to relate shorebird use to management regime was initiated in 1993 by the Black Swamp Bird Observatory. The study will provide shorebird phenological data and habitat use.

6. Raptors



This short-eared owl offered the rare opportunity for a photo. (CA)

In spring, a migrational study of raptors through the western Lake Erie area was continued. The Black Swamp Bird Observatory personnel are observing raptor movements over the Ottawa complex and trap and banding birds. See WMS42, section D for more information on this study. Annually, volunteers conduct observations of migrating raptors during the spring. This year the observations were conducted in conjunction with the above study and include birds for more than just the refuge.

TABLE 21. Five Year Raptor Observations

Species	1989	1990	1991	1992	1993*
American Kestrel	25	9	119	99	66
Bald Eagle	1	3	7	73	71
Broad-winged Hawk	29	133	575	822	1530
Cooper's Hawk	25	41	357	270	170
Golden Eagle	0	0	4	1	0
Merlin	0	0	7	6	8
Northern Goshawk	1	0	12	0	2
Northern Harrier	16	29	210	165	147
Osprey	2	14	20	53	66
Peregrine Falcon	0	0	5	3	6
Red-shouldered Hawk	65	178	124	398	403
Red-tailed Hawk	239	191	638	996	921
Rough-legged Hawk	12	16	24	168	43
Sharp-shinned Hawk	186	511	710	612	582
Turkey Vulture	822	269	1083	2123	2515
Unidentified Accipiter	5	0	11	91	99
Unidentified Buteo	22	9	19	622	706
Unidentified Eagle	1	0	0	1	5
Unidentified Falcon	1	0	2	0	7
Unidentified Raptor	1	0	4	141	300
Total # Birds Observed	1453	1430	3934	6644	7642
Observation Time (Hrs)	59.9	59.8	392.3	597.3	611.3
Raptors/Hour	24.0	24.0	10.0	11.1	12.5

*** Denotes total count for the entire Lake Erie marshes**

7. Other Migratory Birds

Wildlife Biologist Coppen attended the first meeting of the Ohio Working Group under "Partners in Flight - Aves de las Americas" on August 31, 1993. The meeting was held at the Aullwood Audubon Center in Dayton, Ohio. The purpose of this meeting was to develop goals for the group and hold a brainstorming exercise. Additionally, a list of potential participants for technical committees was constructed. Julie Shieldcastle of Black Swamp Bird Observatory was elected chairperson of the Steering Committee, and a secretary was appointed.

Wildlife Biologist Coppen attended the second Ohio Working Group Steering Committee meeting held in Columbus, Ohio on October 5. He was appointed as acting chairman of the Management Technical Committee (MTC) until the proper contacts and procedures develop to define the committee personnel. A brainstorming session was held concerning problems faced by Ohio's neotropical migrants, potential candidates for technical committees, and mailings.

As acting chair of the MTC, Wildlife Biologist Coppen drafted a letter of invitation to potential members of the MTC. An introductory meeting was scheduled for January 20, 1994 in Columbus, Ohio to discuss

MTC objectives and assign tasks. The acting chairman also drafted a prototype resource manager response form to be reviewed by the committee. This form is to be used to conduct a statewide neotropical migratory bird habitat inventory and current management activities file for MTC. A bulletin will be developed as a reference source for managers concerning management techniques available. Other objectives of the MTC include developing a contact list of Ohio resource managers for the habitat inventory, and development of a reference guide for managers that provides information on habitat management strategies.

8. Game Animals

Muskrat house inventories were initiated in 1991 to provide an indices for muskrat populations from year to year. Within the local area, the muskrat is the most important furbearer to trappers. Cedar Point refuge was closed to trapping in 1989 thru 1991 to allow muskrat populations to build and cut open areas in the cattail dominated marsh. The muskrat population exploded from 1991 to 1992. Trapping has since been allowed at Cedar Point to harvest the prolific rodent. Hut numbers fluctuate greatly from year to year depending on the water regime. The decline in house numbers at Darby Division can be attributed to drawdowns associated with dike rehabilitation.

TABLE 22. Muskrat House Count Totals

Ottawa Division	1991	1992	1993
Pool 1	222	450	517
Pool 2a	0	0	16
Pool 2b	0	0	8
Pool 2c	70	57	46
Pool 3	10	107	8
Pool 6	20	45	0
Pool 9	0	92	0
Ent. Pool	42	38	15
Show Pool	0	0	0
Mini-Marsh	0	0	0
MSU 3	0	8	0
MSU 4	12	26	5
MSU 5	24	22	66
MSU 6	0	0	0
MSU 7a	0	0	0
MSU 7b	0	0	0
MSU 8a	0	0	7
MSU 8b	77	114	36
MSU LL	0	0	4

Darby Division	1991	1992	1993
Pool 1	115	14	48
Pool 2	45	0	0
Pool 3	79	0	0
Pool 4	128	30	68
Navarre Division			
Pool 1	183	238	77
Pool 2	346	315	141
Pool 3	548	4061	486
Cedar Point			
Pool 1*	2000	15000	8500
Pool 2	284	320	185
Pheasant Farm	184	230	256

*Muskrat houses are estimates

14. Scientific Collections

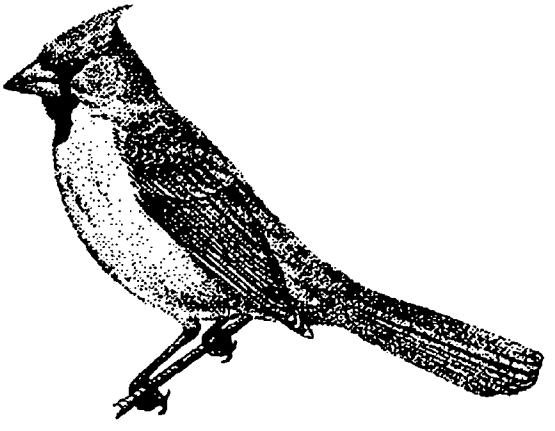
Environmental personnel at Davis-Besse Nuclear Power station of Oak Harbor, Ohio were contacted concerning their interest in scientific collections for the purpose of monitoring radiation in wetland wildlife. They were informed of the application procedure and requirements for a successful application. Concerns about the migratory status of geese were raised and the difficulty in showing length of residence at the Navarre Division. The use of resident turtles as a substitute for monitoring purposes was raised. We also arranged the procurement of muskrat carcasses from refuge trapping permitees at Navarre Division for the purposes of the study.

16. Marking and Banding

During the 1993 wood duck nest box checks 14 incubating adult female wood ducks were banded under a sub-permit issued by Ohio DNR wildlife division. Between July and September, 1993 Wildlife Biologist Coppen attempted bait-trapping wood ducks at 3 designated wood duck traps once a week. The refuge's

banding permit was reactivated in July and bands were ordered. The floating cloverleaf wood duck traps were unsuccessful in capturing any wood ducks despite several location and strategic changes. Traps were set on 11 occasions after extensive baiting. Although an average of 20 to 40 wood ducks were generally spotted near the traps during inspections, no evidence of feeding on corn bait was noted. Attempts to locate new areas with greater brood production for next year are being considered. Visitation by raccoons and muskrats contributed to the lack of success.

Wildlife Biologist Coppen, ROS Roster, and volunteers assisted Black Swamp Bird Observatory in banding neotropical migrants on three occasions during the month of May. On the first occasion approximately 500 birds received bands. Banding was conducted to provide information for research study # WMS19 (see section on Research and Investigations) which will assess migrational movements and habitat use of neotropical migratory birds at Ottawa NWR.

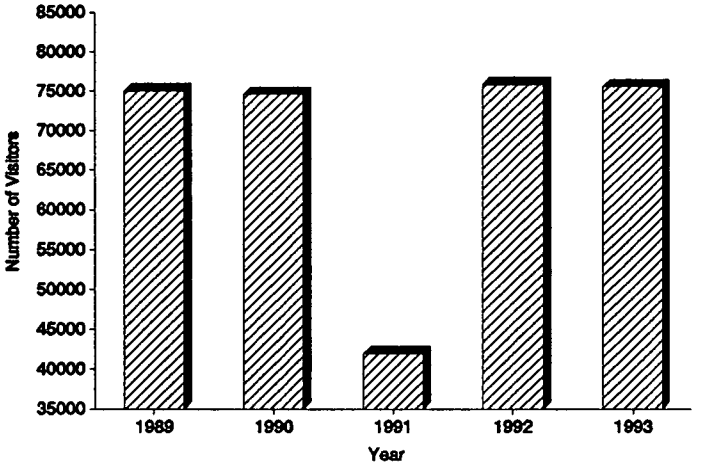


H. PUBLIC USE

1. General

Ottawa's visitation decreased slightly in 1993 to a total of 75,594 visits from 75,894 total visits in 1992. a vehicle road counter is installed on the entrance road and provides visitor traffic data. Peak visitor use occurs on the weekends during spring and fall bird migration periods. ORP Marshall coordinated environmental education programs for teachers and students, planned youth activities for scouts, conducted interpretive programs, presentations and tours for visitors on-site and off-site.

TABLE 23. Visitation Chart



*The low figures for CY91 reflect problems with the traffic counter system that year.

Survey questions addressing public use on the refuge were developed and added to a study to be initiated by investigators studying visitor use trends, and the economic impact of observation forays to wildlife areas by the public. The study was conducted during the year and will continue in 1994. The results will be useful to estimate and project wildlife-oriented recreational use of the refuge and its facilities.

Wildlife Biologist Coppen and ORP Marshall collaborated in a news release alerting the local public of wildlife viewing opportunities and other scheduled activities at Ottawa NWR during autumn, 1993. Local media and several Audubon groups received mailings. A total of 15 news releases in all were developed announcing refuge projects and events. Three news media interviews were conducted by radio stations with staff in the year.

