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OTTAWA NATIONAL WILDLIFE REFUGE COMPLEX
(OTTAWA, CEDAR POINT, WEST SISTER ISLAND)

Oak Harbor, Ohio

ANNUAL NARRATIVE REPORT

Calendar Year 1988

U.S. Department of the Interior
Fish and Wildlife Service
NATIONAL WILDLIFE REFUGE SYSTEM

OTTAWA NATIONAL WILDLIFE REFUGE COMPLEX

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

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Calendar Year 1988

Refuge Manager — Date 5-31-89

Refuge Supervisor Review — Date 6/1/89

Regional Office Approval — Date 6/2/89

INTRODUCTION

The Ottawa National Wildlife Refuge Complex 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 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. Cedar 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.

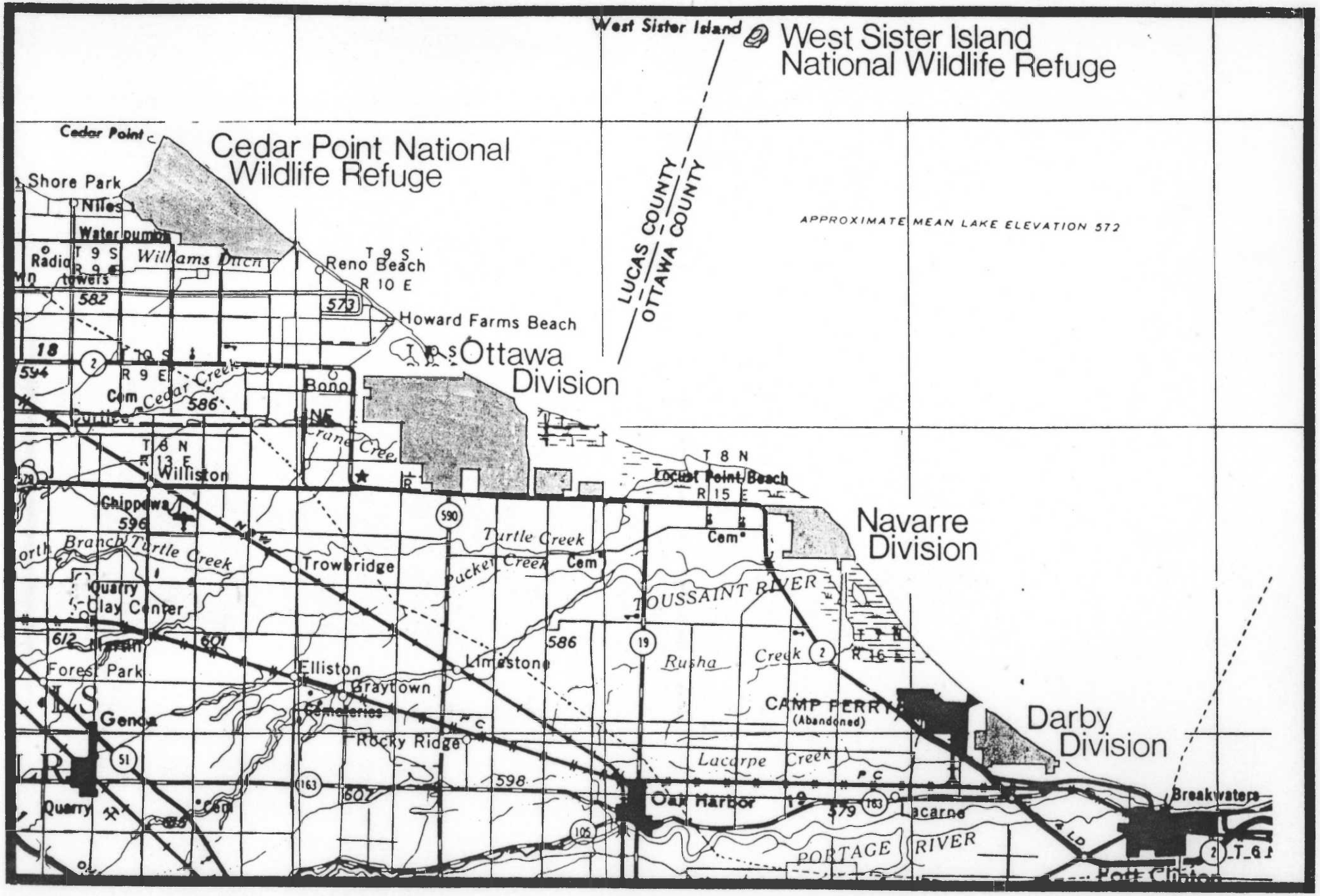
Today, these five separate parcels of land are the Ottawa National Wildlife Refuge Company.

The cities of Toledo, Detroit, and Ann Arbor are within 2 hours drive of Ottawa 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 100,000 visitors per year who primarily visit the refuge for bird watching and wildlife observation.

The total refuge acreage is 8,316 acres of which 5,350 acres are either open pools, marsh, or moist soil units. Water levels in 3,306 acres can be controlled by gravity drainage and filling; in 1,250 acres water is uncontrolled; 576 acres of marsh are controlled by pumps; and in 794 acres of moist soil units water levels are controlled by pumping. The remaining acreage of 2,966 is a mixture of grassland, forest and cropland.

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 eagles, 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.


