OTTAWA NATIONAL WILDLIFE REFUGE COMPLEX

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

Oak Harbor, Ohio

ANNUAL NARRATIVE REPORT

Calendar Year 2002

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Coyotes are common residents on the refuge. Although usually very skittish, this individual was feeling very comfortable having Wildlife Biologist Ron Huffman take her picture.

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.

Before European settlers, the location of Ottawa NWR was part of a 300,000 acre area called the Great Black Swamp. In 1794 the last Native Americans, known as the Ottawas, were forced to flee the area. This allowed the settlers to move in and drain most of the swamp for farming and to provide pasture for livestock. Fortunately, in July 1961 with land acquired under the authority of the Migratory Bird Conservation Act, the Ottawa Division was established to preserve a portion of the remaining Lake Erie marshes. Soon after, Cedar Point was donated to the Service and accepted by the Department of Interior in December 1964.

Darby consists of 640 acres of wetland impoundments managed for migratory waterfowl and other wetland dependent species. 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. Navarre is 591 acres consisting of marsh and valuable beach-ridge habitat heavily used by migrating songbirds and nesting bald eagles.

West Sister Island was established as a refuge in August 1938 by Presidential Order. Located 9 miles out in Lake Erie, the island is designated as a wilderness area and is the site of the largest colonial nesting wading bird colony in the U.S. Great Lakes chain.

The total refuge acreage collectively is nearly 9,000 acres. It is made up of: marshes, open water, wooded wetlands, coastal wetlands, shrub lands, grasslands, cropland, and an estuary. The refuge is intensely managed through a system of dikes, ditches, pumps, and valves to manage water levels. The refuge is highly used by: migrating waterfowl, wading birds, shorebirds, rails, terns, gulls, neotropical migrant songbirds, various raptors including bald eagles and numerous mammals such as white-tailed deer. Crane Creek estuary on the refuge is one of the few remaining open systems to Lake Erie and it provides valuable habitat for spawning fish and native mollusk species.

The cities of Toledo, Detroit, and Ann Arbor are within a 2 hour drive of Ottawa National Wildlife Refuge (NWR). Cleveland, Akron, Columbus, and Dayton are between 2 to 3 hours driving distance. The refuge receives hundreds of thousands of visitors per year who primarily visit the refuge for bird watching and wildlife observation on our 7 miles of hiking trails.

HIGHLIGHTS

- Ottawa NWR was a focus refuge for the National Wildlife Refuge System Centennial (see **7a. Visitor Services**).

- Refuge visitation totaled 126,669 (see **7a. Visitor Services**).

- Private lands restored 26 wetland sites for 98.5 acres, 21 grassland sites for 250 acres, and 7 riparian sites for 20.1 acres (see **5a. Interagency coordination**).

- Adam Grimm unveiled an Ottawa NWR painting available as a poster or print in honor of the Refuge System Centennial (see **7a. Visitor Services).**

Ottawa National Wildlife Refuge
by Adam Grimm

CLIMATE

Table 1. Annual Precipitation and Temperature, CY-2002

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ambient Temp.												
Max (F)	59.0	58.4	68.5	84.0	88.1	88.08	92.7	90.8	89.2	82.9	66.2	53.4
Min (F)	15.8	16.1	6.74	30.8	36.2	54.4	63.8	60.3	46.5	32.8	22.7	8.1
Ave Temp	33.5	33.6	50.4	50.4	55.2	70.7	76.3	74.6	68.5	52.2	40.0	29.9
Precipitation												
Total (inches)	3.45	1.38	2.63	4.59	3.77	1.52	2.88	2.49	1.21	1.62	1.89	1.83

An official National Weather Service station is located at the refuge headquarters and is monitored for precipitation and temperature. The temperature gauge stopped functioning so the monthly temperatures were obtained from Davis-Besse Nuclear Power Plant located on the Navarre Division of the refuge.

The yearly average ambient temperature for 2002 was 51.29°F. Total precipitation for the year was 29.26 inches. It is likely that precipitation totals recorded in colder months are somewhat less than actual due to snow/sleet blowing across the collection unit rather than accumulating in the gauge.

1. MONITORING AND STUDIES

1a. Surveys and Censuses:

Bird Censuses

The Toledo Naturalist Association began its first year of conducting a bird census at Cedar Point NWR. Census information was collected bimonthly from the middle of March through December, with the months of May, June, August, November, and December surveyed only once. Point count data collection totaled 17 days with 194 species recorded. The most individuals recorded in the spring occurred on April 14th with 23,018 birds and for the fall on September 28th with 31,485 birds.

Waterfowl

The Ottawa NWR Complex is primarily a stopover for migratory waterfowl in both spring and fall. However, the refuge maintains a small population of ducks (mainly mergansers, mallards, scaup and black ducks) and a few thousand Canada geese throughout the winter. Waterfowl numbers peak in the fall with large concentrations of dabblers, mallards, and black ducks. Throughout the months of September through April, two aerial counts per month are conducted by the Ohio Division of Wildlife. Waterfowl data presented below is based on these surveys.

A total of 2.14 million duck use days and over 618 thousand goose use days were recorded in 2002.

Table 2. Selected Waterfowl Populations on Ottawa NWR Complex during migration and over winter, 2002.

SPECIES	AVERAGE POP.[1]	PEAK POP.[1]	USE DAYS[1]
Mallard	4863	19125	1181797
Black Duck	642	3175	156050
Gadwall	966	2710	234826
Pintail	205	975	49705
Green-winged Teal	939	4700	228199
Blue-winged Teal	41	365	9941
Wigeon	669	3730	162479
Shoveler	31	145	7511
Wood Duck	3	30	663
Scaup	5	50	1105
Merganser	103	690	25073

Table 2. continued

SPECIES	AVERAGE POP.[1]	PEAK POP.[1]	USE DAYS[1]
Ruddy duck	11	125	2761
Ringneck	334	1530	81074

[1] Calculated over 7 months.

Snow geese

Canada Goose

Canada goose collar surveys are conducted annually by the Ohio Division of Wildlife. Surveys are conducted from September through early April. Many of the primary observation areas are located on the Ottawa NWR Complex. Surveys are designed to track the relative proportions of various Canada goose populations. Most collar observations are from locally banded giant Canada geese populations. Frequently these geese are permanent residents. The other geese frequently observed are from the Southern James Bay population (SJBP) geese. These geese migrate to the area, with peak numbers occurring from November through February. Table 2 shows the observations for Lucas and Ottawa counties.

Table 3. Canada goose collar observations, 2002.

County	Geese examined	Local giant collars	SJBP collars
Lucas	14,442	95	82
Ottawa	26,874	304	223

Passerine/Neotropical Migrants

Neotropical and other passerine migrants are monitored each spring and fall through a combination of point counts and mist net stations located on two units of the refuge. The data is collected by Black Swamp Bird Observatory (BSBO), a local conservation

organization that receives funding through Challenge Cost Share grants and local support. BSBO also operates a Monitoring Avian Productivity and Survivorship (MAPS) site which is located on the Navarre Division of Ottawa NWR. See **Studies and Investigations** for more details.

Immature Bald Eagle on muskrat hut

Bald Eagle

The 2002 nesting season was excellent for Ohio eagles. There were 79 nests in the state, producing a record 107 young. Ottawa NWR Complex had a total of 5 active bald eagle nests, with 2 out of 5 nests producing young (Table 3).

Table 4. Bald eagle nests on Ottawa NWR complex: CY 2002

Location	Nest	Incubation initiation	Estimated hatch date	# Young fledged
Ottawa NWR	Butternut	3/4/02	4/8/02	0
Ottawa NWR	Ottawa	Did not start, nest collapsed		0
Ottawa NWR	Magee Marsh	Did not start		0
Navarre Marsh Unit	Davis Bessie	3/8/02	4/12/03	3
Cedar Point NWR	Cedar Point	2/22/02	3/29/03	3

Woodcock surveys

A woodcock survey route was established in 1999 on Ottawa. There are 13 count stations along the route spaced 0.4 miles apart. The 2002 survey was completed on May 3rd and recorded 13 peenting woodcock. Twenty-two peenting woodcock were recorded in 2001 survey.

Amphibian Surveys

Amphibian night-call surveys are conducted each spring on Cedar Point NWR, Ottawa NWR, Darby Division of Ottawa NWR, and Crane Creek on Ottawa NWR to determine species richness and relative abundance of each species. The survey is done following the Marsh Monitoring Program protocol.

Photo by © Sharon Cummings Bull frog

The three most numerous species on Ottawa include bullfrogs, green frogs and northern leopard frogs. Species and peak survey number from 3 surveys were determined for each site and presented in Table 5. However, Crane Creek and Darby were only surveyed twice during the field season.

Table 5. Amphibian Call Surveys 2002 – Species Richness and Peak survey number.

	Cedar Point East	**Cedar Point West**	**Ottawa Hiking Trails**	**Ottawa Pool 1**	**Darby**	**Crane Creek**
Species Richness	5	5	7	5	3	4
Wood Frog	3	2	6			
American Toad	2			1		
Chorus Frog		3	full chorus			
Spring Peeper	2	full chorus		7	1	4
Bull Frog	2	3	full chorus	8	full chorus	3
Northern Leopard Frog			2	8		7
Green Frog	3	3	full chorus	11	13	4
Fowlers Toad			1			

Marsh Birds

Marsh birds are surveyed using protocols of the ODOW for the Ohio Breeding Bird Survey. For general marsh bird counts, evening surveys are conducted by volunteers following the protocol of the Long Point Bird Observatory in Canada. Both protocols require the use of taped calls but each differs by the amount of time spent at each station, the extent and layout of survey routes and the selection of morning versus evening surveys. Virginia rails, soras and moorhens are abundant throughout the refuge complex. Least and American bitterns are found in a few units of the refuge each year.