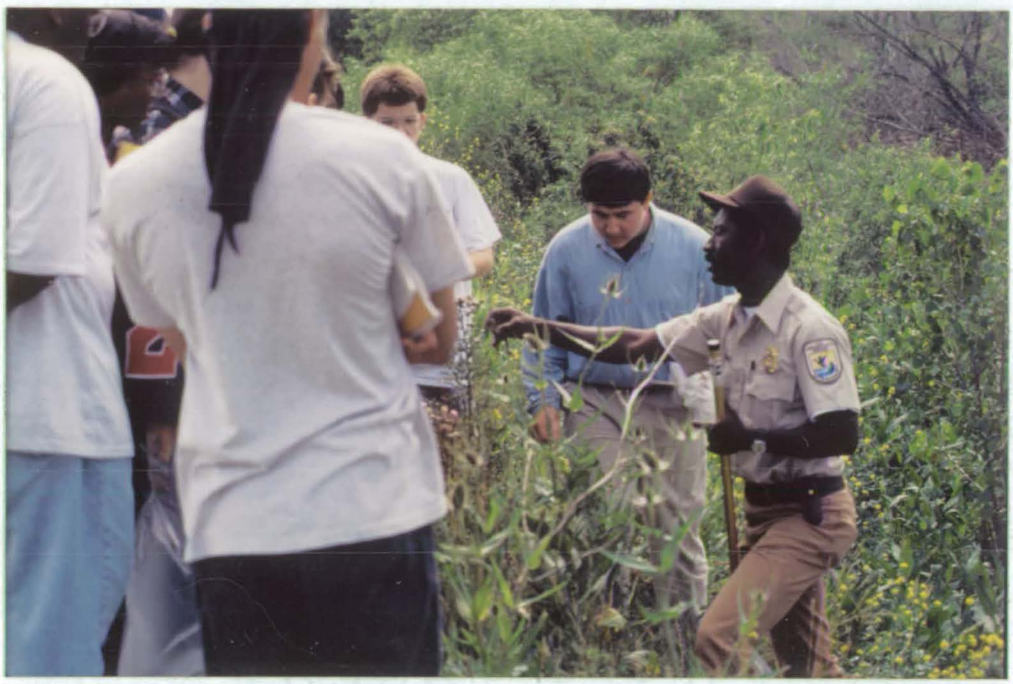
ORP Marshall was interviewed by radio station personnel of WSPD, 1370 AM on the air live on October 30. The interview promoted Ottawa's Open House held on October 31. Private Lands coordinator Cox participated in two radio interviews during the year concerning wetland restoration projects.

Entrance signs produced by the sign shop arrived and will replace existing signs in the upcoming year. Interpretive eagle signs produced by the sign shop were purchased for installation on the refuge public trails and used in cooperative effort by the Ohio Division of Wildlife at an eagle nest site near the Sandusky River in Seneca County.

ORP Marshall represented the refuge as a committee member for the Erie County Visitor's Bureau planning meeting on September 20. The committee identified by name as the Lake Erie Wing Watch is promoting birding events and sites along Lake Erie.

ORP Marshall coordinated plans with the Ohio Division of Wildlife and the Black Swamp Bird Observatory to conduct an Open House event for International Migratory Bird Day scheduled May 8. Events were slated for the Ottawa Refuge and Crane Creek Wildfowlers' Museum in the State Park. The International Migratory Bird Day event was a huge success this year (see H6 for details). A preliminary meeting was held in December for a similar event on May 14, 1994. Participants will include the Ottawa Refuge, Ohio Division of Wildlife, and The Ohio Division of Parks.

2. Outdoor Classroom - Students



Students find outdoor classroom aquatic studies interesting. (JC)

Students visiting the refuge and participating in environmental education studies totalled 1,033 visits in 1993 reflecting a slight decrease from 1,250 visits in 1992. Off-site program student participation totalled 1,701 visits in educational studies instructed by refuge staff.

ORP Marshall was invited in May to give Wildlife environmental talks to 150 students from Findlay Middle School, Findlay, Ohio at the Maumee Bay State Park. Students participated in the field trip for outdoor classroom studies.

An off-site exhibit was setup on June 12 for the Clonlara Home Based Education program conference held at the Toledo Hilton. The exhibit was staffed by ORP Marshall and Volunteer Hardman. Marshall conducted 3 presentations for 26 participants utilizing the "Suitcase for Survival" illegal wildlife trade items.

ORP Marshall participated in an environmental education school day at the Maumee Bay State Park held September 29. A display was exhibited utilizing educational resource information tailored for students

grades 3-5. Registration for school children totalled over 3400 students. Marshall contacted over 1400 students and 100 educators during the 4-hour event.

Mike Buhrow from the Ottawa Soil and Water Conservation District and Joe Morgan from the Ottawa County Board of Education met with Project Leader Adams and ORP Marshall on August 19 to review plans for the Ottawa County 5th Grade Conservation Tour. The 32nd Annual Ottawa County Fifth Grade Conservation Day was held on September 17. Excellent weather prevailed this year permitting participation from approximately 571 students and over 50 teachers. Refuge staff and guest speakers conducted hands-on presentations focusing on conservation and natural resource concepts. Cooperative efforts made from organizations coordinating the event included: Ottawa Soil and Water Conservation District, Ottawa County Extension Service, Crane Creek Wildlife Experiment Station, Ottawa County Board of Education, and Ottawa County Recycling Program.

Scheduled presentations and speakers were as follows:

1. Water: The basis of Life - Fred Synder, District Sea Grant Extension Specialist (site: Ottawa Refuge)
2. Managing Our Resources - Joel O'Brecht, Agriculture Stabilization and Conservation Service (site: Ottawa Refuge)
3. Life in the Marsh - Charles Marshall, Ottawa Refuge ORP (site: Ottawa Refuge)
4. Sportsmen's Migratory Bird Center - Krista Beck, Division of Wildlife/Ohio DNR (site: Crane Creek State Park)
5. Man and His Environment - Bill Hudson, Ottawa County Cooperative Extension Service (site: Crane Creek State Park)
6. Litter and Me - Tim King, Ottawa County Recycling Program (site: Crane Creek State Park)

A fishing clinic was held on June 6 for students in the Ottawa County Schools. Parents and volunteers also participated. ORP Marshall coordinated activities for approximately 60 people. The activities were in observance of Free Fishing Days in Ohio (June 5-6) and National Fishing Week (June 7-13).

Students celebrate National fishing Day. (CM)

ORP Marshall traveled to Bellevue, Ohio on December 15 to give a classroom presentation to 30-third graders at the Ellis Elementary School. Marshall showed a Disney film entitled "Water Birds" and utilized materials from the Wetland Discovery Trunk in hands-on discussion.

National Wildlife Week packets were received from the Ohio Sportsman's League and distributed to educators. A total of 150 packets were received with this years theme entitled "Rain Forest, Help Save Their Layers of Life".

Two Bowling Green State University Cultural Diversity groups visited the refuge on July 3 with 43 students and July 10 with 25 students. ORP Marshall coordinated environmental education activities and tours of the refuge. Volunteer Mike Crofts assisted Marshall on July 3.

A Bowling Green State University Ornithology class of 20 students from Bowling Green, Ohio visited the refuge on October 29 to conduct field studies for fall bird migration species.

On October 9, Wildlife Biologist Coppen instructed Ohio State University Wildlife Biology students on a field trip on sampling methods related to current refuge habitat investigations. Students collected data to investigate moist soil seed yield estimation in two moist soil units, and to develop a potential bald eagle nesting habitat inventory for one woodlot.

The Ohio State University's field biology class students conduct refuge field investigations. (CM)

ORP Marshall conducted a tour on the refuge for 70 Michigan high school students on November 19. The Davis-Besse Nuclear Plant's Office of Environmental Compliance coordinated the visit as a cooperative educational field trip to the plant and refuge. Two groups visited for 1 1/2-hours.

TABLE 24. 1993 Visiting School Groups

School	Town	# Students	Activity
Miami University	Oxford, OH	1	Enviro. history research
Toledo Ag. Ed. Center	Toledo, OH	13	Wildlife Management
Defiance College	Defiance, OH	14	Fields zoology
Millersville St. Marys	Helena, OH	60	Biodiversity studies
West Lake High School	Cleveland, OH	20	Ornithology
*Carroll Elementary	Oak Harbor, OH	20	Wildlife Habitat
*Jerusalem Elementary	Oregon, OH	42	Endangered Species
*Indian Hills Elementary	Rossford, OH	45	Wildlife Management
Bowling Green State University	Bowling Green, OH	43	Environmental Ed.
Bowling Green State University	Bowling Green, OH	25	Environmental Ed.
Ottawa County Schools Conservation Day	Ottawa County, OH	571	Environmental Ed.
*Bataan Elementary School	Port Clinton, OH	27	Environmental Ed.
City of Oregon	Oregon, OH	15	Ottawa's Resources
Bowling Green State University	Bowling Green, OH	20	Ornithology
The Ohio State University	Columbus, OH	30	Vegetation Sampling
Michigan High School	Detroit Area, MI	70	Ottawa's Resources
Toledo Metroparks	Toledo, OH	20	Waterfowl Identification
Ottawa County Schools	Ottawa County, OH	45	Fishing Clinic
	TOTALS	1081	

***Indicates Ottawa Teacher Workshop Graduates.**

3. Outdoor Classroom - Teachers

Approximately 230 teachers and resource educators participated in environmental education programs with students or as a participant during the year. Refuge staff conducted programs on-site and off-site implementing Project Wild, Project Wild Aquatics, and various resource education materials in instructional formats. ORP Marshall coordinated most programs with the assistance of other staff, volunteers, and some assistance from Ohio Division of Wildlife personnel. An educational resource guide developed at Ottawa is provided to any educator requesting information for planning visits to Ottawa. ORP Marshall participated in an education symposium on April 1 at the Perrysburg High School, Perrysburg, Ohio. The workshop presentation was given to 16 educators focusing on environmental education at Ottawa.

A teacher workshop was conducted on May 15 utilizing Project Wild materials. Six participants completed the 7-hour class. Ottawa's resource overview workshop was held on May 22 for ten participants. ORP Marshall instructed both workshops with assistance from Wildlife Biologist Coppen in the overview workshop. Participants observed bird banding and were given a tour of the area during the overview workshop. University of Toledo educator Gerry Underfer assisted in coordinating workshop registration and participant class credit. Four workshop graduates from previous years returned to the refuge during the year with groups of students for outdoor classroom studies.

The refuge submitted a FY94 application for an approved provider of Ohio Department of Education's, Continuing Education Units (CEU's) in December. The application was approved and is valid through June 30, 1994.

4. <u>Interpretive Foot Trails</u>

Platform completed with interpretive sign, benches, and binoculars. (CM)

Interpretive foot trail visits totalled 50,406 visits and were self-interpreted. Refuge staff and volunteers conducted interpretive tours for 138 visitors. A 7-mile interpretive trail system is available for visitors to hike/bicycle on a daily basis during daylight hours. Wildlife observation and photography are two activities most visitors participate in during a visit. The visitor parking lot has an information kiosk as the trail systems initial starting point for all wildlife oriented and non-wildlife oriented activities. The trail system is composed of dike-top roads surrounding moist soil units, open pools, and foot trails meandering through forested woodlots including historical segments of a remnant swamp (The Great Black Swamp). Five interpretive panels and bench sites provide management and wildlife information to the visitor. The observation platform was completed with observation binoculars, benches, and an interpretive eagle panel. The sign shop produced an additional eagle sign for Ottawa's trail to be installed at a new bench site. Interpretive panels purchased with challenge grant funds from the Ohio Audubon Council are planned for incorporating in a second information kiosk in the visitor parking lot as the weather improves in the

upcoming 1994 year. Challenge Grant funding was received during the year to construct a foot bridge to the office from the visitor parking lot for visitor convenience. Plans are to construct the foot bridge in the upcoming year.