West Sister Island
West Sister Island
National Wildlife Refuge
Cedar Point National
Wildlife Refuge
LUCAS COUNTY
OTTAWA COUNTY
APPROXIMATE MEAN LAKE ELEVATION 572
Ottawa
Division
Navarre
Division
Darby
Division
Cedar Point
Shore Park
Niles
Water pumping
Radio towers
Williams Ditch
Reno Beach
Howard Farms Beach
Cedar Creek
Crane Creek
Williston
Chippewa
North Branch Turtle Creek
Trowbridge
Turtle Creek
Bucket Creek
Quarry
Clay Center
Forest Park
Elliston
Limestone
Graytown
Cemeteries
Genoa
Rocky Ridge
Quarry
Cem
Local Point Beach
TOUSSAINT RIVER
Rusha Creek
CAMP PERRY
(Abandoned)
Lacarpe Creek
Oak Harbor
Lacarne
PORTAGE RIVER
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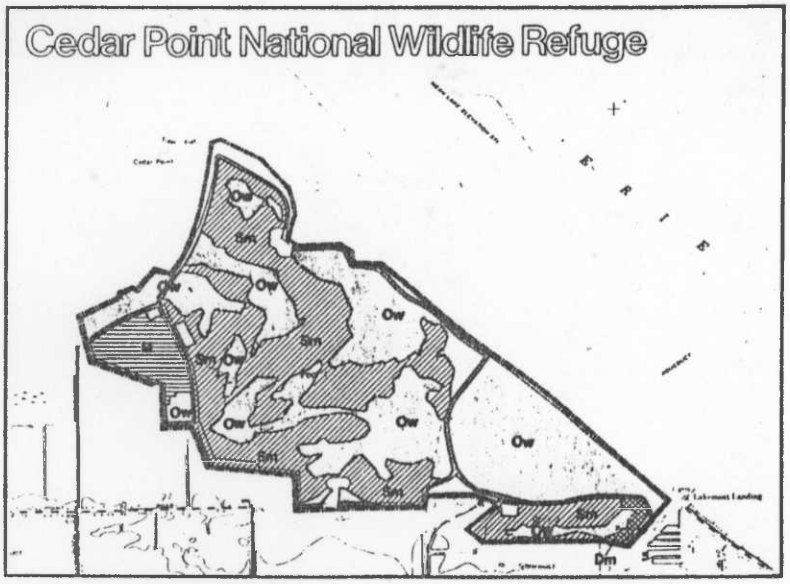
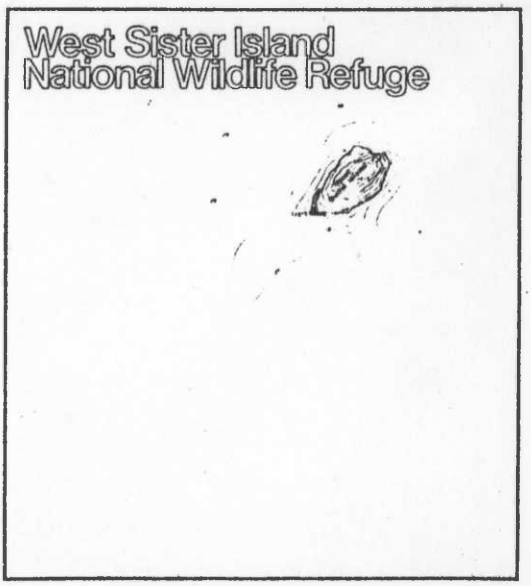
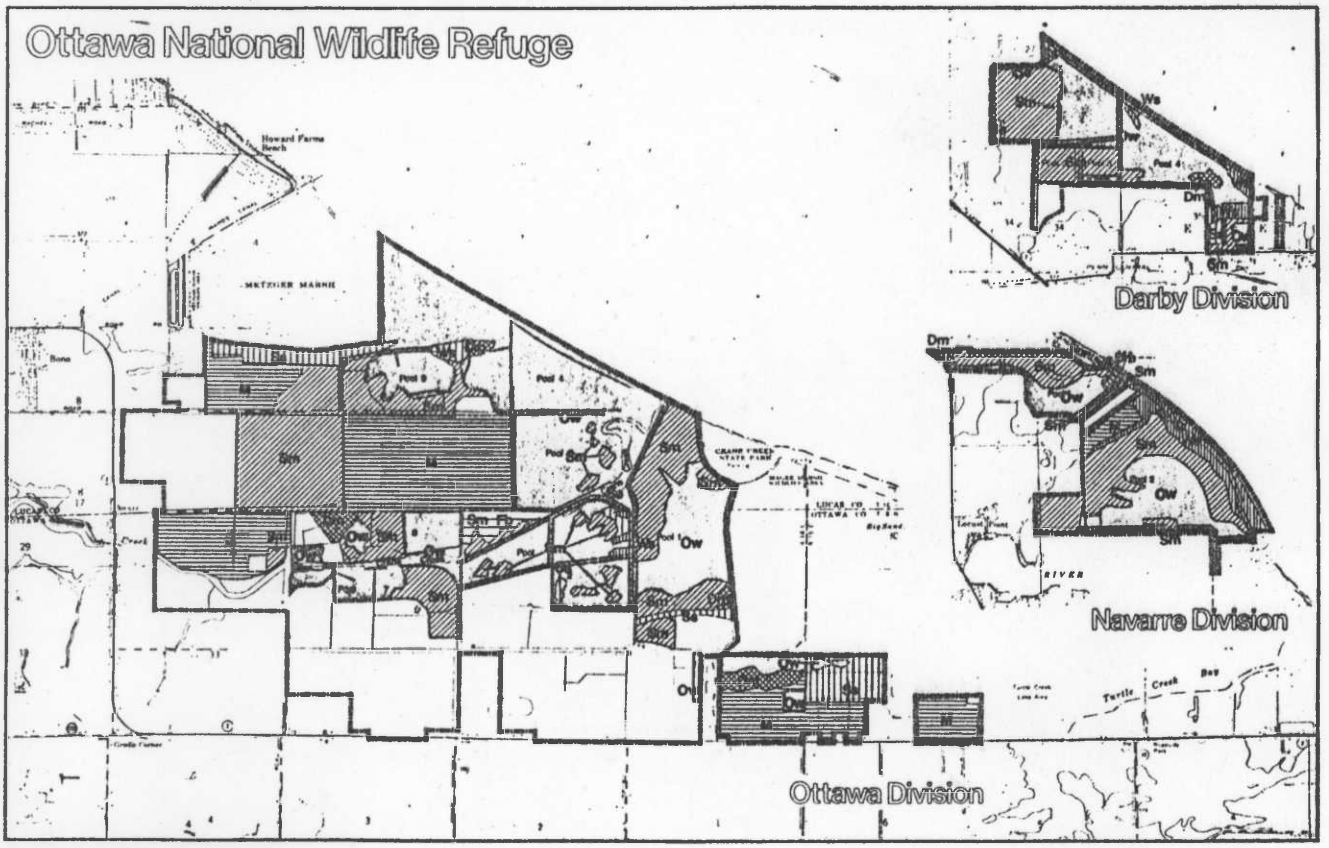