Muskrat

Muskrats are important management tools of wetlands, since they help to maintain open water in otherwise dense vegetation. However, they also cause losses of time, money and habitat when they burrow into dikes and roadways. Therefore, muskrat numbers are monitored through hut survey counts. Hut numbers fluctuate greatly from year to year depending on water management within the units. Excess muskrats are controlled through a refuge trapping program that allows local trappers to bid on open units. See **4e. Native Predator/Pest** Animal Control

White-tailed Deer

Pre-harvest deer spotlight surveys were conducted during November, 2002. Spotlight surveys followed methods provided by Tim Menard, Wildlife Biologist, Flint Hills NWR, Kansas. The method uses set survey routes. The route is traveled by vehicle one time during the day; visible survey distance is estimated at right angles to each side of the vehicle every 0.1 miles. A rangefinder is used to estimate visible distance. Maximum survey distance was set at 400 yards, as tests with the spotlight indicated this was the maximum distance at which deer could be observed. Data is entered into an Excel worksheet that calculates estimated acres of visibility for the spotlight survey. The survey route is 10.7 miles long (Figure 1). The route was modified from previous years due to construction on the MS-8B dike. Estimated survey area in 2002 was 1053 acres (Appendix 1). Estimated survey acres and spotlight surveys were conducted after vegetation leaf off to maximize deer visibility.

Spotlight surveys are conducted at night, starting approximately ½ hour after sunset. Deer survey data are entered into an Excel worksheet that extrapolates observed deer to the total expected deer population for the entire refuge. Four surveys were conducted during November, 2002. Deer observed are recorded into 4 categories: bucks, does, fawns, and unknown. Most deer are observed at a distance, from eye reflections from the spotlight. Since these deer cannot generally be identified, most deer are placed in the unknown category. Also, the late timing of surveys makes it difficult to distinguish between fawns and does.

For the 2002 pre-hunt survey, the number of deer observed per square mile ranged from 35.3 to 43.8, with and average of 36.8 (Table 2). Using a total area for the Refuge of 4,677 acres, this extrapolates to a total deer population of 269. The first 3 surveys produced a remarkably consistent population estimate. A higher estimate during the 4th survey is likely the result of weather conditions, on a night while a storm was coming in, and deer activity was very high.

Table 6. Pre-harvest deer spotlight survey results, Ottawa NWR, November 2002.

Survey Date	Deer Observed					Estimated Population	Deer/square mile
	Bucks	Does	Fawns	Unknown	Total		
12-Nov	3	24	4	27	58	258	35.3
13-Nov	4	15	7	32	58	258	35.3
18-Nov	7	7	2	38	54	240	32.8
21-Nov	3	16	3	50	72	320	43.8
Average	4.25	15.5	4	36.75	60.5	269	36.8

Estimated doe to buck ratio is 3.6:1. While the estimate is based on a fairly small sample size, it indicates an unbalanced sex structure in the herd. A herd with a balanced sex ratio is desirable because it is easier to control population numbers.

Surveys are planned for the post-hunt period in January, 2003. These surveys will be done after deer activity has returned to normal. Another set of surveys is planned for the spring, after fawns are born, to estimate productivity. During the testing phase for the new survey method, each survey (pre-hunt, post-hunt, and spring fawn) will have 4 replicates when possible. Variability between replicate surveys will be used to determine if the number of replicates should be changed. Estimated visible area surveys will be conducted annually to account for habitat-caused visibility differences over time

Shorebird Surveys

Spring shorebird migration peaks in early May with birds remaining in the area for only a short duration. In contrast, the fall migration tends to have a smaller number of birds but lasts for a longer period of time. Some refuge water impoundments are drawn down during the spring providing optimum habitat. The Black Swamp Bird Observatory is in its seventh year of data collection in an effort to relate shorebird use and needs to water management regimes on the refuge. The study is expected to provide valuable information to aid management. See **Studies and Investigations** for more information.

Water Birds

Ottawa and Cedar Point Refuges provide vital feeding areas for a colony of great blue herons, great egrets, and black-crowned night herons nesting on West Sister Island NWR. West Sister Island NWR is located on southwest Lake Erie, approximately 9 miles off shore from Ottawa NWR. The island colony contains approximately 5,000 nests and is the largest heron/egret rookery in United States waters of the Great Lakes. Studies have shown that these water birds will fly 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 mudflats created by Lake Erie wind tides. Species found less commonly in the area include little blue herons and snowy and cattle egrets. See **Studies and Investigations** for more information.

1b. Studies and Investigations

▫The refuge received the final reports in 2002 on the following studies:

Ottawa WMS46 - "Migrational Survey and Habitat Usage of Shorebirds in the Lake Erie Marsh Region" - *Julie Shieldcastle, Black Swamp Bird Observatory.*

Objectives for this study are: 1) to survey populations of shorebirds along the southwestern coast of Lake Erie during spring and fall migrations; 2) to explore 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 fulfill requirements for site identification of the Western Hemisphere Shorebird Reserve Network (WHSRN).

BSBO compiled data from the first 5 field seasons of this study for submission of the Western basin Lake Erie marsh as a WHSRN site. In September 2000, the Western basin marshes of Lake Erie were designated a WHSRN site of Regional importance.

The 2002 field season was the 8th full year of data collection for shorebird migration.
A total of 25 species were recorded on Ottawa Refuge with dunlin (55,731), semipalmated sandpiper (9,658), killdeer (4,991), lesser yellowlegs (4,652), and pectoral sandpiper (3,510) being the top five recorded for the entire year . Individuals of all shorebird species counted during spring migration totaled 32,007; fall migration (July-December) totaled 54,629 individuals.

Spotted sandpiper
Photo by © Sharon Cummings

Ottawa WMS – Migratory Shorebird Habitat Use and Availabiltiy in the Southwest Lake Erie Marsh Region. *Tara VanWyck, The Ohio State University.*
The objectives of this study are 1) Compare shorebird use of wetland habitats within agricultural, managed marsh, and lake-affected areas 2) Compare water regimes, vegetation, substrate organic matter, and invertebrate abundance of wetland habitats within agricultural, managed marsh, and lake-affected areas 3) Relate trends of shorebird use within habitat types to habitat suitability in agricultural, managed marsh, and lake affected areas 4) Monitor changes in shorebird habitat use of and habitat suitability under diverse weather conditions and lake-level fluctuations 5) Provide management recommendations for wetland conservation strategies and techniques to better manage existing wetland habitats for shorebirds in the southwest Lake Erie region.

The study area included Ottawa NWR, Magee Marsh Wildlife Area, and Winous Point Marsh Conservancy. Ninety plots were randomly selected across all study sites. Plots were surveyed every seven days for spring and fall migrations. All shorebirds were counted in each plot using binoculars and a spotting scope from a distance. Surveys were conducted by walking through plots with thick vegetation that impairs visibility. Birds that were flushed were added to the count. Soil samples were also taken to determine organic matter content and macro-invertebrate abundance. One spring and fall shorebird census was completed and three sets of soil samples were collected. However, soil sample analysis has not been completed.

Spring season, late April to early June, was characterized by unseasonably cold temperatures and high precipitation. Data collected during the 7-week spring census indicate that shorebird use was highest in managed marshes and lowest in agricultural plots.

Use days represent days in which shorebirds were observed within plots. Within managed marshes highest use was recorded in early drawdown units for spring (25 use days) and in hemi-marshes for fall (59 use days). Little to no use was observed in deep marshes where water levels are too deep for shorebirds. Late drawdowns occurred after most birds had migrated through for spring, but were used consistently in fall.

The 17-week fall census was characterized by draught conditions, which rendered nearly all of the agricultural wetlands unavailable. However the drying conditions may have provided more habitat in managed marsh and lake-affected wetlands. Highest use per observed days was recorded in drawn-down marshes and coastal wetlands. Due to evaporation and low precipitation, extensive mud flats occurred in the large estuaries (Crane Creek, South Creek, and Muddy Creek).

These are only preliminary results. This study is expected to continue in 2003 when at the end of the field season a final report will be done.

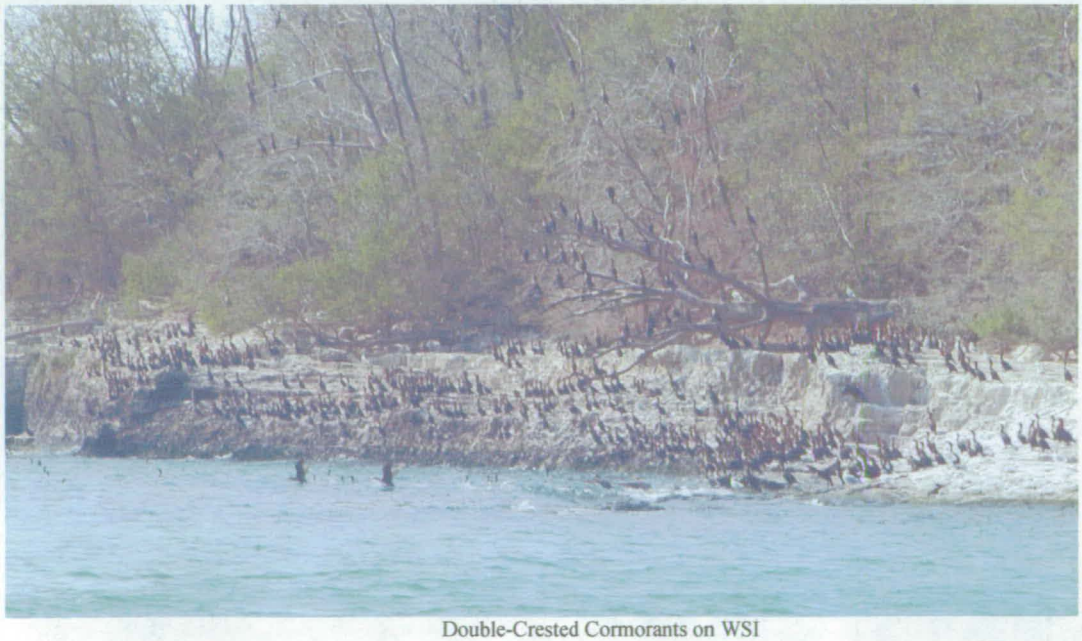
American Avocet

Ottawa WMS28 - "Movement and Habitat Use of Black-Crowned Night Herons of West Sister Island Rookery" - *Mark Shieldcastle, Ohio Division of Wildlife.*
This survey monitors the nesting habitat use and population status of various colonial nesting birds on West Sister Island. Annual nest counts are conducted between June and July to count active nests (15% of island). The number of breeding birds by species are then estimated by extrapolation. Double-crested cormorant numbers continue to increase, while numbers of great blue herons and great egrets are currently stable.