5. Interpretive Tour Routes

International Migratory Bird Day was celebrated on May 8. A glorious day contributed to an excellent turnout. Approximately 1,200 vehicles (3,600 visitors) visited the refuge during the event, with 360 vehicles going through a 5-mile tour route. The refuge open house on October 31 received over 100 vehicles with over 200 visitors driving the same tour route. Many individuals enjoyed the scenic drive through the generally closed sections of the refuge. Comments given to refuge staff from participants referred to the drive as "The Secret Area". A self-interpreted leaflet corresponding sign markers was developed to enhance the tour route.

6. Interpretive Exhibits/Demonstrations

The refuge participated in the first annual International Migratory Bird Day event on May 8. Ottawa Refuge, The Ohio Division of Wildlife at the Magee Marsh Wildlife Area, and the Black Swamp Bird Observatory cooperatively coordinated events for the full day at Ottawa and Magee Marsh. Approximately 3,600 visitors turned out for the event. Guest speakers and volunteers assisting refuge staff contributed to the success of the event. Events were scheduled from 8:00 a.m. to 5:00 p.m. and included decoy carving and painting, wildlife art display, wildlife photography demonstration, raptor banding, shorebird and songbird walks, and a 5-mile self-interpreted auto tour. The event was received well by visitors.

Both indoor and outdoor presentation as outdoor raptor demonstrations by Rex and Shiela Miller draws crowds. (CM)

The refuge conducted an open house for the public on October 31. Activities and demonstrations were scheduled throughout the day. Inclement weather limited public participation for the day, however, visitors expressed a positive response in programs scheduled during the open house. Events scheduled in the office

included wildlife art displayed by well-known Artist Harold Roe (1992 Contest Runner-up for the 1993-1994 Federal Duck Stamp Design), wildlife photography was displayed by Volunteer Jim Fuehrer, and decoy carving was displayed by Maumee Bay Carvers. A bird banding demonstration was available to the public and a birds of prey demonstration was conducted by volunteers Rex and Sheila Miller. Other activities included a self-guided auto tour route on the refuge, wildlife photography tours, birdwalks, and general tours of the area. Visitors that stopped in the office totalled over 150 visits and over 100 vehicles with 200 individuals drove the auto tour.

Indoor wildlife painting display by Harold Roe, 1992-93 Federal Duck Stamp contest runner-up. (TR)

An exhibit was displayed at Bowling Green State University in Bowling Green, Ohio on April 21 by ORP Marshall and volunteer Cornelius. A second exhibit was displayed on April 24 at the Woodville Mall in Northwood, Ohio by ORP Marshall and volunteers. Both exhibits were in celebration of Earth Day and National Wildlife Week.

A refuge exhibit was displayed at the Ohio Wildfowlers Festival, held at the Crane Creek State Park. ORP Marshall and volunteers were present to disseminate information and sell duck stamps. Twenty-four stamps were sold primarily to waterfowl hunters on September 26.

Bowling Green State University Earth Day exhibit staffed by volunteer Cornelius. (CM)

7. <u>Other Interpretive Programs</u>

Biological Technician Cox met with students at Stephen T. Badin High School, (Hamilton, Ohio) to discuss careers in the field of Wildlife Management.

A career day presentation was given by ORP Marshall in two sessions to 40 students at Woodland Elementary in Perrysburg, Ohio on April 23 and one session to 15 students at Fassett Middle School in Oregon, Ohio on April 30. ORP Marshall was invited to the Oak Harbor High School on November 9 for a career day presentation. Marshall discussed career opportunities available with the U.S. Fish and Wildlife Service in two, 1-hour sessions. Sixty students attended from the Oak Harbor High School Agriculture Department.

ROS Lenz, ORP Marshall and Ohio Division of Wildlife Biologist Todd Haines gave ten outdoor writers a tour of the refuge on April 16. A conference for Outdoor Writers of Ohio was held in Toledo during the week of April 12.

Davis-Besse environmental compliance office led tours into the Navarre Marsh to observe bird banding operations on April 16 (10 outdoor writers), and April 25 (20 people Maumee Valley Bird Group).

ORP Marshall was invited to give a general presentation to ten members of the masonic group in Genoa, Ohio on May 10.

On October 2, Wildlife Biologist Coppen instructed participants at an Ohio Division of Wildlife sponsored waterfowl hunting clinic. A slide show and video program was presented to educate waterfowl hunters on waterfowl identification.

8. Hunting

Canada, snow, and white-fronted geese along with ducks are hunted by permit on portions of the Ottawa Refuge. Snow and white-fronted geese occur in such small numbers on the refuge that they are rarely taken during the hunt. The hunt is conducted from blinds in and around agricultural fields and a few moist soil units. Hunting occurs four days a week from half-hour before sunrise to noon. A cooperative agreement provides for the hunt to be administered by the Ohio Department of Natural Resources. Personnel from the adjacent Magee Marsh Work Unit oversee hunting operations. This year marked the 18th and 8th year that refuge hunting of geese and ducks, respectively, has occurred.

The refuge has 27 blinds of which 22 were used in 1993. Blinds 11-13 were closed again this year because of their close proximity to a fall waterfowl banding site. Fifteen blinds are pit blinds with flip tops to allow for better hunter concealment. A handicapped accessible blind is available and was used on seven occasions. Ohio regulations for a goose season was a 30-day split season with open dates of October 16-23 and November 6-27 1993. Ottawa's managed hunt is conducted 4 days a week during the two seasons.

Hunters are selected through a pre-season registration with a computerized drawing. All application procedures and selection process is conducted by the Ohio DNR personnel. This season 2,643 hunters applied to hunt the refuge and 216 permits were distributed. Of the 216 permits, 184 were used for a total of 260 (2 hunters per permit allowed) individuals participating in the hunt. Thirty-four (16%) of the permits were not used. Usually the majority of the hunters selected are associated with large metropolitan areas and this year was no exception. This year 205 (57%) of the 360 hunters were from Cleveland, Akron, or Toledo areas. Hunters from 44 Ohio counties and 2 states (Kentucky and Michigan) participated.

Canada goose populations on the refuge during the hunt were down and can be attributed to a low population of geese and unusually mild winter, resulting in a late migration. Hence, a lower harvest of geese and a slightly lower success rate from last year. The 360 hunters harvested 111 geese for a success rate of 30%. In addition, 36 ducks were harvested. Mallard (20) and wigeon (4) comprised the majority harvested. The following tables show goose population in the fall and winter on Ottawa and hunter harvest and success rates.

TABLE 25. Canada goose populations, Ottawa National Wildlife Refuge, September 1, 1989 to January 15, 1994.

	1989	1990	1991	1992	1993
09/01	1,050	600	140	1,050	300
09/15	1,750	540	1,100	3,200	520
10/01	3,020	2,305	2,850	600	495
10/15	5,075	3,700	5,510	14,450	1,170
11/01	14,840	7,850	6,250	6,350	1,950
11/15	7,950	6,800	7,900	1,100	1,450
12/01	5,575	5,000	5,335	3,900	2,645
12/15	5,100	1,720	8,320	4,550	6,910
01/01	2,550	1,600	8,255	4,070	9,120
01/15	8,900	2,800	8,050	2,500	2,500

TABLE 26. A Five Year Comparison of the Goose Harvest on Ottawa National Wildlife Refuge.

	Number of Hunters	Number of Geese	Goose Hunter Success	Number of Ducks	Duck Hunter Success
1989	474	124	.26	70	.15
1990	463	112	.24	37	.08
1991	519	120	.23	71	.14
1992	520	181	.35	81	.16
1993	360	111	.30	36	.10

9. Fishing

Refuge sport fishing is limited to a 15-acre borrow pit at Cedar Point NWR from June 1 to August 30. Visitors are required to possess a valid state fishing license. Random license checks were conducted during the fishing season to monitor regulation guidelines. A total of 610 visitors for 1830 activity hours participated in fishing the site. Maximum use seems to occur during weekends. A majority of the fishermen checked were senior citizens. Fishing success was the best during the month of June. Sport fish harvested were blue gill, crappie, bass, and channel catfish.

Now that I caught my bait, Let's try for a big one! (CM)

10. Trapping

The refuge is divided into 13 adult and 3 youth trapping units. Harvesting of muskrat, raccoon, mink, fox, opossum, and skunk is permitted following State of Ohio trapping regulations and special conditions set forth by the refuge. The refuge allows trappers on the refuge after the closure of the waterfowl hunting season through 15 March the following year. The adult trapping units are awarded to the highest bidder through a sealed bid process. Youth units are awarded by a lottery system.

Seven adult units were opened during the 1993-94 season. Due to the abundance of muskrat houses and opening the trapping season after the closure of duck season, unit 3 (Cedar Point) was divided into two units to allow for an extra set of trappers. A large number of muskrats were taken from Cedar Point last year, but a significant amount remain to be removed. For this year, units 1, 2, 3A, 3B, 4, 10, and 12 were opened. Units 5, 6, 7, and 8 were closed again due to construction and rehabilitation work during the summer, fall, and possibly winter. Darby Division, Unit 13, was not open to trapping because 3 of the 4 water impoundments were dry again this year for moist soil plant germination and dike and ditch construction. However, after the area was inundated in the fall muskrats started cutting the new vegetated areas, especially in pool 4. The following is a five year comparison of reported harvest and revenues received.

Table 27. Reported Fur Harvest for the Past five Seasons

	89-90	90-91	91-92	92-93	93-94*
Muskrats	1,984	2,637	6,521	14,612	6,646
Raccoon	68	122	40	58	27
Mink	29	34	16	41	24
Skunk	7	4	0	0	0
Opossum	20	36	11	17	11
Fox	15	6	0	3	2

*Reported harvest as of 1/11/94

Table 28. Income from the Past Five Seasons.

	Number of Units Trapped	Total Income
1989-90	5	$ 2,797.74
1990-91	8	$ 3,345.94
1991-92	5	$ 5,151.38
1992-93	6	$ 6,757.69
1993-94	7	$ 6,269.27

11. Wildlife Observation

Public access into refuge units for wildlife observation is permitted on public trails at the Ottawa Division. Refuge policy requires a special use permit or a letter of authorization for reasons to enter the Cedar Point NWR and the Darby Marsh Division. The Navarre Marsh Division public access is limited by the Davis-Besse Nuclear Power Plant operations. Public use activities are restricted on West Sister Island NWR for control of disturbance to colony nesting birds and its Wilderness Area status.

The Western Lake Erie Sierra Club visited the refuge on April 10. ORP Marshall conducted a 5-mile walking tour for 20 members.

Volunteer Chris Ashley conducted a 2-hour tour of Cedar Point Refuge for 25 people from the Cleveland area on May 11.

Three groups consisting of 42 people visited the Navarre Marsh Division to observe bird banding operations conducted by the Black Swamp Bird Observatory in May.

The Maumee Valley Audubon Group of 4 and a Toledo church group of 25 visited the Navarre Marsh Division to observe bird banding operations. Both groups visited the area on September 25.