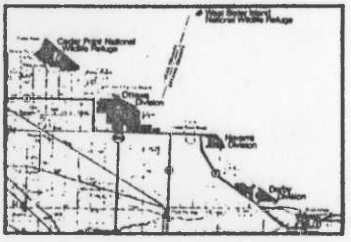


OTTAWA NATIONAL WILDLIFE REFUGE COMPLEX

Oak Harbor, Ohio

prepared for:
U.S. Dept. of the Interior
Fish and Wildlife Service

prepared by:
Miller, Wihry & Lee / EDAW
November 1977



Wetland Types

- Open Water (Ow)
- Shrub Swamp (Ss)
- Wooded Swamp (Ws)
- Refuge Boundary
- Wetland Boundary
- Seasonally Flooded Basin / Flat (Fb)
- Meadow (M)
- Shallow Marsh (Sm)
- Deep Marsh (Dm)

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A. HIGHLIGHTS

Farm Bill Activities and Dike Construction were the primary activities of the year. Record drought conditions made excellent circumstances for this work, even though most refuge and area farmers lost a majority of their crops.

Farm Bill activities provided us with the opportunity to do work which many biologists and refuge managers dreamed of for years. That of restoring wetlands on the private lands. The refuge personnel were involved in restoring over 120 wetlands in Michigan and Indiana. This was accomplished by plugging tiles and building ditch plugs/dams to restore wetlands that ranged in size from one-half acre to over twenty acres.

Dike construction and rehabilitation was started using the funds provided by the Flood Damage Supplemental Appropriation which provided approximately five million dollars to the Ottawa Complex. This work got underway during the late summer and fall period with two major contracts in full swing. These contracts were awarded to George Gradel Company. A third contract was awarded near the end of the year and a fourth was pending.

Drought conditions occurred with a relatively dry spring, followed with no rain from early May through August. This made conditions good for the farm bill and dike construction work, but most area and refuge farmers had record crop failures. Soybeans did not come up, corn either did not grow or did not produce ears. Almost all agricultural crops on the refuge failed.

The drought also reduced the Lake Erie water levels by a very significant amount. We went from a point of having level to high readings to the extreme low point in less than a year, and now have the problem of not being able to put water into the marshes, rather than not being able to get rid of it. The dry weather also managed many of the moist soil and marshes for us by drying them up completely. In most cases, this created an excellent growth of smartweeds and other waterfowl foods and created excellent fall conditions where they could be reflooded in the fall.

The entrance fee system was initiated and this coupled with the dry, HOT weather and dike construction reduce our visitation very drastically. The entrance fee system was in effect from April 1st to November 1st.

Waterfowl populations and use set record levels for recent years with a fall population peak of over 117,000 ducks on the Cedar Point and Ottawa Refuges. The common tern restoration project was continued in cooperation with the Ohio Dept. of Natural Resources. This project is an attempt to reestablish a nesting colony on the Refuge.

A new airboat complete with polymer hull coating and 180hp Lycoming aircraft engine was purchased to assist in our marsh management and a new 3/4 ton 4x4 pickup was received.

Our Administrative Technician since 1974, Virginia L. Behnke, retired on 12/30/88. Charles Marshal, Outdoor Recreation Planner, transferred from Tinicum National Environmental Center in February to take charge of our Interpretation & Recreation program.