Table 7. West Sister Island Breeding Pair Information 1993 - 2002

Species	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Great Blue Heron	2393	1591	1380	1225	920	1160	1107	1180	906	1007
Great Egret	742	1036	1120	687	705	807	840	840	640	733
B.C. Night Heron	746	726	560	500	480	467	387	453	427	393
Double-Crested Cormorant	307	580	1480	1467	1380	1513	2073	2200	2607	2787
Snowy Egret	8	10	10	10	13	10	13	14	13	13

Presently there are 3 concerns confronting colonial waders on the island. Two of them addressed by this study are habitat loss and habitat degradation from double-crested cormorant fecal deposition. Habitat loss, due to canopy height increase, continues to pressure black-crowned night-herons compressing them toward the western end of the island. It was decided that hand cutting trees would encourage shrubby regrowth of the vegetation and may allow expansion of night heron nesting. A goal of 5 acres over 5 years is to be cut. About a half acre was cut in 2002. This was the first year the night herons responded to our efforts at cutting. There was excellent nesting use in the trunk-sprouted hackberry trees. The second concern involves habitat degradation from white wash by cormorants nesting and roosting in the same areas. Highly acidic guano produced by cormorants degrade lower shrubs and under story. At the present time, there is no clear cut solution to the cormorant issue. A third concern involving contaminants found in herring gull chicks is being investigated.



Double-Crested Cormorants on WSI

Ottawa WMS - Response of Native Turtles in the Ottawa National Wildlife Refuge.
Kerry McKenna, Daryl Moorhead, University of Toledo.

This project examined abundance and distribution of native species of turtle (*Emidoidea blandingii* (Blanding's turtle), *Chrysemys picta* (Painted turtle), *Graptemys geographica* (Map turtle), *Chelydra serpentine* (Snapping turtle), in the Ottawa National Wildlife Refuge. This study was proposed in response to the emerging threat posed by the introduction of an exotic turtle, the red-eared slider (*Trachemys scripta elegans*), into the western basin of Lake Erie. Newly published range maps indicate that *Trachemys* has been expanding its range in the Lake Erie basin. Moreover, preliminary studies indicated a significant effect of *Trachemys* on native species in laboratory experiments. For these reasons it is timely to determine the distributions and abundance of native species before the invader establishes significant populations in the area.

In summer 2002, populations of native species were enumerated and preliminary distributions identified in the Ottawa NWR. This study represented one of the first bio-survey and bio-monitoring programs of this kind in the region. We tested new trapping methods, determined appropriate trapping locations, and evaluated the duration of effective trapping season. The resulting data will serve as a baseline for preparing a field study plan for summer 2003.

A total of 171 turtles were captured, marked and released. The basking traps netted a total of 149 turtles (134 Painted turtles, 3 Map turtles, 1 Blanding's turtle, 1 hatchling Snapping turtle). Hoop traps captured 18 turtles (17 snapping turtles and 1 painted turtle). Hand captures added an additional 19 turtles (10 Painted, 3 Snapping, 2 Map, and 1 Blanding's) most of which were nesting females.

Data was examined in more detail for Painted turtles. A non-parametric ANOVA was run to determine if there were differences between sites or habitats. There were no differences between MS-6 and MS-3 or any specific habitat types (open water, pond or unmanaged) within trapping areas, for all turtles. Also, no relationship existed between captures and measures of vegetation. However, males showed significant differences between habitat types, with few captures in the unmanaged area of Crane Creek ($p=0.0285$). There was also significant correlation between depth and habitat use for different age classes; adults were more abundant in deeper water ($r=0.50$ $p=0.0013$) whereas juveniles were more common in shallow water ($r-0.37$ $p=0.02$)

Photo by © Sharon Cummings Map turtle

Ottawa WMS - The effects of Environmental Contaminants on the Health of Fish-Eating Birds of the Great Lakes. *Keith A. Grasman, Ph.D. , Wright State University.*
The objectives of this project were to 1) to elucidate recently documented associations between environmental contaminants and immunosuppression and endocrine disruption in fish-eating birds of the Great Lakes 2) to investigate the occurrence of infectious diseases in fish-eating birds of the Great Lakes; and 3) to investigate population-level effects associated with contaminants by continuing long-term reproduction and banding studies. The study focused on herring gulls, black-crowned night herons, Forester's terns, and Caspian terns.

In the summer of 2002 we collected the following biological samples from West Sister Island: 13 herring gull eggs and 15 embryos; blood samples from 12 herring gull adults, 36 herring gull chicks, and 18 black-crowned night heron chicks; and livers from 2 dead herring gull chicks. Various samples have been archived for biological and chemical analyses. Results obtained thus far are reported below.

Herring gulls on WSI

Reproductive success of herring gulls on the southeast beach was generally good. Survival to fledging (defined as survival to 3 weeks post hatch, even though actual fledging does not occur until 5-6 weeks after hatch) was 1.3 chicks per nest, well above the level of 0.8 chicks/nest needed to maintain a stable population. For comparison, fledging rates were only 0.19 chicks/nest in 1998 and 0.61 chicks/nest in 1999 and 1.6 chicks per nest in 2000. (Note: Several factors may have caused the reproductive failures in 1998-99: PCB-induced wasting syndrome, infectious disease, cyanobacterial toxins (microcystins), or some combinations of these factors. It is clear that this excessive chick mortality was not caused by predation. A potentially toxic concentration of microcystin liver toxin was found in one gull chick from the 1998 dieoff on West Sister (the only bird analyzed). No microcystin toxin was detected in two chicks found dead in 1999. The summers of 2000 and 2002 were cooler and had fewer algal blooms, and herring gull survival was higher.)

Despite the good survival of young gulls on the southeast beach to 3 weeks of age, significant mortality occurred between 3 and 4 weeks, by which time there were only 0.67 chicks per nest. There was evidence to suggest the presence of a predator.

Immature BCNH

It was observed, as in 1998-2000, a low number of herring gull chicks following hatch were in the treed areas.

As in previous years, investigations of immunotoxic effects in W. Sister gulls have revealed immunosuppression that is consistent with that seen at other Great Lakes sites with similar contamination. Tissues from 15 hatching herring gull embryos were taken to measure a variety of physiological effects. Embryos from West Sister exhibited reduced numbers and viability of developing lymphocytes in the thymus where T lymphocytes mature. T lymphocytes regulate immune responses and fight viral infections. These effects on the developing thymus may lead to suppressed function of mature T lymphocytes, which are important for fighting infections. We found suppressed T lymphocyte function in herring gull and black-crowned night heron chicks from WSI. While we have previously observed immunosuppression in WSI gulls, similar suppression in WSI herons is a new finding and raises concerns on health of this declining species.

Ottawa WMS19 - "Migrational Movements and Habitat Usage of Passerines on the Ottawa NWR, Ohio" - *Julie Shieldcastle, Black Swamp Bird Observatory.*
This long-term study of the Black Swamp Bird Observatory to monitor the population status of passerines in the Great Lakes region and to better understand the relationship between enroute habitat and their breeding ecology was continued on the Ottawa NWR complex. Lake Erie may present a barrier that most passerines will not cross when migrating north. Large build ups of migrants occur along the southwestern shoreline of Lake Erie, creating excellent opportunities for study and attracting large numbers of birding tourists. Monitoring Avian Productivity and Survivorship (MAPS) station information is also included in this report.

Spring
Temperature patterns were above the ten-year average for spring 2002. April weather patterns resulted in good bird movement and the month of May saw very good wave development as well. Total spring banding numbers at Ottawa NWR Complex include 8,609 individuals banded and 9,665 individuals handled.

Table 8. Top Ten Species Banded at Ottawa NWR Complex in Spring 2002.

Magnolia warbler	875	Gray catbird	749
Yellow warbler	670	American redstart	552
White-throated sparrow	969	Red-eyed vireo	359
Myrtle warbler	446	Swamp sparrow	372
Trail's flycatcher	664	Ruby-crowned kinglet	102

Spring point counts are conducted in conjunction with mist net operations. Point count data collection totaled 49 days with 146 species recorded representing 31,191 individuals. The most abundant species recorded were blue jay (6,448) followed by red-winged blackbird (5,089), cedar waxwing (1,878), Canada Goose (1,692), and tree swallow (1,376).

Fall

Fall migration starts in late July for many species and some breeding neotropicals such as the yellow warbler are practically gone from the study area by mid-August. Fall temperatures appeared similar to 2001. Fall bird migration is dominated by different stimuli than in spring. Weather appears less important and food availability appears to be a key factor. Total fall banding numbers at Ottawa NWR include 5,048 individuals of 89 species banded.

Table 9. Top Ten Species Banded at Ottawa NWR in Fall 2002.

Swainson thrush	679	Gray catbird	382
Myrtle warbler	1,162	Cape May warbler	243
Blackpoll	658	Common yellowthroat	333
White throated sparrow	559	Ruby-crowned kinglet	323
Golden-crowned kinglet	297	Hermit thrush	139

Fall point counts are conducted in conjunction with mist net operations. Point count data collection totaled 51 days with 113 species recorded representing 31,189 individuals. The most abundant species recorded were red-winged blackbird (17,368), common grackle (2,372), European starling (2,202), Canada goose (947), and white-throated sparrow (656).