Nine volunteers from a local metropark were led by Wildlife Biologist Coppen on a scheduled refuge and wildlife observation tour on November 10. The history of the local area was part of the major discussion.

17. Law Enforcement

Project Leader Adams, ROS Lenz and Roster, and ORP Marshall attended law enforcement refresher training March 22 to 25 at Des Moines, Iowa.

SA Dan LeClair and ROS Lenz retrieved ducks from the BP Oil Refinery after they had died in their oil retention ponds in March. Over 100 ducks, geese, herons, and other migratory birds had died at that period.

ORP Marshall was detailed to assist SA LeClair undercover illegal harvesting and selling of walleye suspected being transported into Ohio from Michigan. The detail occurred on April 9.

SA LeClair instructed Project Leader Adams and ROS Lenz in use of the 4046 pistol and conducted practice drills in May.

Refuge Law Enforcement Officers Lenz, Roster, and Marshall reviewed four LE-training videos for discussion. Tapes included: 1. "Illegal Harvest of Waterfowl" by Dave Hall, 2. "Use of Force with Randy Means", 3. "Preventing Police Liability With Randy Means", and 4. "Positive Personal contacts with Randy Means". All produced by the Southeastern Center for Liability Management. Refuge officers completed review in June.

Ms. Dawn James, a background investigator conducted interviews with staff on June 14 as required for refuge officers holding law enforcement commissions.

The State of Ohio had an early teal hunting season in September, during which Refuge Officers Lenz and Roster ticketed two individuals for shooting before legal hunting hours and one individual for possession of lead shot.

Refuge Officers Adams, Lenz, Marshall, and Roster traveled to Shiawassee Refuge for semi-annual firearm requalifications on October 5.

Waterfowl hunting season reopened on November 6 and closed on November 27. Refuge officers Adams, Lenz, Roster, and Marshall coordinated law enforcement patrols with SA LeClair and state law enforcement officials. Refuge Officer Marshall in a patrol observed an individual entering the refuge boundary at Cedar Point NWR and attempting to illegally take a shot bird that had fallen into the refuge. The individual was contacted and field information taken for a citation.

Resident Special Agent Dan LeClair at the Helm. (CM)

TABLE 29. Summary of 1993 Citations

Violation	Citations	Disposition
Unlawful Trespass on a National Wildlife Refuge	2	$100 each
Unlawful Take of Migratory Waterfowl Before legal Shooting Hours	2	$200 - 1 pending
Possession of Shot Other than Steel	1	Pending

Sunbathers on a closed beach at Cedar Point NWR continue to be a challenge for refuge officers. (CM)

20. Take Pride

Refuge staff sold 114 Duck Stamps for a total of $1,710 for the 1992-93 season.

Refuge staff sold 27 duck stamps on August 18 at the Crane Creek Wildlife Experiment Station and 16 duck stamps on August 25 at the Resthaven Wildlife Area. Hunters at both areas were registering for special selection drawings to waterfowl hunting programs.

I. EQUIPMENT AND FACILITIES

1. New Construction

Work at the Darby Unit continued this summer with the construction of a small dike/ditch in Pool 4 to isolate a drainage culvert coming from private land and to rehab the south dike of Pool 3. Spoil piles from the 1992 work were leveled and reshaped into rough dikes. Some of the areas were seeded.

An 18" culvert and screwgate was installed from the Lindsey-Limestone Moist Soil Unit into the MSU 8A pump structure to allow the pump to be used in draining the moist soil unit.

An additional 36" culvert with screwgate was installed in the southwest corner of MSU 3 to facilitate better flooding capabilities. Rip-rap was placed on the south slope of the main moist soil pump ditch to complete the south slope. Now for the north slope.

An additional 36" culvert and screwgate was installed into MSU 3 to assist in flooding the unit. The two original 24" culverts, shown lower in the ditch, will not handle the entire pump flow when the unit in nearing higher water levels. Steel sheet piling is now being used on new culvert installations to reduce rip-rap interference with screwgates and flapgates. (SC)

2. Rehabilitation

A number of farm ditches were cleaned of silt during the winter and early spring months to improve farm fields. Spoil was spread across adjacent fields.

The gasoline engine and 14" vertical turbine pump in the NE corner of MSU 5 had not been used for the past several years was removed. The M-Farmall (U-6) engine was rebuilt and the unit reinstalled in the pool 1 water control structure to turn the structure into a pump station. This allows us some pumping capability for pools 1, 2B, and 2C and should greatly improve our water management capabilities in the future.

The rehab of the dike toes along the north and east sides of MSU 8A was completed, except for seeding of the slopes. This work converted the steep and eroded vertical banks to a 5-6/1 slopes to provide easy maintenance. The former ditch, which lay immediately below the vertical slopes was moved further into the unit to allow a bench between the ditch and the dike toe to facilitate vegetation growth and reduce bank erosion.

The rehab of the dike toes in MSU 8A was completed to convert the eroded and near vertical dike slopes to a slope that can retain vegetation and be mowed. A bench is left between the borrow ditch area and the slope to allow better vegetation growth and help protect the dike from wave erosion. (SC)

Moist Soil Unit 7b north dike was rip-rapped with FY93 money totaling $4,900.

Three underground fuel oil and/or gasoline tanks (one at the headquarters, and two at Q-3) were excavated via contractor and all sites were closed.

The south dikes of MSU 3 and MSU 4 were originally built without removing the underlying tiles which allowed the units to drain via tiles into the adjacent pump ditch. The tiles were removed by refuge operators to give better water management to control problem vegetation.

Sheet steel piling were driven around the headquarters/Radar ditch culvert and flapgate to prevent rip-rap from falling down, jamming the flapgate, and making it inoperable. This steel piling is being used on all new installations to reduce problems of this nature.

A culvert under Stange Road at the intersection of Stange and Krause Roads was replaced and the MSU 8A/Pool 2A culvert project was completed. The project included a fish-hook protective dike to prevent ice damage. Ice damage to the MSU 3 screwgates was repaired and a protective mound placed in front of this structure.

The west dike of unit FU 6A was rebuilt and raised to prevent water flooding on nearby private property.

3. Major Maintenance

Maintenance staff installed a new power line to the Farm Unit 12 motor/pump to control water levels. This pump was shut down since mid-1992 because of a broken power line. Since the line under the ditch had given problems in the past, an overhead crossing was constructed of 4" iron pipe and the line routed through this to allow easy maintenance and future replacement.

The 5hp electric pumps installed in 1988-90 with flood damage funds were designed with right angle gearboxes which have proven extremely short-lived and expensive to repair and maintain. They were replaced with a belt-drive system similar to those on our older farm-dike pumps. The rebuilt pumps were installed in FU 2, MSU 7A, Mini-Marsh, MSU 8A, and MSU 8B. The pumps in 7A and 8B were also rebuilt with new main shafts and lower bearings. Motor covers were built for all pump motor to protect the motor, belts, etc from the elements as well as provide safety shields.

Dike problems have been caused by high water levels against unprotected dike slopes. In the past 5-8 years, major work efforts have been expended to correct these problems by providing rip-rap. Recently, with only limited or no funds available for rip-rap, we have been experimenting with designs to allow more vegetation growth near or on the dike toes. (SC)

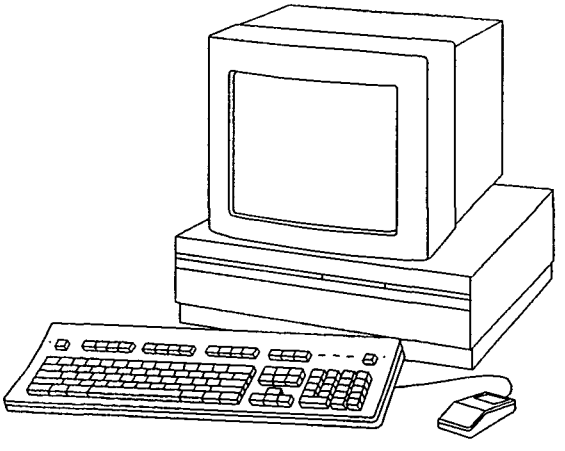
4. **Equipment Utilization and Replacement**

The Ford 8" portable pump was retrofitted with a new 30 gallon gasoline tank to allow less fillups. A Murphy switch system was installed to allow automatic engine shutdown upon loss of oil pressure, high water temperature, and loss of suction. Similar Murphy systems were installed on the Thompson pump and the AC tractor. A switch placed on the crissifulli hose will allow automatic tractor shutdown if the pump experiences loss of water for any reason, such as hose breaking, PTO failure, out of water, etc. This has improved our ability to do overnight pumping.

A new 1994 3/4 ton pickup with utility box was received for use in the private lands wetland restoration program.

6. **Computer Systems**

A Hewlett-Packard Deskjet 550C color printer was purchased to be used with refuge GIS software in vegetation and land acquisition mapping. MSDos 6.0 was purchase and installed on several computers. A GPS unit was purchased to provide latitude-longitude coordinates in the field for cover mapping and other GIS work.



J. OTHER ITEMS

1. Cooperative Programs

Memorandums of Understanding conducted between the Ohio Department of Natural Resources and the U.S. Department of Interior, U.S. Fish and Wildlife Service active during the calendar year is as follows:

1. Cooperation in the production of Canada Geese in the State of Ohio (banding operations),
2. Cooperation in the managed hunt program of Waterfowl on the refuge,
3. Research management study of the heron rookery on West Sister Island National Wildlife Refuge.

A cooperative program continues to exist between the Toledo Edison Electric Company and the U.S. Fish and Wildlife Service for management of the Toledo Edison Owned Navarre Marsh unit as part of the Ottawa Refuge Complex. Refuge personnel provide a management plan for water manipulation of the unit, and Toledo Edison personnel are responsible for overseeing the regulation of water levels.

Regional Director Marler spoke at the dedication of the 1,100-acre Pickeral Creek Wetland Restoration project on Sandusky Bay on October 2. This Ohio Division of Wildlife project was a joint venture of the North American Waterfowl Management Plan for the protection and restoration of Lake Erie's marshes.

Regional Director Sam Marler visits Ohio to speak at the Ohio Division of Wildlife dedication of the Pickerel Creek Wildlife Area Project. (SL)

The Ohio Audubon Council donated $2,000.00 for the installation of a foot bridge over Radar Ditch to provide visitors easy access to the headquarters building. The project will be completed in 1994.

The Partners for Cultural Diversity is a cooperative program between Ottawa National Wildlife Refuge, Shiawassee National Wildlife Refuge, National Fisheries Research Center - Great Lakes, University of Michigan-Ann Arbor, and Gibsonburg and Buena Vista High Schools. This year students of color were recruited for the Youth Conservation Corps. With all "Partners" signing the Action Plan, this signifies an opportunity to make advancement towards a diversified work force and to advise women and people of color for recruitment possibilities, but more importantly to bring an awareness of our natural resources.