B. CLIMATIC CONDITIONS

TABLE 1. Annual Precipitation and Temperatures, CY 1988

	Precipitation			Temperature	
Month	CY-1988	Normal	Snowfall	Max.	Mi
Jan.	0.75	1.62	7.0	53	0
Feb.	1.07	1.57	15.0	54	-2
Mar.	1.48	2.44	4.8	70	17
Apr.	1.22	2.91		80	30
May	0.46	3.22		87	35
Jun.	0.43	3.78		100	50
Jul.	2.43	3.63		100	70
Aug.	3.86	3.42		100	50
Sep.	3.08	3.37		86	50
Oct.	3.14	2.18		81	20
Nov.	4.55	3.13	T	65	27
Dec.	1.72	2.93	6.0	58	10
Totals	24.19	34.20	32.8		
Extremes				100	-2

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, 1988 was warmer than last year with 3 consecutive months reaching a high of 100. The highs for 1985, 1986 and 1987 were 91, 94 and 97 respectively. The extreme low for the year was -2 degrees F, which is within 2 degrees of the overall low for the last 3 years.

The total annual precipitation for 1988 was 10 inches below normal for Ottawa and approximately 16 inches less than last year. The water management regime was greatly impacted when summer rains did not replenish water evaporated from pools.

From 1985 to 1987 high lake levels crippled our ability to manage water levels effectively. Tables turned in 1988 when the lake dropped 1-1/2 feet to average levels - too low to reflood units to planned fall levels.

New pump stations to be built in 1989 at Ottawa, Darby and Cedar Point will improve our water management abilities when Lake Erie is uncooperative.

D. PLANNING

3. Public Participation

Open houses were held spring and fall to provide the public with an opportunity for input into refuge operations and management. Both were well attended. A local carving club, the Maumee Bay Carvers Club set up tables of bird carvings that were a desired addition to the events.

4. Compliance With Environmental and Cultural Resources Mandates

Applications for Section 404 permits were submitted to the Corp of Engineers for the dike rehabilitation projects. Permits were received for the four current projects.

5. Research and Investigations

Ottawa WMS28 - "Movement and Habitat Usage of the Black-crowned Night Herons of the West Sister Island Rookery" Mark Shieldcastle, Ohio Dept. of Natural Resources Experiment Station. Research objectives are: (1) to determine feeding and roosting locations along Lake Erie; (2) to determine if there is a colonial interaction with the rookery in Sandusky Bay; (3) to determine migrational movements of both banded and auxiliary marked birds; (4) and to determine rookery population estimates, and habitat parameters. On-going.

Habitat usage by the various colonial nesters were monitored and population status estimated. Nestlings were banded as a part of a long term study to establish migration routes. The pilot study, which began in 1987, on establishing an estimate of nesting pairs, colony movement, and habitat parameters was continued. The drought of 1988 had considerable impact on the nesting waders of West Sister Island. An increase in dead young in the colony and dead adults both on the ground and on their nest was noted.

TABLE 2 Project Banding to Date - West Sister Island

Species	1982	1983	1984	1985	1986	1987	1988	Total
Black-cr. Night Heron	151	197	104	160	195	167	116	1090
Great Blue Heron	2	6	3	2	1	20	2	36
Great Egret	6	10	8	12	23	37	40	136
Snowy Egret	2	4	11	7	14	4	8	50
Cattle Egret		7		12		4	0	23
Little Blue Heron		3		4	3	1	1	12
Herring Gull	1	11		16	12	35	11	86

TABLE 3 Project Estimated Breeding Populations on West Sister Island in 1988

Species	# of Nests
Black-crowned Night Heron	1285
Great Blue Heron	1500
Great Egret	700
Snowy Egret	10
Cattle Egret	5
Little Blue Heron	2
Herring Gull	700

WMS-19 "Habitat Use and Migrational Movements of Non-Game Birds in the Lake Erie Marsh Region of NW Ohio" Mark Shieldcastle, Ohio Dept. of Natural Resources Experiment Station.

Passerine Migration Study - A long term study of passerine migration was continued on both Ottawa and Navarre units of Ottawa NWR. Due to consistent northeast winds the spring migration was very slow to get started. The normal late April wave never materialized and bird numbers were consistently low until May 8th. Bird captures increased 1200% from the 7th. Major movements were recorded on May 8, 10, 13, and 15. Ninety-five species totaling 2,440 new birds were banded in 2,250 net hours. The top species banded were: Magnolia Warbler 193, Yellow Warbler 169, White-throated Sparrow 126, Catbird 99, and Chestnut-sided Warbler 90.

The fall migration was heavily affected by the drought of 1988. Food production was severely reduced on the Navarre beach ridge and was not much better on Ottawa. Big movements were noted September 4, 10-11, 24, and October 1-2. Navarre bandings included 1,049 birds of 64 species. The most common species banded were Blockpoll Warbler 110, Swainson Thrush 103, Catbird 71, Magnolia Warbler 64, and White-throated Sparrow 60. Butternut Lodge bandings totaled 458 birds of 54 species. Dominant species were Swainson Thrush 64, Magnolia Warbler 40, Gray-checked Thrush 37, Ovenbird 31, and Blackpoll Warbler 24.

There were 94 birds that were banded in previous years, captured. Forty-seven of these were Yellow Warblers with the oldest being at least 7 years old. There were 17 species recaptured. Following the Yellow Warbler were Cardinal 12, Indigo Bunting 10, Red-winged Blackbird 6, and Downy Woodpecker 4. A Prothonatary Warbler banded as a nestling in 1985 on the south side of Sandusky Bay was captured as a breeding male.