▫The following are ongoing studies that were taking place on the refuge in 2002, but we have not yet received final reports:

Ottawa WMS - Effects of fish disturbance/predation on wetland macrophytes and invertebrates. *Judy Sudomir, Kent State University.*

Ottawa WMS - Spatial/temporal activity budget for piscivorous waterbirds in Crane Creek Estuary. *Judy Sudomir, Kent State University.*

Ottawa WMS - An ecological assessment of invasive and aggressive plant species in coastal wetlands of the Laurentian Great Lakes: a combined field-based and remote-sensing approach *–Ric Lopez, EPA.*

Ottawa WMS - The effects of soft sediment depth on unionid and zebra mussel interactions. *Rick Bowers and Ferenc de Szalay, Kent State University.*

Ottawa WMS - Current Status of the Lake Erie Water Snakes (*Nerodia sipedon insularum*) on West Sister Island, Ottawa National wildlife Refuge. *Richard B. King, Northern Illinois University.*

Ottawa WMS - Food web and feeding influences on PCB bioavailability. *Gene Kim, The Ohio State University.*

Metzger Marsh

Metzger Marsh - The Army Corp of Engineers permit specified that the marsh remain open to Lake Erie for 4 years, from March 1999 to March 2003. During this time, many studies are underway to document the effects of the project on invertebrate, fish, bird, and plant communities. These projects are too numerous and varied to summarize annually. We plan to summarize the results of these research projects when final reports are received in 2003.

Great Lakes Coastal Wetlands Indicators program

The US Environmental Protection Agency has given monies to the Great Lakes Commission's grant program to fund studies that will assist in the development of an index of biotic integrity (IBI) of Great Lake coastal wetlands. Researchers from various agencies and institutions are collaborating to concurrently develop IBI's for coastal wetlands in the other Great Lakes. Once this IBI has been developed it will be used to assess wetland health and measure changes in habitat quality from restoration efforts.

The following studies involved sampling on Ottawa Refuge as part of this project's goal.

A Vegetative Index of Biotic Integrity for Lake Erie's Coastal Wetlands and Corroboration with an Index of Biotic Integrity for Nearshore Fishes. *David Johnson and Eugene Braig, The Ohio State University.*

Testing Flora and Fauna Indicators of Coastal Wetland Health in Lake Erie. *Ferenc A. de Szalay, Kent State University.*

Effects of Photo-induced toxicity on larvae fish. *Deb Swackhamer, Andy Adams and Randy Lehr, University of Minnesota.*

In addition, Ottawa NWR was sampled as part of Ohio's efforts in GAP Analysis of Lake Erie Wetlands by Laura Novak, USGS.

2. HABITAT RESTORATION

2a. Wetland Restoration (Off-Refuge)

This season the Partners for Fish and Wildlife Program once again performed wetland restorations on private lands. This year all of the wetland restorations were performed by private contractors. The refuge has an ever increasing maintenance need therefore less equipment operators for use on private lands. Several contractors have been utilized over the last few seasons in an attempt to find one or two that suit the needs of our program. We now have at least three we use on a regular basis with more wanting to give restoration work a try every year. Restorations were completed in two counties in Michigan (Lenawee and Hillsdale). Twenty-two sites were restored for a total of 68.5 acres.

Most of the wetland basins restored in 2001 are starting to fill finally. We have had no reported problems as of yet. Beginning in the 1999 field season we required landowners to place chain-link fence on the face of newly constructed berms and dikes in an attempt to try and reduce muskrat damage. The use of chain-link fence on the face of every berm that is built has proved to be a tremendous success in keeping muskrat damage from occurring.

Due to changes in the

Conservation Reserve Program (CRP) and the popularity of the Wetland Reserve Program (WRP), the Natural Resources Conservation Service (NRCS) and the Farm Service Agency (FSA) are completing an ever increasing number of wetland restorations on their own. In addition, areas within the River Raisin watershed (most of Lenawee county) were eligible for the United States Department of Agriculture's new Conservation Reserve Enhancement Program (CREP). These programs are sometimes in direct competition with the Service's wetland restoration efforts. The popularity of the CREP program in Lenawee County Michigan and the financial incentives associated with it reduced our wetland projects by over 50%. In addition, the Michigan Department of Environmental Quality is requiring permits on an ever increasing number of wetland restoration projects. These factors, in conjunction with the vast number of sites we have already restored, are making potential "quality" restoration sites more difficult to find.

In 2001, our partner, Ducks Unlimited was awarded a North American Wetlands Conservation Act (NAWCA) grant for southeast Michigan. The Partners for Fish and Wildlife Program's role in the grant is to deliver the private lands portion of the grant. Wetland restorations will be completed through this grant through the 2003 field season to fulfill our commitment to all of our partners involved in the NAWCA grant

This project on Dr. Larry Dasch's property required cutting one tile to restore 3 separate wetland basins. The tile was cut in 2001, however it did not fill until 2002.

Hillsdale County, Michigan
The weather was very dry this year with no periods of rain to affect work. The dry weather in early spring was a blessing for doing earthwork in the early summer months though more rain would have helped to fill last season's wetlands. Towards late summer, early fall, the ground became so dry that soil compaction became quite difficult. In late September, early October, a couple significant rain events caused some serious settling on berms that were not able to be compacted very well. In the spring, those projects will need to be evaluated for repair.

One of the blessings about using contractors is that I do not have to spend time working on down equipment. The drawback is that the contractors have other jobs to complete and must fit the restorations in when they can. Due to all of the above mentioned factors, the field seasons seem to produce fewer restoration projects. Thirteen wetland restorations were completed for a total of 45 acres in Hillsdale County.

Lenawee County, Michigan
Again this year in Lenawee County the U.S. Fish & Wildlife Service entered into a cooperative agreement with the local Soil & Water Conservation District to implement the Partners for Fish & Wildlife Program. This was the fifth year that we worked through an agreement with the district. The local chapter of Pheasants Forever is also very instrumental in carrying out the cooperative agreement. Through this agreement, 9 wetland basins were restored for 23.5 acres.

Since the 1997 field season, landowners are being held responsible for maintenance of wetland restoration projects. I am happy to report that in 2001, only one wetland was repaired due to poor design and/or construction flaws at the time it was built.

Ottawa and Sandusky Counties, Ohio
Through partners like Ducks Unlimited, we are finding more wetland projects in Ohio. Although most of the projects in Ohio are not typical wetland restoration projects, we will still contribute funding if it is available. Due to the flat nature of this part of the state, most projects require extensive dike work sometimes requiring dikes on all four sides to pool and contain the water. These projects can be quite expensive and would be very cost prohibitive if it were not for contributions from partners such as Ducks Unlimited and the Ohio Division of Wildlife. There were three such projects in 2002 for a total of 24 acres.

Ashland County, Ohio
Even though Ashland County is out of the Ottawa Refuge focus area and would normally be covered by the Reynoldsburg Field Office, in 2001 we began work on a wetland project upstream of the Mohicanville dry dam. The dam is in a U.S. Army Corp of Engineers flood easement area. The dry dam is closed during periods of heavy rain to prevent the downstream agricultural areas from flooding. When these events occur, our wetland project site may be under up to six feet of water. We installed a water control structure to retain such floodwaters for migratory waterfowl. The project will have a permanent pool of 6 acres but may be much larger after periods of flood.

2b. Upland Restoration (Off-Refuge)

Native Warm Season Grasses

In 2001 the U.S. Fish and Wildlife Service with cost share assistance from the Joint Venture Coordinator purchased a Truax no-till rangeland drill for planting native warm season grasses. The drill is stored by Pheasants Forever in Lenawee County, Michigan and is on loan to them whenever they need it. The purchase of the drill will allow the Partners for Fish and Wildlife program to plant better nesting cover around our wetland sites.

Lenawee, Hillsdale, and Monroe County, Michigan
With the addition of the new no-till rangeland drill and the conventional-till drill restored in 1999, we continue with our partner Pheasants Forever, to plant better nesting cover for waterfowl and other migratory birds. Due to the financial incentives offered by the CREP program, there was a sharp reduction in the number of grassland sites that were planted in the River Raisin CREP area. Landowners in Lenawee County only planted 9 sites to native warm season grasses for a total of 132 acres. Monroe County landowners planted 1 native warm season grass site for a total of 14 acres. In Hillsdale County Michigan, most of which is not in the River Raisin CREP area, landowners planted 6 sites for a total of 63 acres.

Ottawa, Erie and Sandusky Counties, Ohio
In 2001 the Ottawa National Wildlife Refuge's establishment of native warm season grasses on private lands through the Service's Challenge Cost Share program began to come to a close. The recipient of the Challenge Cost Share Grant was the Erie-Ottawa Chapter of Pheasants Forever. Cost share dollars were used to purchase a native grass seed mixture consisting of big bluestem, little bluestem, Indian grass, and switch grass. Due to unfavorable planting conditions in 2000, there was a back log of sites to be planted in 2001. Several of those sites had to wait until spring 2002 to be completed. In Sandusky County, 5 sites for a total of 41 acres were planted with the native grasses mix.

Riparian Corridor

Again in 2002, Private Lands Biologist Steve Dushane coordinated efforts with the East Lansing Private Lands Office and The Nature Conservancy of Indiana to reforest 20.1 acres of riparian corridor. The tree plantings were completed on the East Fork of the West Branch of the St. Joseph River in Hillsdale County, Michigan. The five riparian sites were restored in an effort to enhance and provide habitat for the federally endangered Clubshell Mussel.

Private Lands Biologist Steve Dushane began to assist Fisheries Biologist Susan Wells in a dam removal site she had been working on at the Boy Scout camp "Camp Miakonda". The dam was on the Ottawa River in Toledo, Ohio and seemed to have been put in for aesthetic purposes only. The dam is scheduled to be removed in late winter 2003.

Private Lands Biologist Steve Dushane and Fisheries Biologist Susan Wells began work on some stream bank work on the Ottawa River as well. The project consisted of debris removal, re-sloping and reshaping of banks, as well as reestablishing native vegetation along the banks of the river. The project improved 5480.4 ft of stream bank as well as opened up 5.2 miles of stream to fish passage.

3. HABITAT MANAGEMENT

3a. Water Level Management

Water levels are managed on Ottawa NWR to allow for impoundment rehabilitation, moist soil plant production, and spring and fall migrations. The goal is to ensure a diversified habitat for a variety of wildlife species throughout the year.