3. **Items of Interest**

Training Attended in 1993:

Adams:
Refuge Law Enforcement Refresher, Des Moines, IA, 3/22-26
Fire Training for Resource Managers, Charleston, SC, 4/26-30
Law Enforcement Re-qualification, Shiawassee NWR, 10/6
Management Training for Resource Managers, Penn State University, 12/1-10

Lenz:
Refuge Law Enforcement Refresher, Des Moines, IA, 3/22-26
Team Leadership Seminar, Toledo, OH, 7/27
Law Enforcement Re-qualification, Shiawassee NWR, 10/6
Ethics Training, Ann Arbor, MI, 11/9
Managing Multiple Priorities, Toledo, OH, 12/7

Cornelius:
Ethics Training, Ann Arbor, MI, 11/9

Roster:
Real Estate Pre-acquisition Contaminants Course, Twin Cities, MN, 3/16
Refuge Law Enforcement Refresher, Des Moines, IA, 3/22-26
Law Enforcement Re-qualification, Shiawassee NWR, 10/6
Ethics Training, Ann Arbor, MI, 11/9

Marshall:
Refuge Law Enforcement Refresher, Des Moines, IA, 3/22-26
Law Enforcement Re-qualification, Shiawassee NWR, 10/6
National Watchable Wildlife Conference, Corpus Christi, TX, 11/10-14

Coppen:
Invertebrate Workshop, Puxico, MO, 5/5-6
Prairie Ecosystems: Wetland Ecology, Mgt., and Restoration, Jamestown, ND, 8/9-13
Moist Soil Management Workshop, Puxico, MO, 9/14-15
Moist Soil Workshop for Field Staff, Puxico, MO, 9/21-24
55th Midwest Fish & Wildlife Conference, St. Louis, MO, 12/11-15

Revenue sharing checks for FY93 were mailed in April to Ottawa and Lucas Counties for the sums of $21,091.00 and $34,164.00, respectively. This accounts for a nationwide payment of 81.65% of the full entitlement.

4. Credits

We would like to thank everyone who helped put this report together:

Adams	Sections C-3; D-3 and E-7.
Lenz	Sections E7-8, and J1-4,
Roster	B; D-5; F1, 5, 12; G1-4; and H8-10.
Cornelius	Sections E-5; F-4; and I1-8.
Cox	Sections A; C1-2, F14-15, editing, and coordination.
Coppen	Sections D-2; D5-6; F1, 3, 10; G2-4, 7, 11, 14, and 16.
Marshall	Sections E2-4, 6; H1-7, and 11-20.
M. Miller	Sections E5.
L. Miller	Typing, editing, and organization.

Photo Credits:

CM	Charles Marshall
TR	Thomas Roster
JC	Jorge Coppen
SC	Stanley Cornelius
RA	Ross Adams
JF	Jim Fuehrer
TC	Thomas Cox
JS	Jim Schott
JAF	Judy Flood
CA	Chris Ashley
KO	Kevin Osbourne

Cedar Point National Wildlife Refuge

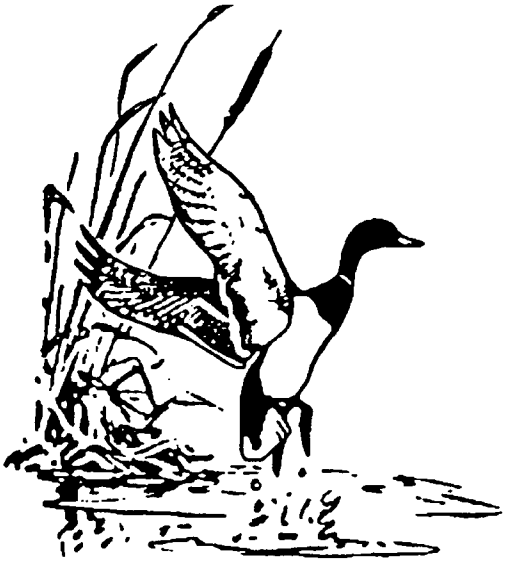
Cedar Point NWR is administered as a unit of the Ottawa Complex. The refuge contains approximately 2,500 acres and is entirely marsh except for the dike system. A dike system isolates the marsh from the adjacent Lake Erie and divides the refuge into three pools. All pools are predominantly cattail, bulrush, and other emergent vegetation. The pools are managed to provide stable water levels which are lowered during the summer months only to the extent necessary to encourage aquatic vegetation.

The refuge provides habitat for migrating waterfowl and other marsh and water birds and marsh nesting habitat for a variety of birds. Herons and egrets make extensive use of the area for feeding.

The nesting pair of bald eagles succeeded in producing two young this year (see G-2 for details).

A 15 acre borrow pit near Yondota gate is open for fishing from June 1 through August 31. The pond was stocked with channel catfish during the summer.

Muskrat populations have exploded in the refuge since most of the area was not opened to trapping during the 90 - 92 seasons. The increase in population has helped in opening up the large cattail areas.



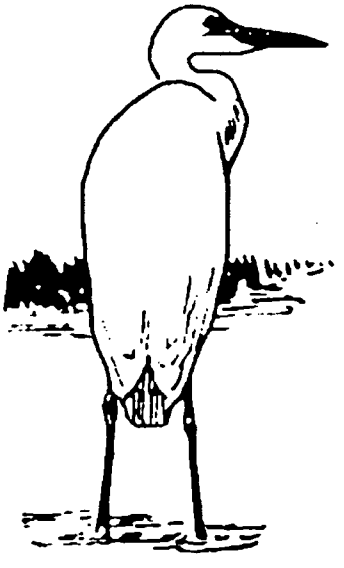
West Sister Island National Wildlife Refuge

West Sister Island NWR is an 82-acre island located in the western basin of Lake Erie. It is jointly owned by the U.S. Coast Guard and the U.S. Fish and Wildlife Service. Five acres, including a lighthouse, are owned by the Coast Guard but managed along with the other 77 acres by the Service as a wilderness area. Tall hackberry trees with an under story of abundant poison ivy 12 feet tall dominate most of the island. Great solomons-seal reaches 7-9 feet in height and a great variety of ferns, wild flowers, mushrooms, and other plant life abound.

The island is composed of glacial fill over a limestone shelf. The limestone shelf protrudes along the island showing where large coves have been eroding by hydrological forces. There are no sand beaches but rather two rocky shoals for access to the island. The soil contains a great amount of clay, loam, and humus layers which annually receives a topically applied layer of nitrogen supplied by the thousands of nesting colonial birds.

West Sister Island is noted for having the largest heron/egret rookery in the Great Lakes. Great blue herons and great egrets comprise 65 percent of the nesters.

One trip was made to the island by researchers to finish installing reference points, creating a grid, on the island to estimate nest and track movements of colonial nesters. Refuge staff accompanied the researchers on their visits.



A Wildlife Oasis

In visiting Ottawa National Wildlife Refuge (NWR) Complex, you are in an area unique to Ohio. Unlike you, early settlers would not have set foot here for fear of their lives! It was part of a 300,000acre swamp extending from present-day Sandusky, Ohio to Detroit, Michigan.

Impenetrable swamps made the area foreboding to Indians who lived here. Bartering furs for the white man's tobacco and corn, they called themselves traders or, in their language, "ottawas."

But progress prevailed. The formidable "Black Swamp" was drained. The forests of panther and eagle became fields of farmer and blackbird. From 300,000 acres, the marshes were whittled to less than 15,000 acres.

Since 1961, the Federal government has saved more than 8,000 acres of these marshes. Today, Ottawa, Cedar Point and West Sister Island are the only national wildlife refuges in Ohio.

The Ottawa NWR Complex, including Darby and Navarre marshes, is a wildlife oasis in the midst of an urban desert. Located within the Detroit-Toledo-Cleveland megalpolis, Ottawa is slightly more than an hour's drive for more than 10 million persons! Yet it provides one of the few places in Ohio where the visitor can still see bald eagles or thousands of Canada geese and ducks including mallards, blacks, bluewing teal, wood ducks, American wigeon and canvasbacks.

In the dramatic story of Ohio's history, the refuges of the Ottawa Complex preserve some of the finest and wildest chapters.

The Eagles of Ottawa

Bald eagle nests were once common along the Lake Erie shoreline. Today, only a dozen or so eagles are left in Ohio. Ottawa is one of the few places where you can still see our national symbol flying free.

Widespread use of pesticides and destruction of nesting habitat have drastically lowered bald eagle numbers. In 1978, the bald eagle was placed on the Federal endangered species list. Today, eagles are abundant only in Alaska. They're classified as "threatened" in Michigan, Wisconsin, Minnesota, Oregon and Washington. They are facing extinction everywhere else.

Currently, 137 national wildlife refuges protect 44 endangered species like the bald eagle. Ottawa is proud to be one of these important sanctuaries.

The Timeless Refrain of "Goose Music"

If you visit Ottawa NWR during spring or fall, you'll witness an event as notable as the seasons that has facinated man since time began, namely, the migration of Canada geese.

Why do geese stop here? Well, you might compare Ottawa to a roadside rest area for weary travelers.

Geese follow invisible highways-in-the-sky called "flyways." From east to west, four flyways cross the country, the Atlantic, Mississippi, Central and Pacific.

Ottawa is located on the Mississippi flyway. Like any good rest area, it provides the geese with abundant food and water before they continue their journey.

During their fall respite at Ottawa, geese re-fuel on natural foods such as tender grasses and pondweeds plus crops including corn, sorghum and buckwheat.

Sometime in mid-March, the timeless refrain of what conservationist Aldo Leopold called "goose music" will fill the air. The returning geese will alight briefly at Ottawa to rest and feed before heading north to their Hudson's Bay nesting areas. There, the mysterious cycle of migration will begin once again.

Man Helping Wildlife

Restoration of the lands of the Ottawa Complex is an on-going process. Like other national wildlife refuges in the Great Lakes Region, Ottawa is being developed according to a master plan. Its dikes and associated facilities are being repaired to provide water control essential for marsh management.

When completed, 20 pools will provide some 4,000 acres of permanent marsh for waterfowl and other wildlife. Temporary water will be provided by another 1,000 acres of moist soil food production units. These are drained in early summer to allow natural plant growth and flooded in fall. Seasonally flooded flats of Crane Creek and Lake Erie provide an additional 1,000 acres of wetland habitat.

Cooperative farmers plant corn, sorghum and buckwheat as part of the refuge's waterfowl food production program on the upland. As a result of this wetland and upland habitat management, peak waterfowl populations in excess of 25,000 geese and 65,000 ducks are expected. Other upland habitat is managed to provide a mixture of food and cover for a variety of wildlife including deer, pheasants and rabbits.