WMS-16 - "Woodcock Population and Habitat Manipulations" Mark Shieldcastle, Ohio Dept. of Natural Resources Experiment Station. Spring woodcock habitat remained in fair condition in 1988. Birds are beginning to utilize fields planted to prairie grasses but several traditional grounds are beginning to be overgrown. This study recommends that consideration should be put into future management plans for recovering several units that are being overgrown with dogwood. Due to weather conditions, no banding was conducted in 1988.

A birds eye view of a "timber-doodle." (CM)

WMS-32 - "The Effects of Wetland Water-Level Manipulation on Macroinvertebrate Abundance" Terry Riley, Ohio State University, Masters Thesis. This research has two basic objectives and they are: (1) to determine the effect of various drawdowns on macroinverterbrates; (2) to determine the effect of invertebrate abundance on waterfowl use. This is an ongoing study and results are forthcoming.

WMS-33 - "Blackbird Damage Research" USDA, Aphis, Ohio Field Station, Sandusky, Ohio, Richard Dolbeer and Paul Woronecki. This years research was to compare the effectiveness of applications of methiscarb-cue (limestone) and cue-only in the field interior with that of methiocarb-alone in protecting corn fields from blackbirds. Three plots of various varieties of corn were planted in MS- 4 for this project. However, drought conditions prevented the production of an adequate crop to allow any evaluation. Apparently, the crop yield was not even enough to attract blackbirds. This project is on-going.

E. ADMINISTRATION

1. Personnel

Refuge crew - left to right: Cornelius, Fehribach, Reynolds, Marshall, Day.
Not pictured: Tansy, Behnke, Frost, and Kruger (MC)

Michael G. Tansy - GS-12, PFT ..... Refuge Manager

Stanley S. Cornelius - GS-11, PFT ..... Assistant Refuge Manager

Virginia L. Behnke - GS-5, PFT (Retired 12/30/88)..... Administrative Technician

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

David L. Day - WG-8, PFT ..... Equipment Operator

Robert Reynolds - WG-8, PFT ..... Maintenance Worker

Denise Fehribach - GS-5, PFT ..... Assistant Refuge Manager

Stephanie B. Frost - GS-5, PFT (Term. 03/24/88)..... Assistant Refuge Manager

David Kruger - GS-5, Temp (Term. 08/27/88)..... Biological Technician

Stephanie Frost was assigned from Horicon to Ottawa on 11/9/87 to complete a scheduled tour. She resigned on 03/24/88 for personal reasons. During her short tour here, she proved to be an asset to the refuge and we were sorry to lose her.

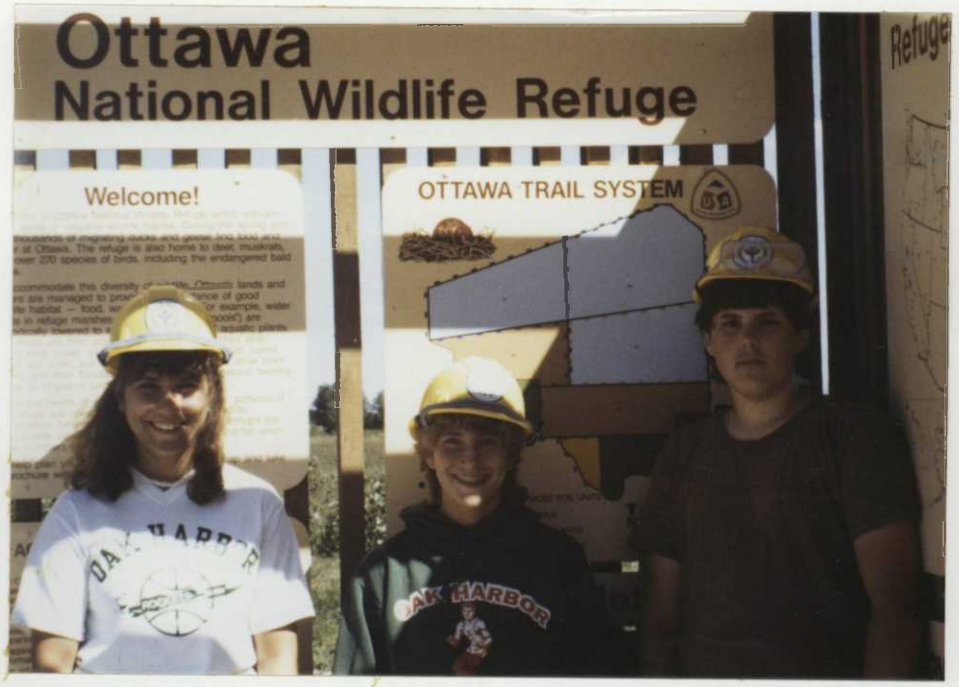
Virginia L. Behnke who was our Administrative Technician since 1974 retired on 12/30/88.