All of our management capabilities revolve around gravity flow and pump structures on diked wetland impoundments. To maintain water level management, dikes must be fully functional and intact. With Ottawa NWR complex having nearly 35 wetland impoundments spread over approximately 9,000 acres, maintaining dikes is not a simple task. Reconstruction and general maintenance projects can require large amounts of time, manpower, and equipment. Our maintenance crew does an excellent job of ensuring that structures, pumps, and dikes are fully functional and working. The following equipment was purchased with 2002 monies to aid them in their efforts.

*JD 345 Riding Mower with 48" deck. $5,623.24
*Cat 416D Backhoe Loader. $54,278.43
*JD 670C Motor grader $111,076.93
*Cat D4GXL Dozer. $62,981.80
*Ford 126 Ranger $19,450
*Ford 137 Excursion XLT $30,200
*Ford F250 full size pickup w/ extended cab $23,600

3b. Moist Soils Management

Moist soil unit 8b was drawn down so that construction on the south dike of the unit could begin. The south dike of the unit was in very poor condition and no longer functioning. It was decided it would be best to push the old dike up next to Krause road, eliminating part of a refuge ditch, but providing a public

walking trail off of Krause road. A new ditch willl be dug on the south side of Krause Road to replace the eliminated ditch.

We would like to give a special thanks to Seney NWR for lending us their maintenance crew, and we feel much gratitude to their maintenance staff for their efforts on getting this project underway.

3c. Graze/Mow/Hay - NTR

3d. Farming

Farming on Ottawa NWR is done primarily on a cooperative basis, with farmers taking a share of the crop and leaving a share for wildlife. Fields are normally planted on a two or three year rotation with corn, soybeans and wheat being the primary crops. In 2002, this plan was followed, with some "refuge corn" (not harvested, but cut in winter) and buckwheat planted by refuge staff in waterfowl hunt units.

3e. Forest Management

Approximately 1/2 acre of trees on West Sister Island was hand cut to a four foot height in 2002. These cuts are adjacent to black-crowned night-heron nesting habitat. These cuttings encourage regeneration of shrubby vegetation, which is preferred nesting habitat for black-crowned night herons. The cuts re-sprouted as predicted and for the first time night herons responded to our efforts at cutting. There was excellent nesting use in the trunk-sprouted hackberry trees. Original plans called for 1 acre cuts annually for 5 years, after which success of the program would be evaluated. Unfavorable weather conditions and lack of a suitable boat for transport resulted in no cuts being completed in 2001.

A 20' by 30' fenced in deer exclosure was placed in the Woods north of Krause road in April of 2002. The purpose of the exclosure is to determine how much the deer are affecting the succession of the woods by over grazing.

3f. Fire Management

Refuge staff members Doug Brewer, Dan Frisk, Ron Huffman, and Steve Dushane received fire training for controlled burns. Ron Huffman wrote the fire management plan for the Refuge so that in 2003 Ottawa can begin to use fire as a management tool.

3g. Native Pest Plant Control

Ottawa NWR Complex manages an extensive system of diked wetlands. Diked wetlands are very expensive to build and maintain. Refuge staff face a continual battle to maintain the integrity of this system. Trees such as willows and cottonwoods are rapid colonizers along dikes, and as they grow in size, represent significant threats to dike integrity. As these trees age, they cause dike damage by providing flow channels along root systems, or extensive damage and subsequent erosion when they are blown over during high wind events. Dike maintenance is much easier and more economical when dikes are maintained while trees are still small shrubs. Shrubs are controlled by a combination of mowing and spraying with pesticides. During 2002, no dikes were sprayed with pesticides.

3h. Invasive Plant Management

Galerucella sp. beetles were reared on the refuge for a second year. Staff and volunteers upgraded the rearing enclosures by building a wooden 11' by 6' foot box with plastic lining to hold water. With the use of PVC pipe and netting, a dome cover enclosed the box. 100 pots were filled with purple loosestrife plants in the early spring and placed in the enclosure. Beetles were then collected from near by established *Galerucella* sp. populations and put into the enclosure to lay their eggs. Once larvae hatched, the pots were then placed in show pool. It is estimated that approximately 63,750 beetles were released.

Monitoring of beetle populations at Cedar Point and Darby found that in 2002 Cedar Point NWR had Galerucella sp. beetle populations significantly expanding. Colonies had been found at least half way through the main pool and Pheasant Farm. The beetles are likely originating from the Mallard Club State Wildlife area that borders Cedar Point on its west side where sustainable beetle populations have been established.

The Division of Wildlife aerial sprayed 120 acres of purple loosestrife and phragmities with 240 lbs of Glyphosate on Ottawa and Cedar Point NWR.

Purple loosestrife infestations were mapped on Ottawa, Cedar Point, and Darby. Refuge staff visually inspected units, mapping areas on aerial photos. These areas were then input into a GIS database.

4. FISH AND WILDLIFE MANAGEMENT

4a. Bird Banding

Wood duck banding

This was the second year in a row Ottawa NWR staff teamed with the Division of Wildlife staff at Magee Marsh Wildlife Area to band wood

ducks. Although wood ducks are the target species, mallards and other waterfowl are banded as well. Two sites were chosen; one on Ottawa Refuge (MS6) and one at Darby (Pool 4). Sites are baited with corn and ducks are captured with ground launching rocket nets that are manually detonated.

Table 10. 2002 State of Ohio wood duck banding quota

Adult female	Adult male	Hatch year female	Hatch year male
270	270	480	200

Table 11. 2002 Ottawa NWR wood duck banding results.

Refuge	Location	Species	Adult female	Adult male	Hatch year female	Hatch year male
Ottawa	MS6	WODU	2	77	11	24
Darby	Pool 4	WODU	11	37	9	26
Ottawa	MS6	MALL	5	4	4	6
Darby	Pool 4	MALL	21	9	47	44
Darby	Pool 4	NOPI	0	1	0	0

4b. Disease Monitoring and Treatment

The West Nile Virus workgroup, comprised of various agencies including: the Ohio Department of Health, Ohio Department of Agriculture, Ohio Department of Natural Resources, The Ohio State University, Ohio Environmental Protection Agency, Association of Ohio Health Commissioners, Ohio Mosquito Control Association, Ohio Environmental Health Association, and the United States Department of Agriculture, created a plan for the State of Ohio to combat West Nile Virus. Surveillance for West Nile Virus was completed by taking blood and cloacal swab samples from various birds across the state. Ottawa NWR was included as one of the sample areas where birds were surveyed.

4c. Reintroductions

A trumpeter swan pair nested on the refuge this year for a third year in a row. Five young fledged. The ODNR Division of Wildlife has been reintroducing trumpeter swans since 1996.

4d. Nesting Structures

Blue Bird Boxes

Bluebird nest boxes were re-established on the Ottawa and Navarre Divisions of Ottawa NWR in 1998. Nest boxes are monitored weekly by volunteers. Currently there are 70 nest boxes on Ottawa, and 56 boxes on Navarre. Boxes are primarily used by tree swallows, and occasionally by house wrens. House sparrow use is discouraged by regular cleaning of the boxes and removal of adults when possible. In 2002, 3 nests were started by bluebirds on Ottawa. One successfully fledged 4 young, which is the first time recorded since the nest box monitoring began.

Tern Platforms

Two platforms were built in 1994 to provide nesting habitat for common terns in Crane Creek on the Ottawa Division of Ottawa NWR. The platforms had little success during the first three years due to predation by great horned owls. The numbers of nests ranged from 48 to 60 with only 2 or 3 fledglings surviving each year. Modifications to the platforms that allowed young terns to escape and hide under raised structures on the decks of the platforms have greatly improved the fledgling survival rate in the past 6 years (Table 12). In 2000, the platforms were moved from Crane Creek to Pool 1 due to lower water levels in Lake Erie. In 2001, 3 more platforms were built providing a total of 5 nesting platforms. This year one more has been added to Pool 1 totaling 6 platforms in addition to 2 more placed at Navarre division of Ottawa NWR.

Table 12. Common Tern Platform Nesting History on Ottawa NWR 1997 - 2002.

Year	Pairs	Nests	Young	Young/Nest
1997	34	36	27	0.75
1998	30	40	23	0.58
1999	40	61	47	0.77
2000	50	70	91	1.3
2001	55	63	103	1.63
2002	50	71	54	0.76

Table 13. 2002 Common Tern Platform Nesting on Navarre Division, Ottawa NWR.

Year	Pairs	Nest	Young	Young/Nest
2002	1	1	2	2

4e. Native Predator/Pest Animal Control

Muskrats are important management tools of wetlands, since they help to maintain open water in otherwise dense vegetation. However, they also cause losses of time, money and

habitat when they burrow into dikes and roadways. Therefore, muskrat numbers are monitored through hut survey counts. Hut numbers fluctuate greatly from year to year depending on water management within the units. Excess muskrats are controlled through a refuge trapping program.

Hut counts were conducted from dike roads throughout Ottawa NWR Complex during the last week of October to provide an index of muskrat populations. Hut counts were as follows: Ottawa–741, Navarre–3, Darby–41, Cedar Point–616. Hut counts underestimated the true number of huts because 1) roadside surveys are inadequate in large and/or densely vegetated units, and 2) counts occurred early in the season when many huts were just beginning to be constructed. Casual observations later in the season, after vegetation had died back and hut construction was completed, indicated that a substantial number of huts were not recorded during the October survey.

Trapping was conducted at Ottawa and Cedar Point. Ottawa consisted of 4 units. Unit 1 (total hut count 162) was Pool 3, Pool 9, MS 3, and MS 6. Unit 2 (total hut count 358) was MS 4 and MS 5. Unit 3 (total hut count 112) was the walking trails area, consisting of MS 8a, MS 8b, and Pools 2a, 2b, and 2c. One youth trapping unit was awarded by random draw of interested youths in the local commuting area. Youth Unit 1 (total hut count 54) was at Ottawa, consisting of MS 7a and 7b. Cedar Point Pool 1 was trapped as 1 unit, with 533 huts observed during surveys. Although Pool 2 at Cedar Point had 65 huts, it was not trapped to allow muskrats to begin to open up the dense cattail stands in this unit. No trapping was conducted at Navarre or Darby due to the low number of huts observed.