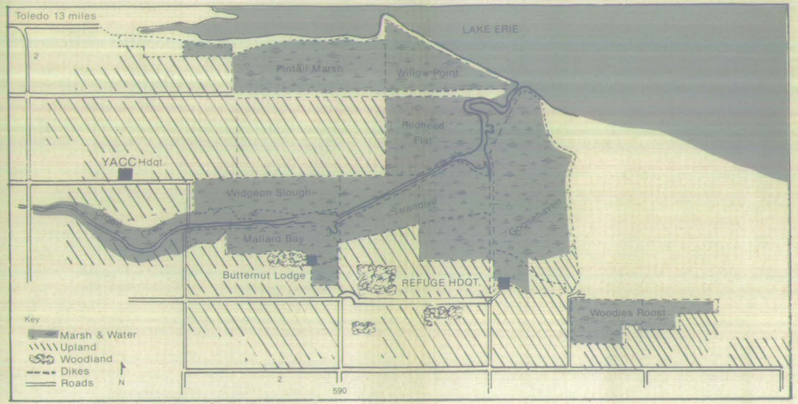
Ohio's First National Wildlife Refuge

Like an errant child, 82-acre West Sister Island sits nine miles off the north shore of Ottawa NWR. Near West Sister, Oliver Hazard Perry sent the immortal message to General William Henry Harrison after the battle of Lake Erie, September 10, 1813:

> "We have met the enemy and they are ours. Two ships, two brigs, one schooner and one sloop."

The light house was manned until 1937. In 1938, President Franklin Roosevelt declared 77 acres of West Sister to be Ohio's first national wildlife refuge.

West Sister Island NWR is a rookery for black-crowned night herons, great blue herons and great egrets. Closed to the public, the island is a priceless living laboratory. West Sister was designated a Wilderness Area in 1975.



Recreational Opportunities

The Blue Heron Trail system offers over seven miles of interpretive trails through a variety of habitats. A resident flock of Canada geese provides opportunities for year-round observation and photography. In winter, the trails are used by cross-country skiers.

The Butternut Lodge is an environmental education site available to groups. It is used annually by students from elementary age through college level. ~~In addition to the lodge, three rustic cabins are available for overnight use by such groups.~~

Leaflets, slide shows, films and speakers are available from refuge headquarters. Throughout the year, the refuge hosts a variety of workshops for the public.

Hunting and Trapping

A controlled goose hunt is held annually on the Ottawa NWR during Ohio's goose hunting season. Only Canada, snow (including blue phase)and white-fronted geese may be hunted. Hunters are chosen through a drawing held in late summer.

Limited trapping for muskrats is allowed annually on selected units of the Complex. Trappers are selected through a public drawing each fall.

Cedar Point National Wildlife Refuge

Cedar Point is a historic 2,245 acre marsh located where Maumee Bay meets Lake Erie. Cedar Point was donated to the Fish and Wildlife Service in 1965 with an estimated value of $1 million. With less than five percent of the original Lake Erie marshes remaining, Cedar Point today is truly priceless.

Unlike Ottawa, which attracts mainly Canada geese, Cedar Point is most attractive to ducks. Drawn down in spring to permit vegetation to emerge, marshes are filled in early fall. Large pools underlain with plants beckon ducks from the Mississippi and Atlantic flyways, expecially mallards and black ducks.

Human encroachment poses a constant threat to Cedar Point and other refuges located near urban areas. To maintain wildlife sanctuaries in the face of increased demands for public use is the task facing the 400 units of the National Wildlife Refuge System across America.

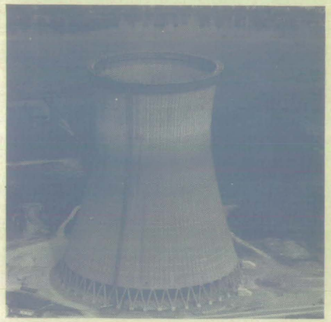
Navarre Marsh

Like the fabled Colossus of Rhodes, the 500-foot cooling tower of the Davis-Besse Nuclear Power Station dominates the skyline east of Ottawa NWR.

Navarre marsh is jointly owned by Toledo Edison and Cleveland Electric Illuminating companies. It was traded to them for Darby Marsh in 1967 by the Fish and Wildlife Service. (FWS) Wildlife management rights on 591 acres of Navarre marsh are retained by the FWS.

The cooling tower for the nuclear reactor sits on a limestone outcropping above the marsh. The marsh is watched closely for signs of radiation and thermal pollution.

Over 90 species of birds nest at Navarre. Common mammals include muskrat, raccoon, fox and mink. Marsh mallow, water lily and American lotus dot the waterways.



How to Reach Ottawa

Refuge headquarters is located on Ohio State Route #2, midway between Toledo and Port Clinten and north of the village of Oak Harbor. Office hours are 7:30 a.m. to 4:00 p.m. Monday thru Friday. For further information write Refuge Manager, Ottawa National Wildlife Refuge Complex, 14000 W. State Route #2, Oak Harbor, Ohio 43449. Phone: (419) ~~897-0214~~ 898-0014

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

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

RF-31540-1 JUNE 1991

Ottawa National Wildlife Refuge Complex

Ohio

Birds: a Checklist

The Ottawa National Wildlife Refuge (NWR) complex, located 15 miles east of Toledo, Ohio, contains remnants of a vast marsh that once bordered western Lake Erie. The complex is comprised of three wildlife refuges: Ottawa NWR, Cedar Point NWR and West Sister Island NWR.

The Ottawa complex consists of 8,316 acres of marshes, grasslands and forests that support a variety of wildlife communities. Also, the complex is an important resting and feeding area for waterfowl and other birds traveling the Mississippi and Atlantic flyways.

Dramatic flights of migratory birds may be seen at Ottawa NWR, notably the spring migration of warblers and the autumn passage of waterfowl. Ottawa is home to nesting bald eagles from February, when nesting begins, until the fledging of eaglets in July. Eagles can be observed throughout the year. Eaglets fledged from northern territories migrate through during fall in increased numbers. Federal and State management projects involve constant monitoring and banding of eaglets. Management efforts have helped increase bald eagle numbers in Northwest Ohio and provide excellent opportunities to view the bald eagle in the wild here at Ottawa.

The 274 birds listed are regular visitors to the Ottawa NWR. Another 49 have been seen only a few times on the refuge and are included in the accidental list.

Birds listed are grouped according to their taxonomic identification, first by order (solid line) and then family (dotted line). The family is a classification unit that places birds of similar body structures, feeding habits, and flight together. The order is a more inclusive category consisting of related families. Learning some of these common characteristics can help in identifying new birds.

The English or common names used and the taxonomic order are in accordance with the American Ornithologists' Union "Checklist of North American Birds", 6th Edition, (1983), 3rd Supplement (1989).

This list is designed to inform the visitor to Ottawa NWR of the chances of seeing a specific bird during a visit. The status symbols used do not reflect actual population densities but rather detectability which, in most cases, is similar.

Symbols used are as follows:

Season

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

Status

c - common: seen on 90% of visits
f - fairly common: seen on a majority (51%) of visits
u - uncommon: seen on 20-50% of visits
r - rare: seen on less that 20% of visits
x - extremely rare: seen on 5 or fewer visits since 1969
- no records
* Has nested on the refuge

Common Name	S	s	F	W
Common Loon	x	x	u	r
Pied-billed Grebe*	c	c	c	r
Horned Grebe	u	x	u	x
Red-necked Grebe	x	-	x	-
Eared Grebe	x	x	x	-
American White Pelican	x	x	x	-
Double-crested Cormorant	c	f	f	x
American Bittern*	u	r	r	x
Least Bittern*	u	r	r	-
Great Blue Heron*	c	c	c	c
Great Egret*	c	c	c	r
Snowy Egret*	f	f	f	-
Little Blue Heron*	u	u	u	-
Tricolored Heron	x	-	x	-
Cattle Egret*	r	r	u	-
Green-backed Heron*	c	c	c	-
Black-crowned Night Heron*	f	c	c	x
Yellow-crowned Night Heron	x	x	x	
Glossy Ibis	x	-	-	-
White-faced Ibis	x	-	-	-
Tundra Swan	f	-	f	f
Mute Swan	x	x	x	x
Greater White-fronted Goose	x	-	x	x
Snow(blue phase) Goose	f	x	f	f
Brant	x	-	x	-
Canada Goose*	c	c	c	c
Wood Duck*	f	f	c	u
Green-winged Teal*	f	u	c	u
American Black Duck*	c	f	c	c
Mallard*	c	c	c	c
Northern Pintail*	f	u	c	f
Blue-winged Teal*	c	c	c	x
Northern Shoveler*	c	u	c	u
Gadwall*	c	u	c	u
American Wigeon*	f	u	f	u
Canvasback	f	x	f	u
Redhead	f	x	f	x
Ring-necked Duck	f	-	f	r
Greater Scaup	x	-	x	x
Lesser Scaup	f	x	f	u
Oldsquaw	r	-	r	r
Black Scoter	x	-	x	x
Surf Scoter	-	-	x	x
White-winged Scoter	x	x	x	x
Common Goldeneye	c	-	f	f
Bufflehead	f	-	f	u
Hooded Merganser*	f	u	c	u
Common Merganser	c	-	u	f
Red-breasted Merganser	c	x	f	u
Ruddy Duck*	c	u	c	u
Turkey Vulture*	f	u	x	-
Osprey	u	x	x	x
Bald Eagle*	c	c	c	c
Northern Harrier	f	r	f	f

Common Name	S	s	F	W
Sharp-shinned Hawk	f	x	u	x
Cooper's Hawk*	f	x	r	u
Red-shouldered Hawk*	u	x	x	x
Broad-winged Hawk	u	x	x	-
Swainson's Hawk	-	x	x	-
Red-tailed Hawk*	c	c	c	c
Rough-legged Hawk	f	-	r	f
Golden Eagle	x	x	x	-
American Kestrel*	f	u	f	f
Merlin	r	x	x	-
Peregrine Falcon	r	x	r	-
Gyrfalcon	x	-	x	x
Ring-necked Pheasant*	f	f	f	f
Northern Bobwhite	x	x	x	-
King Rail*	r	x	x	x
Virginia Rail*	u	r	r	x
Sora*	c	u	u	-
Common Moorhen*	u	u	u	x
American Coot*	c	f	c	u
Sandhill Crane	r	-	x	-
Black-bellied Plover	c	u	f	x
Lesser Golden-Plover	f	x	f	-
Semipalmated Plover	c	u	f	-
Piping Plover	x	-	x	-
Killdeer*	c	c	c	u
American Avocet	-	x	r	-
Greater Yellowlegs	c	u	c	x
Lesser Yellowlegs	c	u	c	-
Solitary Sandpiper	c	u	f	-
Willet	x	x	r	-
Spotted Sandpiper*	c	c	c	-
Upland Sandpiper*	u	r	r	-
Whimbrel	x	x	x	-
Hudsonian Godwit	x	x	u	-
Marbled Godwit	x	x	r	-
Ruddy Turnstone	u	u	u	-
Red Knot	x	x	u	-
Sanderling	r	x	f	x
Semipalmated Sandpiper	f	u	c	-
Western Sandpiper	r	x	u	-
Least Sandpiper	f	f	f	x
White-rumped Sandpiper	u	r	u	-
Baird's Sandpiper	x	-	u	-
Pectoral Sandpiper	f	u	c	-
Dunlin	f	u	c	r
Stilt Sandpiper	x	r	f	-
Buff-breasted Sandpiper	-	-	r	-
Ruff	x	x	x	-
Short-billed Dowitcher	f	u	c	-
Long-billed Dowitcher	x	x	f	-
Common Snipe*	c	x	f	r
American Woodcock*	u	r	u	-
Wilson's Phalarope*	r	r	u	-
Red-necked Phalarope	x	-	r	-