TABLE 4 Five-Year Staffing Levels

	Full-Time	Part-Time	Temporary	FTE
FY 1983	6	1	1	7
FY 1984	6	1	4	7
FY 1985	6	0	2	7
FY 1986	6	0	2	7
FY 1987	6	1	2	7
FY 1988	7	0	1	7.2

2. Youth Programs

The 1988 YCC camp began on June 27 and was completed on August 19. Three enrollees were selected from six applicants. Applicants gender consisted of 4 males and 2 females. Applicants chosen for this years camp consisted of 2 females and 1 male. This decision was made due to the previous years selection being more males than females. Recruitment was made by advertising within local high schools in the area. No crew leader was hired because of the few number of enrollee positions awarded to Ottawa for 1988. Camp supervision was directed by the refuge staff.



Happy YCCers! Left to right: Kelly Mauter, Kim Mauter, Scott O'Reilly (CM)

Work projects totalled 11 coded activities. Projects included boundary posting of refuge units, kiosk, gate and sign painting, mowing, maintenance cleaning, lodge and cabin maintenance, parking lot landscaping, trail maintenance, trail bench construction and bench installation. A multi-media first-aid course was completed through the Red Cross and several environmental education field trips were taken. A general orientation was given the first day of work to acquaint enrollees to the refuge and YCC program.

Trail work was only one of many projects the three enrollees completed. (CM)

Enrollee paid hours for the 8 week camp totalled 893 hours, including a paid holiday, at a salary cost of $3,212.60. Cost of materials totalled $716.49. No crew leader salary was obligated. Total camp cost for the year was $3,929.09.

Environmental Education activities for enrollees included field trips of a variety of conservation levels. They were given tours and talks by staff during visits to the Toledo Monument and Ohio Department of Natural Resources areas (Ohio State University Extension Fish Hatchery, Put-In-Bay).

Refuge staff were instrumental in providing Environmental Education input during field work projects.

No serious incidents or time-lost accidents occurred during the 8 week camp. However, YCC Enrollee, Kim Mauter, did have a response to the weather on July 27 which was diagnosed as heat exhaustion. The heat exhaustion symptoms occurred during a normal work period

and as a safety precaution Kim was transported to a local medical official for observation and was subsequently released.

Other minor enrollee incidents included poison ivy and insect bites.

4. Volunteer Program

The volunteer program continued to be quite successful in Fiscal Year 88 with 1,998 total hours donated. Two groups volunteered for a total of 60 hours. Volunteers have provided the extra manpower to assist refuge staff perform work duties such as: Tern project, goose neckband survey, tern census, purple loosestrife spraying, clerical work, photography, trail maintenance and general maintenance.

Volunteers help make life a little easier and refuge staff appreciate the contribution of each volunteer.

TABLE 5 1988 Volunteer Hours

Volunteers 1987	Hours Donated	Volunteers 1988	Hours Donated
Julie Indorf	388	Joe Komorowski	52
Al Kahl	166	Kathy Mock	48
Mike Crofts	213	Craig Limpack	48
Chris Crofts	885	Jeff Lammie	48
Allen Cornelius	21	Linda Sangrik	48
Mary Gloer	37	Art Weber	80
Dana Fall	5	Dave Kruger	28
Correne Cornelius	5	Joe Bass	400
Al Schlect	48	Mark Shieldcastle	35
Dan Lucas	48	Mary Ann Messerly	8
Scott Crofts	48	Ed Pierce	47
Andrea Fought	2	Northwood Boy Scouts	30
Paul Morris	8	Bexley Ohio Boy Scouts	30

Total Hours 1,998

5. Funding

TABLE 6 Funding breakdown for the last five year fiscal period

	FY 84	FY 85	FY 86	FY 87	FY 88	FY89
Operations & Maint.	264,800	232,900	200,300	254,800	264,000	298,300
ARMM's	74,000	131,000	95,200	62,800	26,200	0
Special Projects						20,000
Threats & Conflicts*	0	6,000	16,000	12,000	9,000	0
Farm Bill Funding						34,000
TOTALS	338,800	369,900	311,500	329,600	299,200	352,300

*Threats & Conflicts - Includes contaminates and purple loosestrife control.

In the past several years ARMM's funding has allowed us some repair of facilities, especially dikes, and replacement of some vehicles. These funds plus a portion of the purple loosestrife funding allowed us to purchase an airboat in 1988. However, other ARMM funding to shingle the shop building and a vehicle replacement was diverted to cover farm bill costs. In 1988, our fixed costs ran up to 87% of our budget, including the ARMM's funding (96% without ARMM's). It is apparent that our ARMM's funds are rapidly becoming a part of our fixed costs.

Our Fiscal Year 89 budget was even more of a disappointment. After the funds which are earmarked for farm bill activities and special projects, we are left with a realistic budget of $298,300. The fixed costs account for over 92%. We are also being told that some of this budget should be spent on farm bill activities. Thus we are really looking at reduced funding for this year, even though our salary cost are increasing by well over $25,000. Other fixed costs such as utilities, etc. are also increasing.

In summary, our 1989 budget is not realistic if we are to do even minimum maintenance of refuge equipment and facilities. The heavy workload of the farm bill activities is putting an even higher stress on our aging vehicle and equipment fleet. Farm bill funds must be used to keep this equipment in good repair if any of these programs are to continue.

6. Safety

In 1988, no accidents occurred involving staff and resulting in injuries or lost time from work. Two summer heat injuries required a visit to the local hospital by YCC enrollees.

An excellent program on ice safety was presented to the staff by a Ohio Dept. of Natural Resources Watercraft Specialist.