Minimum bids for each unit were set at $100.00. Awarded bids were $1537.00 for Ottawa Unit 1, $1275.00 for Ottawa Unit 2, $352 for Ottawa Unit 3, and $1555.00 for Cedar Point. Total income from the trapping program was $4719.00. No fee was charged to the youth trapper.

The trapping season ran from December 3, 2001 to March 15, 2002. The trapping season was opened 1 month earlier this year to increase trapping opportunities, and to encourage trappers to target racoons. Pool 9 of Ottawa Unit 1 and Youth Unit 1 were closed to trapping until January 7th, due to waterfowl hunting season. Trappers at all Ottawa units were restricted to access after 12 noon during waterfowl hunting days. All Ottawa units were closed, and traps tripped or removed, during the Refuge deer hunt. Bald eagle nesting exclusion zones were closed to trapping beginning on February 1, 2001.

A youth trapping workshop was held March 2-3 on Ottawa NWR, at Woodies Roost, by the Ohio State Trappers Association. Seven youth trappers participated in the workshop, with 18 muskrats trapped.

Trappers proposed a pre-season planning meeting for 2002-2003 during the 2001 bid opening. Trappers desired input into trapping planning, unit boundary designation, smaller units, and revisions to the bidding process. A pre-season planning meeting with trappers will be implemented to take advantage of their expertise, with the Refuge making the final decisions on trapping plans. The youth trapping programs and workshops will be expanded to increase youth involvement in Refuge trapping management.

The early trapping opening on the Refuge caused no problems, and increased the take of muskrats, opossums, and raccoons. Muskrat populations and take will need to be carefully monitored in the future to ensure desired habitat conditions are met.

Opossum Photo by © Sharon Cummings

Table 14. Reported harvest by unit for 2001-2002.

Unit	Muskrat	Mink	Raccoon	Fox	Opossum	Skunk
Ottawa 1	1076	2	24	0	4	5
Ottawa 2	1759	0	2	0	0	0
Ottawa 3	411	0	12	0	0	0
Youth 1	211	0	0	0	0	0
Cedar Point	1949	2	28	2	20	0
Totals	5406	4	66	2	24	5

Table 15. An 8 year comparison of trapping efforts for the Ottawa NWR Complex.

	94-95	95-96	96-97	97-98	98-99	99-00	00-01	**01-02**
Muskrat	2,251	1,505	3,131	3143	442	3600	1928	**5406**
Raccoon	42	1	22	4	0	64	32	**66**
Mink	11	3	3	4	0	12	4	**4**
Skunk	4	0	0	0	0	0	2	**5**
Opossum	8	0	11	0	0	21	7	**24**
Fox	1	0	0	0	0	0	2	**2**
No. Units	6	5	5	4	2	6	4	5

4f. Invasive Animal/Non-Plant Management

Gypsy Moth
A gypsy moth trapping program has been conducted on Ottawa NWR since 1983. The purpose of the trapping program is to monitor low-level gypsy moth populations and help determine when more intensive survey methods should be employed. Seven gypsy moth traps are placed throughout Ottawa NWR each year. This year a total of 90 male moths were trapped, with all 7 traps catching gypsy moths. Trap catches at Ottawa NWR averaged 13 moths per trap in 2002. This is an increase from 10 moths per trap in 2001. Based on these results, gypsy moth populations are not expected to impact forest resources in the immediate future.

5. COORDINATION ACTIVITIES

5a. Interagency Coordination
Magee Marsh Wildlife Area administered by the Ohio Department of Natural Resources, Division of Wildlife borders Ottawa NWR. However, wildlife does not acknowledge invisible human boundaries and will move freely between both marshes. Staff at Magee and here at Ottawa have agreed that it is in the best interest for the resource and for each agency to combine our efforts and coordinate with each other on various management activities. Some of these activities include: controlled waterfowl hunt, controlled deer hunt, wildlife surveys, and water level management. Coordination for these activities involves meetings and in some cases sharing man power or equipment.

Agencies involved with the Partners for Fish & Wildlife Program include: Natural Resources Conservation Service, Farm Service Agency, Michigan Association of Conservation Districts, Lenawee County Soil and Water Conservation District, Hillsdale County Soil and Water Conservation District, Monroe County Soil and Water Conservation District, Ottawa County Soil and Water Conservation District, Sandusky County Soil and Water Conservation District, Monroe County Planning Department, City of Monroe, Monroe Public Schools, Boy Scouts of America, Greater Toledo Area Metroparks, Hillsdale County Drain Commission, Lenawee County Drain Commission, Michigan Mountain Bike Association, Pheasants Forever, Ducks Unlimited, The Nature Conservancy, Michigan Department of Natural Resources, and Ohio Division of Wildlife.

5b. Tribal Coordination NTR

5c. Private Lands Activities
More than 130 individuals were contacted by mail or telephone to encourage involvement in the Partners for Fish & Wildlife Program. Many individuals learned about the program through the Partners for Fish and Wildlife Display. The display was exhibited at various presentations as well as at several USDA workshops. The best Partners for Fish and Wildlife outreach tool still remains word of mouth.

Site evaluations were conducted on over 50 parcels of land. Technical assistance was provided to many landowners who had areas that were not restorable but still wanted to help benefit wildlife and/or the environment. Technical assistance was also provided to landowners having projects that were too costly for the program to restore with our available funding.

Wildlife Biologist Steve Dushane continues to participate in the East Fork Advisory Group. This group was started by the Nature Conservancy to help guide conservation practices on the East Fork of the West Branch of the St. Joseph River. This stretch of the St. Joseph River is one of most biologically diverse streams in the Midwestern United States. It's inhabitants include more than 17 different species of mussels including the Federally Endangered club shell mussel.

Farmers Home Administration (FmHA) Conservation Easement Program
The Ottawa National Wildlife Refuge manages a total of 29 conservation easements in three different states. There are 16 easements in Michigan, 11 in Indiana, and 1 in Ohio. During 2002 many of the easements were not visited. Private Lands Biologist Steve Dushane and Refuge Operation Specialist Doug Brewer did visit several sites in Indiana to try to resolve resource issues. Private Lands Biologist Steve Dushane and Refuge Operation Specialist Doug Brewer with assistance from Wildlife Biologist Ron Huffman did evaluate one new inventory property for a proposed easement. The parcel of land was on the Saline River in Monroe County , Michigan and will be recommended for easement. Several easements still need to be re-posted and some need to be posted for the first time.

Schoonover Waterfowl Production Area
The Ottawa National Wildlife Refuge manages one waterfowl production area (WPA) located in Lenawee County, Michigan. The WPA has a 53-acre wetland that was finally restored in 1997. In the spring, the wetland holds high numbers of redhead and ringneck ducks with an occasional canvasback mixed in. In 1999, 20 acres of the WPA were planted to a native warm season grasses mix. The mix consisted of big bluestem, Indian grass, Eastern gamma grass, switchgrass, and a mixture of native forbes. In 2000 the grasses really began to show and many even went to seed. In 2001 however, the grasses became a little more crowded with competition. An application of Plateau herbicide seemed to help reduce competition. An additional wetland restoration was completed on the WPA in 2002.

A small basin that drains into the main 53 acre wetland was restored and enhanced by removing tiles and constructing a low level berm. Installation of a water control structure will aid in the management of the wetland. Biologist Steve Dushane with assistance from Biologist Ron Huffman will begin working on a burn prescription for the native grass areas of the WPA.

Also in 2002, the look and the functionality of the WPA were greatly improved through the installation of gates and split rail fences at both of the parking areas as well as installation of the WPA rules and highway signs. The signs, fencing and gates were installed by the Ottawa NWR staff on a work day at the WPA. With the promise of venison chili for lunch, it's amazing what you can get done in one day.

Nelson Reau, Dave Day, Ken McConahay, Marge Miller, Allen Katynski, Doug Brewer, Kathy Huffman, Dan Frisk, Steve Dushane

2002 Private Lands Habitat Numbers

Michigan Wetland Restorations

		Sites	*Acres*
Lenawee County	-	9	23.5
Hillsdale County	-	13	45
MICHIGAN TOTALS:		**22**	**68.5**

Ohio Wetland Restorations

		Sites	*Acres*
Ottawa County	-	2	7
Sandusky County	-	1	17
Ashland County	-	1	6
OHIO TOTALS:		**4**	**30**

Michigan Warm Season Grass Restorations/Establishment

		Sites	*Acres*
Lenawee County	-	9	132
Hillsdale County	-	6	63
Monroe County	-	1	4
MICHIGAN TOTALS:		**16**	**209**

Ohio Warm Season Grass Restorations/Establishment (PF Challenge Grant)

		Sites	*Acres*
Sandusky County	-	5	41
OHIO TOTALS:		**5**	**41**

Michigan Riparian Area Restoration (Cooperative Agreement With TNC)

		Sites	*Acres*
Hillsdale County	-	5	20.1
TOTALS:		**5**	**20.1**

Ohio Riparian Area Restoration

	Sites	*Units*
Lucas County -	1	**5480.4 Ft of Streambank**
	1	**5.2 Miles of Fish Passage**

Wetland Totals: **26 Sites for 98.5 Acres**
Grassland Totals: **21 Sites for 250 Acres**
Riparian Totals: **7 Sites for 20.1 Acres, 5480.4 ft of streambank, 5.2 miles of fish passage**

6. RESOURCES PROTECTION

6a. Law Enforcement

The main law enforcement focuses on the refuge hunt programs as well as special events such as IMBD. With Jeff Enlow transferring to Erie NWR in Region 5, the number of collateral duty officers was reduced to two. Refuge Manager Frisk and ROS Brewer attended LE refresher courses. Eleven tickets were issued in 2002 for the following violations: one for an unconfined domestic animal, one for taking a migratory bird without a permit, three for hunting without a duck stamp, one for using lead shot, two for hunting without HIP certification, two for taking a migratory bird in a closed season, and one for taking two ducks over legal bag limit.