Common Name	S	s	F	W
Red Phalarope	-	-	x	x
Franklin's Gull	x	x	r	-
Bonaparte's Gull	f	x	c	f
Ring-billed Gull*	c	c	c	f
Herring Gull*	c	c	c	f
Iceland Gull	x	x	-	-
Glaucous Gull	x	-	-	x
Great Black-backed Gull	f	u	c	f
Caspian Tern	f	u	c	-
Common Tern*	f	f	c	x
Forster's Tern	f	u	c	-
Black Tern*	u	r	u	-
Rock Dove*	f	f	f	u
Mourning Dove*	c	c	c	c
Black-billed Cuckoo*	u	u	u	-
Yellow-billed Cuckoo*	f	c	c	-
Barn Owl*	x	x	-	-
Eastern Screech-Owl*	u	r	u	u
Great Horned Owl*	c	f	f	c
Snowy Owl	x	-	x	x
Long-eared Owl	u	-	-	x
Short-eared Owl	r	-	-	r
Northern Saw-whet Owl	u	-	x	x
Common Nighthawk*	u	-	u	-
Whip-poor-will	u	-	x	-
Chimney Swift*	f	u	f	-
Ruby-throated Hummingbird*	u	u	f	-
Belted Kingfisher*	f	u	f	r
Red-headed Woodpecker*	f	u	f	u
Red-bellied Woodpecker*	u	x	r	f
Yellow-bellied Sapsucker	f	-	c	x
Downy Woodpecker*	c	f	c	c
Hairy Woodpecker*	u	x	u	u
Northern Flicker*	c	c	c	u
Olive-sided Flycatcher	u	x	u	-
Eastern Wood-Pewee*	c	c	c	-
Yellow-bellied Flycatcher	u	u	u	-
Acadian Flycatcher*	u	r	x	-
Willow Flycatcher*	f	c	u	-
Least Flycatcher	c	u	f	-
Eastern Phoebe*	c	r	f	-
Great Crested Flycatcher*	c	f	u	-
Eastern Kingbird*	c	c	c	-
Horned Lark*	c	f	u	f
Purple Martin*	c	c	c	-
Tree Swallow*	c	c	c	x
Northern Rough-winged Swallow*	f	u	u	-
Bank Swallow*	f	u	f	-
Cliff Swallow*	u	x	u	-
Barn Swallow*	c	c	c	-
Blue Jay*	c	c	c	c
American Crow*	f	r	u	u
Black-capped Chickadee*	u	x	r	r
Tufted Titmouse*	f	u	u	f

Common Name	S	s	F	W
Red-breasted Nuthatch	u	-	u	x
White-breasted Nuthatch*	u	u	f	f
Brown creeper	f	-	c	f
Carolina Wren*	x	x	x	x
House Wren*	c	c	c	-
Winter Wren	f	-	c	u
Sedge Wren*	x	x	x	-
Marsh Wren*	f	f	f	r
Golden-crowned Kinglet	c	-	c	u
Ruby-crowned Kinglet	c	-	c	x
Blue-gray Gnatcatcher	c	u	x	-
Eastern Bluebird*	u	x	x	-
Veery	f	x	u	-
Gray-cheeked Thrush	f	x	f	-
Swainson's Thrush	c	r	c	-
Hermit Thrush	f	-	f	x
Wood Thrush*	c	c	x	-
American Robin*	c	c	c	f
Gray Catbird*	c	c	c	x
Northern Mockingbird*	r	x	r	u
Brown Thrasher*	c	f	f	x
American Pipit	f	-	u	x
Cedar Waxwing*	f	f	f	r
Northern Shrike	x	-	x	r
Loggerhead Shrike	r	-	x	x
European Starling*	c	c	c	c
White-eyed Vireo*	f	x	x	-
Solitary Vireo	f	x	u	-
Yellow-throated Vireo*	f	-	x	-
Warbling Vireo*	c	c	c	-
Philadelphia Vireo	f	x	f	-
Red-eyed Vireo*	c	c	c	-
Blue-winged Warbler	f	-	x	-
Golden-winged Warbler	u	-	x	-
Tennessee Warbler	c	x	f	-
Orange-crowned Warbler	u	-	x	x
Nashville Warbler	c	-	f	-
Northern Parula	u	-	x	-
Yellow Warbler*	c	c	c	-
Chestnut-sided Warbler	f	x	u	-
Magnolia Warbler	c	x	f	-
Cape May Warbler	c	-	c	-
Black-throated Blue Warbler	c	x	u	-
Yellow-rumped Warbler	c	x	c	x
Black-throated Green Warbler	c	x	f	-
Blackburnian Warbler	f	x	u	-
Yellow-throated Warbler	x	-	-	-
Pine Warbler	x	-	x	-
Kirtland's Warbler	x	-	-	-
Prairie Warbler	x	-	x	-
Palm Warbler	c	-	f	-
Bay-breasted Warbler	c	x	f	-
Blackpoll Warbler	c	r	f	-
Cerulean Warbler	u	-	-	-

Common Name	S	s	F	W
Black-and-white Warbler	c	x	f	-
American Redstart*	c	f	f	-
Prothonotary Warbler*	f	f	u	-
Worm-eating Warbler	x	-	-	-
Ovenbird*	f	x	u	-
Northern Waterthrush	f	x	u	x
Louisiana Waterthrush	x	-	x	-
Kentucky Warbler	x	x	x	-
Connecticut Warbler	u	x	x	-
Mourning Warbler	f	r	x	-
Common Yellowthroat*	c	c	f	r
Hooded Warbler	r	-	x	-
Wilson's Warbler	c	r	f	-
Canada Warbler	c	r	f	-
Yellow-breasted Chat*	u	r	-	-
Summer Tanager	x	-	-	-
Scarlet Tanager*	c	r	u	-
Northern Cardinal*	c	c	c	c
Rose-breasted Grosbeak*	c	u	u	-
Indigo Bunting*	c	c	c	-
Dickcissel*	x	x	f	-
Rufous-sided Towhee*	c	u	u	r
American Tree Sparrow	c	-	c	c
Chipping Sparrow*	f	r	u	-
Field Sparrow*	c	c	c	x
Vesper Sparrow*	f	u	r	-
Savannah Sparrow*	f	f	u	x
Grasshopper Sparrow*	r	u	x	-
Henslow's Sparrow	x	-	x	-
Sharp-tailed Sparrow	x	-	x	-
Fox Sparrow	c	-	c	-
Song Sparrow*	c	c	c	c
Lincoln's Sparrow	f	x	f	-
Swamp Sparrow*	c	u	f	c
White-throated Sparrow	c	-	c	u
White-crowned Sparrow	c	x	f	f
Dark-eyed Junco	c	-	c	f
Lapland Longspur	x	-	x	r
Snow Bunting	u	-	f	f
Bobolink*	f	f	f	-
Red-winged Blackbird*	c	c	c	c
Eastern Meadowlark*	f	f	f	u
Western Meadowlark	r	x	-	-
Yellow-headed Blackbird*	u	x	x	x
Rusty Blackbird	f	x	f	u
Brewer's Blackbird	x	-	x	x
Common Grackle*	c	c	c	u
Brown-headed Cowbird*	f	c	f	u
Orchard Oriole*	f	f	u	-
Northern Oriole*	c	c	f	-
Purple Finch	f	-	r	x
House Finch*	r	x	u	u
Common Redpoll	u	-	x	r
Pine Siskin	u	-	x	r

Common Name	S	s	F	W
American Goldfinch*	c	c	c	c
Evening Grosbeak	r	-	x	x
House Sparrow*	c	c	c	c

Accidentals

Red-throated Loon	Gannet	Wood Stork
American Flamingo	Ross Goose	Ruddy Shelduck
Fulvous Whistling Duck	Trumpeter Swan	Cinnamon Teal
Eurasian Wigeon	Harlequin Duck	Bohemian Waxwing
Barrow's Goldeneye	King Eider	Yellow Rail
Black Rail	Wilson's Plover	Purple Sandpiper
Black-necked Stilt	Pomarine Jaeger	Long-tailed Jaeger
Great Skua	Little Gull	Lesser Black-backed Gull
Black-legged Kittiwake	Least Tern	Groove-billed Ani
Barred Owl	Western Kingbird	Harris' Sparrow
Black-billed Magpie	Boreal Chickadee	Bewick's Wren
Townsend's Solitaire	Muscovy	Townsend's Warbler
Black-headed Grosbeak	Blue Grosbeak	Pine Grosbeak
Hoary Redpoll	Red Crossbill	White-winged Crossbill
Oregon Junco	Lark Sparrow	Bachman's Sparrow
Clay-colored Sparrow	Black-chinned Sparrow	
Smith's Longspur	Common Black-headed Gull	

Notes

Date_____ No. Species_____

Time Afield_____

Observers_____

_____

Weather_____

Remarks_____

_____

_____

_____

_____

For further information contact:
Refuge Manager
Ottawa National Wildlife Refuge
14000 West State Route 2
Oak Harbor, Ohio 43449
(419) 898-0014