Federal OSHA personnel, on request, inspected the shop ventilation unit. The headquarters furnace was given an inspection and adjustments were performed to correct problems. The YCC crew, 3 staff and 1 volunteer attended the standard 8 hour Red Cross first aid course. Safety meeting/actions were held throughout the year and covered a variety of topics including:

-Electrical Safety and ventilation
-Winter driving and chain saw safety
-Defensive driving and equipment loading and unloading
-Tire Hydroplane
-Boating safety and defensive driving
-Heat humidity work hazards
-Railroad crossing and rabies
-Office safety
-Preventable accidents
-Tornado Safety
-Professional driving tactics

7. Technical Assistance

The Ottawa refuge staff has served on the Wetlands Task Force since it was started in 1980. The counties of Lucas, Sandusky, and Erie have recently joined with Ottawa County in the task force. Almost all marsh owners in the entire northwest corner of the state are

represented. The private and public wetland managers meet to help each other and the public with wetland problems and the eradication of purple loosestrife. The task force was originally formed to assist and encourage Ottawa County landowners to convert wet areas of their land into wetlands.

The refuge staff worked on Farm Bill activities throughout the year with the heaviest workloads from April through August. Inspections were completed on FmHA inventoried lands in Lenawee County, Michigan.

The refuge led a team which restored over 120 wetlands in Indiana and Michigan. Work began in early spring by contacting farmers enrolled in the Conservation Reserve Program (CRP) program with the information that we would restore any wetlands on their lands. Response was excellent and we began a program of breaking and plugging tiles and damming drainage ditches that drained these wetlands.

Most work involved removing approximately 40 feet of a drainage tile and/or building small dams and ditch plugs to retain more water. Refuge Manager Tansy and Assistant Manager Cornelius evaluated each response by working with the individual farmer and then supervised the work crews.

Work was accomplished using the backhoe and 450 dozer from Ottawa and the 750 dozer from Muscatatuck NWR. Operators included personnel from Ottawa, Muscatatuck, as well as Clarence Cannon NWR, Flint Hills NWR, and Loxahatchee NWR. John Allen from Clarence Cannon spent three tours (6 weeks) in the area.

The following pictures describe the work.

Given a grassy field, now enrolled in the Dept. of Agriculture Conservation Reserve Program, which is tiled and/or ditched to drain a former wetland, ... (SC)

Now with a willing landowner a little backhoe work to plug a tile, and/or a dozer to build a small dam ..... (SC)

And we can restore some of the wetlands that have been drained for decades. (SC)

Work often included installing a drainage culvert with riser. We normally made use of the common plastic culvert materials. (SC)

In many instances, landowners had already attempted these restorations. This landowner had previously created the wetland by plugging the drainage dike with his small Ford tractor and loader. However, the small dam washed out. We built a sizable dam complete with spillway, overflow riser to create a 5-6 acre wetland. (SC)

Refuge crews seeded the areas in the fall. Dam with riser and trash guard in the foreground. Dry marsh with heavy stand of smartweed is in background. (SC)

October rains filled most of these wetlands to give excellent migration habitat and set up next spring and summer nesting areas. (SC)

F. HABITAT MANAGEMENT

1. General

Habitat at Ottawa National Wildlife Refuge consists of a variety of wetland types (65%), grasslands (20%), croplands (8%), forest and brush land (4%), and dikes and roads (3%). Marshes are managed to provide year-around food, cover, and nesting habitat for waterfowl and other migratory water birds. Moist soil and cropland units provide food for migrating waterfowl and grassland units provide nesting cover for waterfowl, and other migratory and 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.

Moist Soil Units are managed to provide annual early successional mud flat species, such as smartweed, wild millet, etc. Annual drawdowns cause the unit to progress through a series of successional stages from the early smartweed/millet stage through the beggarstick/perennial stage, to the woody growth or cattail stage. The early stages are the most productive and can only be maintained by tillage of the soil or by a period of flooding for 1-2 years.

It is important to note that most of Ottawa's management capabilities revolve around gravity drainage. In the mid to late 1970's, energy conservation was a factor in the design of water control structures. Dual flap gates on screw gates that faced in opposite directions were installed. Gravity was all the energy needed and the system worked well during those years, when Lake Erie levels were ideal for refuge management and the wind tides cooperated with each blow from the southwest and northeast.

With record high water levels set in 1985, 1986 and early 1987, gravity control structures were no longer adequate. High water levels in pools could not be relieved without a major cost in money and human effort to pump it out with portable Crisafulli pumps.

Severe erosion took place on all unprotected dikes. Defects in dikes caused by groundhogs and muskrats became evident. Carp found these dike leaks and wallowed out several feet of dike. Faulty water control structures became more serious as the pressure from high water tested their capabilities. Hundreds of acres of emergent vegetation were lost due to flooding and the lack of ability to gravity drain in the high water years. Decreased water levels in mid 1987 permitted adequate drainage to relieve pressure on the dikes.

In 1988, many areas were drawn down to revegetate and facilitate renovation of damaged dikes, water control structures and pump stations. Unfortunately, the drought early this year completely dried areas that were to remain partially flooded. There were no spring or summer rains to replenish the soil moisture and low lake levels prevented gravity filling most units. The low lake levels prevailed until late November, making it impossible to reflood many units without costly pumping. One positive aspect of the drought was the die off of thousands of carp in refuge pools. Water quality and submerged aquatics growth should improve next year.