6b. Permits & Economic Use Management

Letter of Authorization

Letters of Authorization are issued to volunteers for wildlife or economic monitoring and surveys, and activities relating to public use. Letters of authorization are no longer issued for studies conducted on the refuge, special use permits are issued for this purpose. On occasion, letters of authorization may be issued for alternative purposes.

Seventeen letters of authorization were issued for the CY 2002. One letter was issued for the City of Toledo to remove trees, 5 letters were for field trips, and all other letters were issued for monitoring and surveys conducted by volunteers.

Special Use Permit

Special Use Permits are issued to Researchers conducting studies on the refuge. Sixteen permits were issued in CY 2002 and 3 permits were still active from CY 2001.

6c. Contaminant Investigation - NTR

6d. Contaminant Cleanup - NTR

6e. Water Rights Management - NTR

6f. Cultural Resources Management - NTR

6g. Land Ownership Support - NTR

7. PUBLIC EDUCATION AND RECREATION

7a. Visitor Services

The year 2002 was an exciting and busy one at the Ottawa NWR. 126,669 visitors came to the refuge to enjoy our hiking trails, view spectacular wildlife, enjoy programs and drive our auto tour. In 2002 Ottawa NWR was a focus refuge for the National Wildlife Refuge System Centennial. We held many special events throughout the year and added a special centennial theme to many of our regular events. The Ottawa National Wildlife Refuge Association opened a bookstore in the refuge office and staff and volunteers kept the office open more hours during the busy spring and fall.

Right: Christmas Bird Count

Our first event of the year was the Christmas Bird Count on January 6, refuge staff and volunteers invited these hardy bird watchers to the office for some warm drinks and a chili lunch, about 40 cold birders ate in two shifts. It went a long way to making some new refuge friends.

Refuge Auto Tour

Our next event on the refuge was our International Migratory Bird Day (IMBD) Open House and Auto Tour on May 11. This event was the refuge's focus centennial event for the year and was attended by 2800 people. Activities for the day included an unveiling of the refuge painting done by Adam Grimm in honor of the centennial. Posters and limited edition prints are being sold by the Ottawa National Wildlife Refuge Association and money from the sale will be used for habitat restoration on refuge property. Adam was present for the day's event to sign posters and prints.

Adam Grim Poster Signing

Above: Junior Duck Stamp Judging

The Ohio Junior Duck Stamp Contest Award Ceremony was held at the IMBD celebration. Around 120 people attended the ceremony where we handed out prizes to winners from across the state who had placed 1st, 2nd, 3rd and Honorable Mention. The students also enjoyed meeting Adam and getting advice from him. Special guests attending the IMBD Celebration included Puddles the Blue Goose and Muddy the Mudhen – a migratory mascot for the Toledo Mudhens baseball team.

Above: Puddles with Wildlife Biologist Ron Huffman and his daughter, Tara

Above: Muddy the Mudhen with Refuge visitors.

A new refuge program to assist disabled visitors was unveiled at the Open House. The Ottawa NWR Association raised donations to purchase a 6 passenger golf cart. The cart and a volunteer driver can be reserved by visitors who would not otherwise be able to hike the trails.

July 8, 2002

OTTAWA NWR,

I just wanted to send you a picture of the maiden voyage of your handi-capped golf cart - Wednesday May 15, 2002. My mom and dad had an absolutely wonderful time on their trip around the Ottawa NWR and are still talking about it. Their guide did an excellent job!

It was their first trip to the Lake Erie Island Region. We took them to Marblehead, Catawba, Port Clinton and McGee Marsh. As it turns out, your tour around Ottawa was the highlight of their trip. Thankyou so much for providing such a wonderful service.

See you next Summer for another tour!

Paul Gilson
106 Meadowridge Drive
Geneva, OH 44041

The day also included children's activities, displays by local conservation agencies and wagon rides.

The refuge also held a Free Fishing Day event, beach cleanup in celebration of Coastweeks, National Wildlife Refuge Week Open House and Auto Tour and two additional auto tours were held in November and December.

The Ottawa National Wildlife Refuge Association hosted other friends groups from Michigan and Indiana, along with Regional Office staff and Regional Friends representatives as part of the Friends networking initiative. The Oh'michiana Sub-Regional networking group met at the refuge office and discussed upcoming events including the centennial. Special guest T.R. Bear made an appearance as part of the centennial discussion.

HUNTING

Waterfowl Hunting

The Lake Erie Western Basin marsh region has a long standing history of waterfowl hunting. As part of the Refuge System's "Big" 6 public use activities and to preserve part of our local heritage, Ottawa strives to provide optimal quality hunting opportunities. To enhance the waterfowl hunt program at Ottawa, six Jon boats were purchased with 2002 money. The boats will be provided at the water blinds for easier access and for easier transportation of decoys to and from the blind.

Canada, snow, and white-fronted geese along with ducks are hunted by permit on portions of the Ottawa Refuge. The hunt is conducted from blinds in and around agricultural fields, wetland and moist soil units. Hunting occurs four days a week from one half-hour before sunrise to noon for a total of 16 days. The Ohio Department of Natural Resources administers the hunt including publicity, receipt and handling of permits, applications, preparation and distribution of special one-day permits and collections of hunting data. Ottawa NWR staff assists DOW in the operation of a mandatory check station and oversight of all hunting operations. Ottawa's managed hunt is conducted Monday, Wednesday, Friday, and Saturday of each week. Total participation this season was 505 hunters harvesting 493 ducks and 54 Canada geese.

The opening day of the refuge hunt is reserved for a special youth hunt, October 12th,13th, and 19th. The youth are selected and can bring one partner (adult) to hunt with them. This year 39 people (29 youth and 10 adults) harvested 67 geese and 13 ducks.

Table 16. 2002 Four highest harvested species.

SPECIES	NUMBER HARVESTED
Mallard	45
Gadwall	15
Wood duck	10
Canada Goose	10
All other species	<5

Controlled White-tailed Deer Hunt

A total of 163 hunters participated in the controlled white-tailed deer hunting program during the 2001/2002 hunting season harvesting a total of 34 deer (Table 1). Eight individuals took advantage of our handicap accessible blinds, and the youth hunting program had a participation of 22 individuals.

Table 17. 2001-2002 White-tailed deer harvest information

	Number	Deer Harvested		Total
Date	Hunters	antlerless	antlered	Deer
12/28/2001	11 Youth	7	1	8
12/29/2001	10 Youth	3	1	4
01/02/2002	31 Adult	8	1	9
01/03/2002	31 Adult	2	0	2
01/04/2002	33 Adult	2	0	2
01/05/2002	33 Adult	6	1	7
Totals	149	28	11	32

A number of changes were made to the 2002 deer hunt on the Refuge in an effort to improve overall harvest. Youth hunters continued to hunt 11 units. The number of adult hunt units was reduced from 11 to 10, with 1 alternate hunt group drawn, and the number of hunting days was increased from 4 to 5. One hunt unit was dropped from adult hunts based on comments from hunters in 2001. Deer hunts were held during the regular statewide deer shotgun season, instead of during muzzleloader season. Adults were allowed to use any legal weapon, and all hunters chose to use shotguns. Instead of a separate season for hunters confined to wheelchairs, 2 of the 10 adult hunt units (D1 and D2) each day were set aside for wheelchair hunters. Wheelchair hunters were also allowed to have 2 hunting partners, as well as a non-hunting assistant.

Youth deer hunts were held on December 1st and 2nd, 2002. There was 1 youth hunter per unit, with a non-hunting licensed adult partner. Youth hunter participation rate was 14 out of 22 possible hunters. Youth hunters harvested 8 deer (Table 18).

Adult hunts were held from December 3rd to 7th, 2002. Wheelchair participation rate was 7 out of 10 possible hunters. The overall adult hunter participation rate was 147 (includes both handicapped and alternates) out of 150 possible hunters.

A total of 65 deer were harvested during all deer hunts. Harvest information is listed in Table 18.

Table 18. 2002 Deer Harvest Information, Ottawa National Wildlife Refuge.

Date	Hunt	Number of Hunters	Deer Harvested			Total Deer	Hunter Success
			Does	**Button Buck**	**Buck**		
12/1/2002	Youth	8	4	2	1	7	0.88
12/2/2002	Youth	6	0	0	1	1	0.17
Youth Sub-Total		14	4	2	2	8	0.57
12/3/2002	Adult	29	13	3	3	19	0.66
12/4/2002	Adult	29	5	5	3	13	0.45
12/5/2002	Adult	27	9	1	2	12	0.44
12/6/2002	Adult	32	6	2	1	9	0.28
12/7/2002	Adult	30	1	2	1	4	0.13
Adult Sub-Total		147	34	13	10	57	0.39
TOTALS		161	38	15	12	65	0.40

While several nice 8 point bucks were taken, several trophy class bucks present on the refuge continued to elude deer hunters in 2002.

Four pre-harvest deer spotlight surveys were conducted during November, 2002. The average number of deer observed per square mile is listed in Table 19. Estimated doe to buck ratio is 3.6:1. While the estimate is based on a fairly small sample size, it indicates an unbalanced sex structure in the herd. A herd with a balanced sex ratio is desirable because it is easier to control population numbers. Surveys are planned for the post-hunt period in January, 2003.

Table 19. Average of pre-harvest deer spotlight survey results, Ottawa NWR, November 2002.

Deer Observed					Estimated Population	Deer/square mile
Bucks	Does	Fawns	Unknown	Total		
4.25	15.5	4	36.75	60.5	269	36.8

Fishing

Refuge sport fishing is limited to a 15-acre borrow pit at Cedar Point NWR from June through August. Anyone fishing over the age of 15 must possess a valid state fishing license. Random license checks are conducted during the season to monitor visitor

regulation compliance. Maximum use generally occurs during weekends in June. Sport fish harvested include blue gill, crappie, bass and channel catfish.