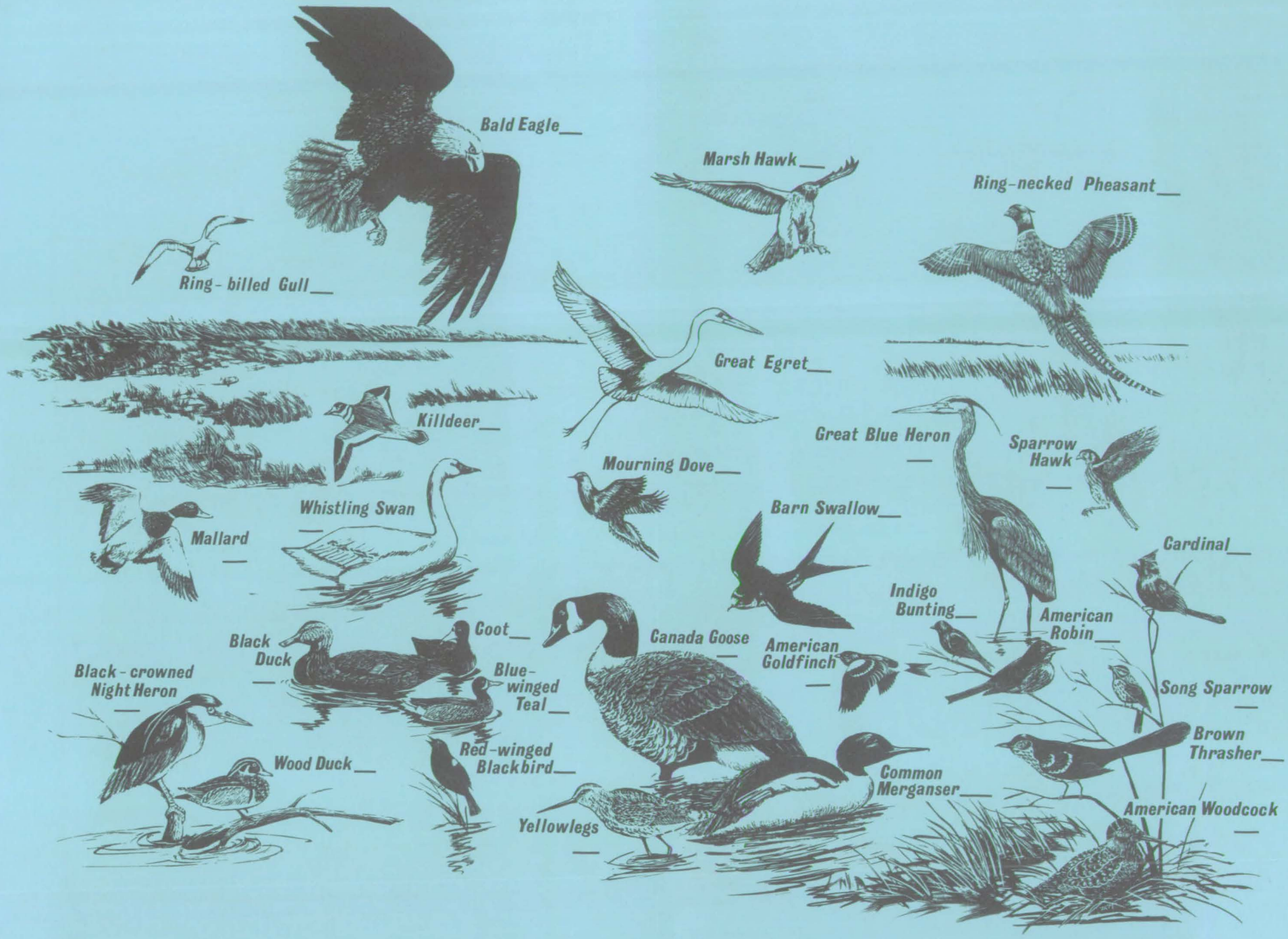
RF-31540

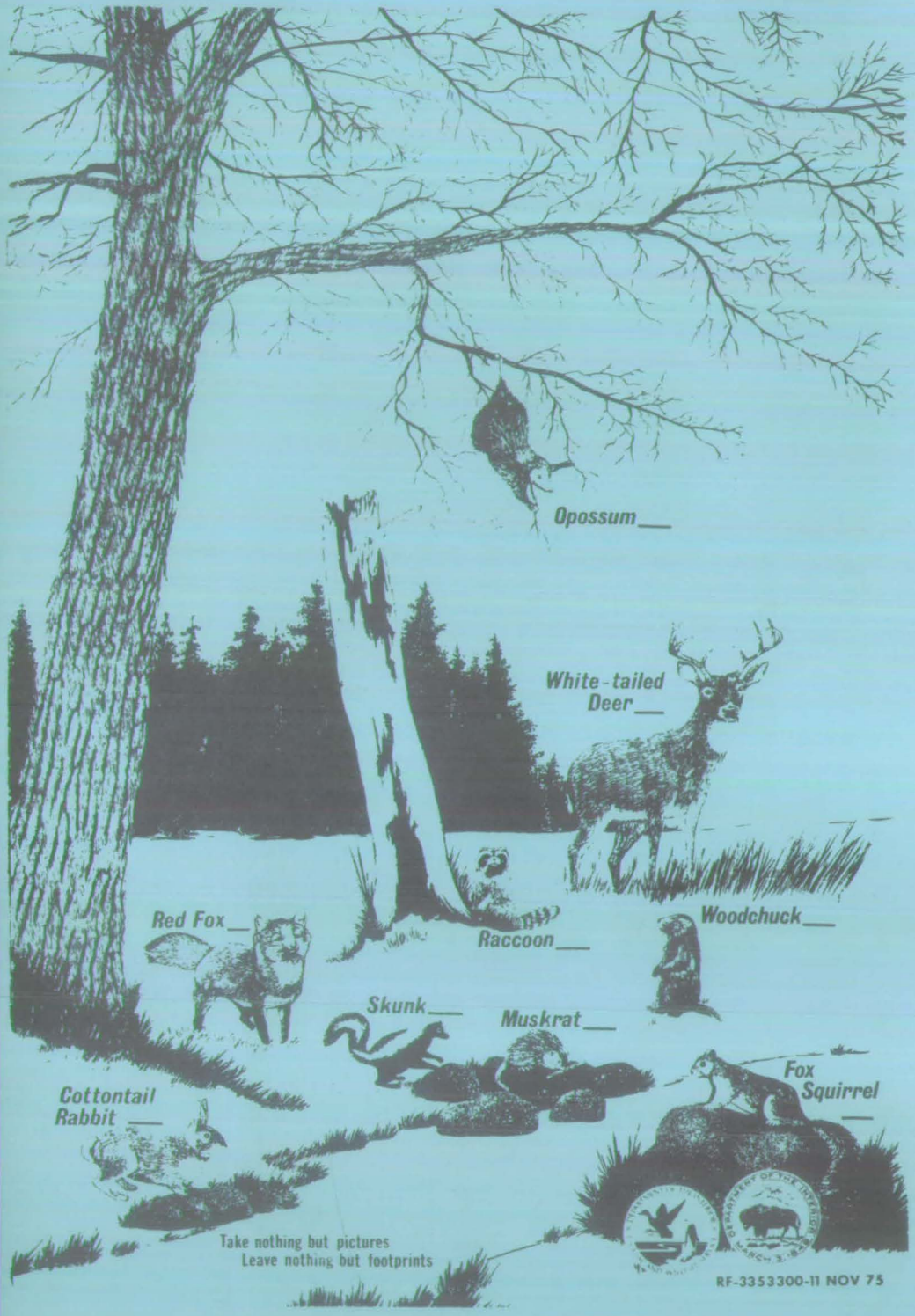
Sept 1991

Birds

Ottawa National Wildlife Refuge Complex

Ohio


Bald Eagle
Marsh Hawk
Ring-necked Pheasant
Ring-billed Gull
Great Egret
Killdeer
Great Blue Heron
Sparrow Hawk
Mourning Dove
Whistling Swan
Barn Swallow
Mallard
Cardinal
Indigo Bunting
American Robin
Coot
Canada Goose
Black Duck
American Goldfinch
Black-crowned Night Heron
Blue-winged Teal
Song Sparrow
Brown Thrasher
Red-winged Blackbird
Wood Duck
Common Merganser
Yellowlegs
American Woodcock

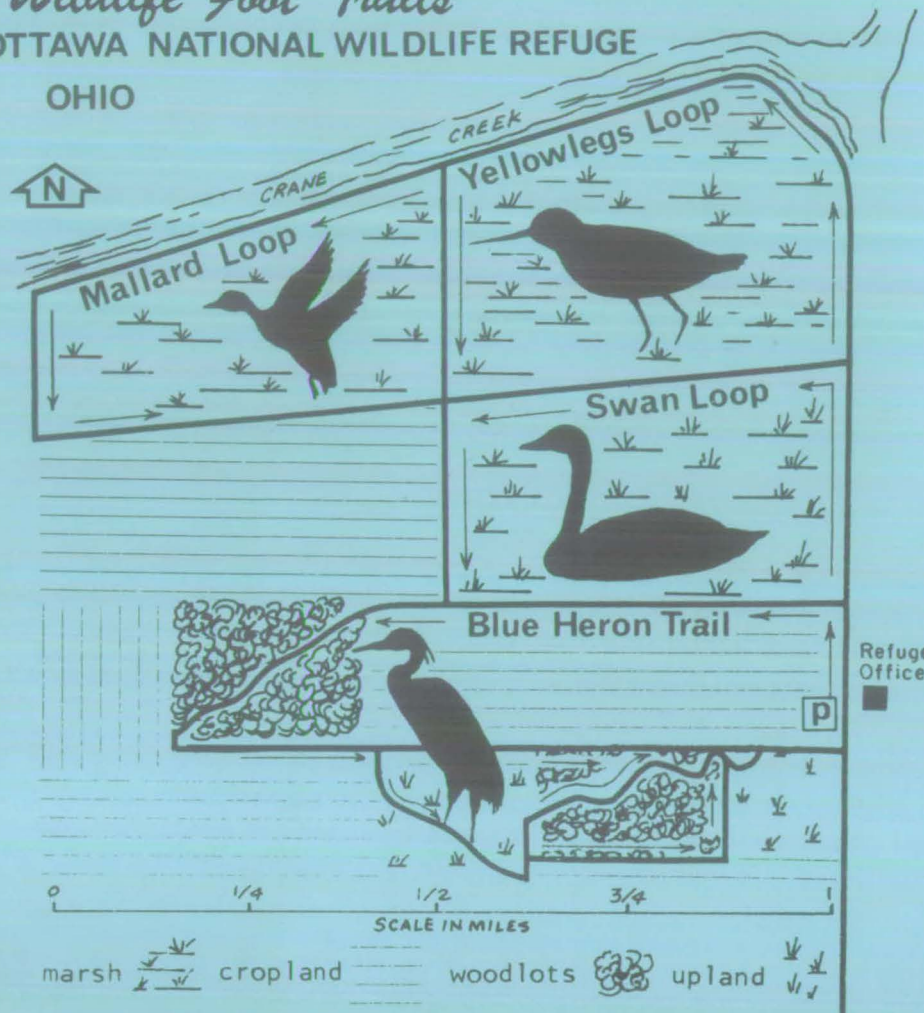


RF-3353300-11 NOV 75

Wildlife Foot Trails

OTTAWA NATIONAL WILDLIFE REFUGE

OHIO



These wildlife trails are open from sunrise to sunset throughout the year for you to walk and observe wildlife. Colored signs mark each trail route: Blue Heron Trail is blue, Swan Loop is white, Yellowlegs Loop is yellow and Mallard Loop is green. For your safety, access is limited to these trails only. For additional information contact: Refuge Manager, Ottawa National Wildlife Refuge, 14000 West State Route 2, Oak Harbor, Ohio 43449. Phone (419) 898-0014.

STATE ROUTE 2

← Toledo, 15 miles - Port Clinton, 18 miles →