7b. Outreach:

Environmental Education

Environmental education programs were held on the refuge for 678 students, off-site students taught by refuge staff totaled 314. Environmental education field trips to the refuge ranged from second graders learning about birds to college students learning about wildlife management. The 41st annual Fifth Grade Conservation Day was held on the refuge, approximately 600 students, every 5th grader in the county, learned about conservation and natural resources. The Wind, Waves and Wildlife Girl Scout Camp was held at the refuge again this year. 10 girl scouts learned about birds, bird banding, butterflies, geology, water, and the National Wildlife Refuge System. The camp was a day camp with one overnight stay to allow for early morning bird watching. Refuge staff presented career information at 3 different events; a total of 236 people learned about the Fish and Wildlife Service and career opportunities available.

Tom Kashmer with Girl Scouts

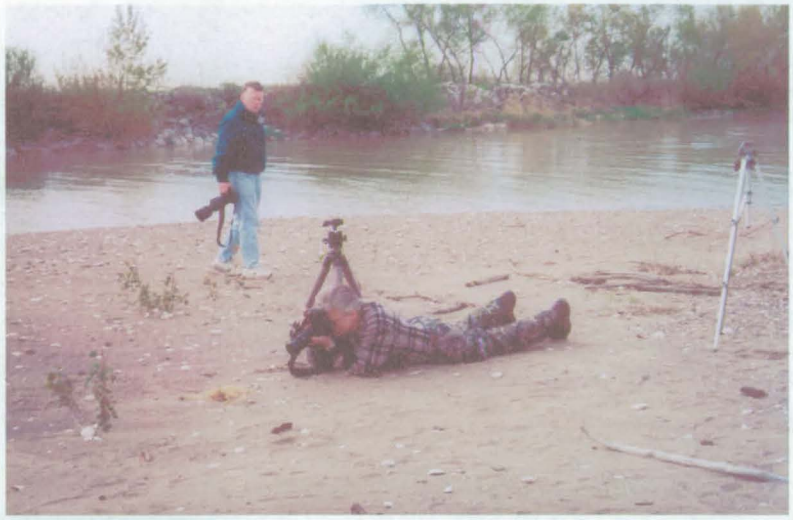
342 students entered the Junior Duck Stamp Contest in the State of Ohio. The judging was held on April 4th at the Davis Besse Nuclear Power Station. Alex Hogrefe from Deshler, Ohio took Best of Show honors in the state. An award ceremony was held in conjunction with International Migratory Bird Day. All first, second and third place entries were displayed at many locations around the state including the Ohio Decoy Collectors and Carvers Association annual show in Westlake, Ohio. We are discussing a partnership with the group to improve the program in the state.

Junior Duck Stamp Judges with painting awarded Best of Show

Refuge staff presented refuge information to approximately 400 teachers at COSI's Teacher Toolbox. This annual event brings together local resource and science based groups and agencies that provide services to teachers, scout groups and home school organizations.

Programs and Events

The refuge participated in a variety of outreach events where the refuge display was viewed by a variety of audiences. Events included Lake Erie Wing Watch (250 people), Toledo Zoo Earth Day (1500), Toledo Metroparks Earth Day (300) and the Waterfowlers' Festival (600). Programs and talks about the refuge were presented to 110 people in a variety of settings.



Above: Photo shoot held during the IMBD event

Alpena FRO staff member Susan Wells created a beautiful float for the Oak Harbor Apple Festival Parade. The float represented the 6 priority public uses of the National Wildlife Refuge System. Staff and volunteers passed out fortune cookies that contained a centennial message, and we were rewarded with a 3rd place trophy.

Above: Ottawa NWR float

Right: Refuge manager Dan Frisk passing out refuge fortune cookies at the Apple Festival Parade

Ottawa NWR Association Members

Volunteers

The refuge has always had an excellent group of volunteers and this year was no exception. In addition to helping to keep the office open weekends and staff the new bookstore there were many other projects they worked on through the year. Many volunteers had the opportunity to drive the golf cart to provide access for visitors with disabilities. Volunteers also staffed the many displays at local events and festivals, they provided a live raptor display at IMBD and set up the tents for the special events. A volunteer dinner was held in November to thank the volunteers for all of their hard work through the year. Jack and Janet Volker were awarded with Co-Volunteer of the Year Honors. A total of 11,017 hours were worked by volunteers at the refuge this year.

Rex Miller, Refuge Volunteer

8. COMPREHENSIVE CONSERVATION PLANNING - NTR

9. PROVISIONS UNIQUE TO ALASKA – N/A

10. PLANNING AND ADMINITRATION

In 2002 Ottawa NWR upgraded several of the old computers. Loyd Mitchell from the RO Computer Support Group came down to install a network and file server for the office. We also contracted with SkyCasters to upgrade from a slow dial-up connection to a high speed satellite internet service. Email and internet access was changed from a shared walkup to each user having access at their desktop. This project consumed a considerable amount of time for biologist Ron Huffman, but greatly increased the overall efficiency of the office.

In 2003 Ottawa completed installation of the computer network begun in 2002. A local company installed a fiber optic network connection to the shop. The maintenance computer was moved out to the shop for easier access by the maintenance staff.

We installed a Vantage Pro weather station outside the refuge office. The weather station will aid in the fire management program, provide local weather information to staff and for annual narratives, and in the future will provide local conditions to the public via the refuge's web site.

REFUGE STAFF

Dan Frisk, GS-0485-13, PFT	Refuge Manager
Doug Brewer, GS-0485-12, PFT	Refuge Operations Specialist
Stanley Cornelius, GS-0485-11, PFT *Retired 3/1/02*	Refuge Operations Specialist
Marjorie Miller, GS-0303-7, PFT	Administrative Technician
Ronald Huffman, GS-0486-11, PFT	Wildlife Biologist
Steven Dushane, GS-0486-9, PFT	Wildlife Biologist, Private Lands
Rebecca Hinkle, GS-0025-9, PFT	Park Ranger (Public Use Specialist)
David Day, WG-5716-8, PFT	Engineering Equipment Operator
Kenneth McConahay, WG-5716-10, PFT	Engineering Equipment Operator
Jeffrey Enlow, WG-4749-8, PFT *Transferred to Region 5, Erie NWR, 01/20/2002*	Maintenance Worker
Eric Smith, W6-4749-8, PFT *EOD 10/06/02, transferred from Ft. Caroline Nat. Memorial, Jacksonville, Florida*	Maintenance Worker
Allen Katynski, WG-4749-6, Intermittent *6/12/02-10/11/02*	Maintenance Worker

Gary Kinser, WG-4749-6, Intermittent *6/17/02-8/19/02*	Maintenance Worker
Deanna Swicegood, GS-0025-4, STEP *5/26/02-8/09/02*	Park Ranger
Kristen West – GS-0404-3, STEP *6/25/02-9/12/02*	Biological Science Aid

The following are people who work at Ottawa NWR, but are not employed by Ottawa NWR.

Susan Wells, GS-0482-7	Fishery Biologist – Alpena FRO
Ethan Simmons– OSU STEP student	Fisheries Aid

L – R: Nelson Reau, Dave Day, Marge Miller, Ethan, Ken McConahay, Allen Katynski, Gary Kinser, Deana Swicegood, Ron Huffman, Rebecca Hinkle, Doug Brewer, Kristen West, Dan Frisk
Kneeling: Steve Dushane and Susan Wells

CEDAR POINT NATIONAL WILDLIFE REFUGE

Cedar Point NWR, named for the rows of cedar trees that once grew at its northern tip, is administered as a unit of the Ottawa NWR Complex. Previously a popular shooting club, the land was donated to the U.S. Fish & Wildlife Service in 1965. The refuge encompasses approximately 2,445 acres and is entirely marsh except for the dike system and a few acres of remnant beach covered with hardwoods.

The refuge is divided into three pools, one being the largest contiguous wetland in the Lake Erie Marshes. Minimal water level management is used to encourage and maintain aquatic vegetation. All pools are predominately cattail, bulrush and other emergent vegetation highly valuable to wildlife. Herons, egrets, migrating waterfowl and shorebirds make extensive use of the area for feeding. The refuge also provides nesting habitat for a variety of birds including the bald eagle.

A 15 acre borrow pit off of the main entrance to the refuge is open to fishing from June through August. A permit is required to access any other parts of the refuge.

Cedar Point post 16, Pool 1

WEST SISTER ISLAND NATIONAL WILDLIFE REFUGE

West Sister Island NWR is an 82-acre island located in the southwestern basin of Lake Erie 9 miles north of the shoreline. The U.S. Coast Guard owns 5 acres of the island, which includes a light house built in 1847. The last people to live on the island were a light house keeper and his family. In 1937 the light house was automated and the island has been uninhabited since. In 1938 the remaining 77 acres was designated a wildlife refuge, and in 1975 it became Ohio's only Wilderness area.

The island rises 35 feet above the high water mark. It is composed of glacial till over a limestone shelf. The limestone shelf protrudes along the island showing where large coves have been eroding by hydrological forces forming stoney cliffs 15-20 feet high. 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 receive a topically applied layer of nitrogen supplied by thousands of nesting colonial birds. West Sister Island is noted for having the largest heron/egret rookery in the U.S. Great Lakes. Forty percent of herons and egrets in the Great Lakes nest on this island. Great blue herons and great egrets comprise 65% of the nesters, followed by black-crowned night herons. Herring and ring-billed gulls also nest on the island along the gravel beach. See **Studies and Investigations** for more information.

Since 1998, 1 acre of trees a year is cut by handsaws to encourage shrub growth for black crown night heron nesting habitat. The vegetation on the island consists of 40-50 foot hackberry trees dominating the canopy, with poison ivy, some of it 12 feet tall, and Great Solomon's Seal dominating the under story. Other plants such as various ferns, wildflowers, and mushrooms are also found on the island. The response to the cuts has been excellent.

A 25' Justice Boston Whaler with a Mercury 250hp outboard motor was bought with 2001 money. With the purchase of this boat, the refuge will now have its own transportation to the island which will improve monitoring and management efforts.

Immature Great Egrets on nest

WSI cliffs

Immature Black-crowned Night Heron