An undesirable aspect of the construction and drawdowns is the expansion of the purple

loosestrife infestation that we are already having difficulty controlling. The lower water levels this year facilitated its spread in several units (especially the Pheasant Farm). Private wetlands and state park lands adjacent to the refuge are heavily infested and provide a constant source of re-festation even when control actions are effective in removing adult plants. Overall, the refuge is slowly losing the battle. All major divisions of the refuge are at least slightly infested. Control expenditures at the level of the past few years is slowing the spread and stopping a rapid takeover.

Another aggressive aquatic plant of concern is Phragmites. Phragmites started out in several units as small clumps, but has steadily increased the acreage it dominates. If it continues to expand at this rate, it may become a serious problem in Cedar Point - Pool 2 and the Show Pool. An aggressive control program will be initiated in 1989.

Ottawa Wetland Units

Pool 1

Water was drained slowly from May to July by gravity drainage, and pumping through the adjacent Ohio Dept. of Natural Resources pump, and was finished with the Crisafulli pump. The drought completely dried up residual water in the bays by late July. Levels remained low for the rest of the year as new dike construction proceeded.

Mudflats and dying carp attracted a great number of shorebirds, herons and egrets. Staff and volunteers regularly checked the area for signs of a botulism outbreak with negative results. Excellent stands of nutsedge in the low areas and millet/smartweeds in the higher elevations resulted from the drawdown. There was no germination of purple loosestrife, but several new clumps of mature plants were sprayed after the area was surveyed with the ATV. The 6-8 inches of water in bay areas attracted large numbers of migrating waterfowl in the fall. Peak populations in the unit reached 5,000 birds.

A construction contract was awarded to the George Gradel Company in March to reconstruct the north and south dikes and replace the silted water control structure on the southeast corner. Work began in August and by the end of the year, earthwork was completed on the north dike. The rest of the contract will be completed in 1989.

Pool 2A

Water levels were at the desired levels due to our ability to add water without costly pumping. The drought slowly evaporated water in the pool until the ditch was almost dry (approximately 3 feet below pool bottom). Water was eventually added by gravity filling until it was high enough to flush the sand out of the 2A/2B water control structure.

The objective of encouraging emergents was not realized because of the low water levels. However, excellent stands of moist soil annuals did develop in the mudflats to provide food for migrating waterfowl. Cottonwood, willow and sweet clover dominated the higher elevations. The area was heavily used by waterfowl late in the year.

The north, south and west dikes are in excellent condition. The east dike has some erosion problems at the toe. The clogged water control structure was cleaned and a water level gauge was installed.

Pool 2B

The scheduled spring drawdown was delayed due to wetland restoration activities. The area cannot be gravity drained unless the adjoining units are completely dry, so the Crisafulli pump was used to draw the water level down. After vegetation responded, water was added slowly from 2C until the planned level of 570 feet was reached in the fall.

Excellent submerged aquatics developed in the bay and were heavily used by wood ducks until late summer. The cottonwood seedlings in the bay were dead, but more seedlings covered the higher elevations on the east side. Good stands of millet and smartweeds grew along the pool edges.

The silt and sand that clogged the water control structure between Pools 2A and 2B was flushed out by the high water levels in the fall. A water level gauge was placed in the north west barrow pit. It covers the lower elevations not covered by the gauge on the pool 2B/C water control structure.

Pool 2C

The unit was kept at a stable level to drown cottonwood seedlings in the bays and encourage emergents in the shallower areas. The cottonwood seedlings have been set back, and narrowleaf cattail is spreading throughout the unit. Smartweeds and millets covered half of the pool.

Pool 6 (Woodies Roost)

The pool's eroding dikes are incapable of retaining the water levels as high as desired. The water level dropped with lake levels and adjacent Ohio Dept. of Natural Resources areas in the spring. Efforts to let water in through the Ohio Dept. of Natural Resources canal failed when the water leaked out and/or evaporated. Water levels rose in the fall when lake levels rose. As a result the adjoining marsh was reflooded with precipitation and lake water.

The objective to open the dense cattail with high water was not met. However, vegetation response to the unexpected drawdown was excellent. Dense smartweed grew along the waters edge and in muskrat eat outs.

East and south dikes are no longer capable of retaining water. Both dikes are severely eroded in areas and are riddled with muskrat and woodchuck holes. The north half of the east dike is overgrown with sumac and dogwood and is barely wide enough to ride an ATV on. The north dike also has some erosion and muskrat hole problems.

Pool 3

Water levels fluctuated with Lake Erie until the dike was plugged and the pool drained in August by the dike contractors. Precipitation filled the pool after earthwork was completed in November.

Although water levels were not controlled, lake levels came down enough to allow excellent stands of smartweed and walter's millet to grow in all sections but the main bay.

Show Pool

A faulty water control structure allowed the pool to fluctuate with Lake Erie until July. At that time, a coffer dam was installed for the flood damage pool dike construction. It remained in place until the end of the year. Water levels were fairly stable July through December, approximately 6-8 inches below the general pool bottom leaving water in the deeper ditches and old borrow pits.

Smartweed covered areas that were previously open water.A Phragmites patch is expanding and should be controlled. Cottonwoods have either died or been set back by previously high water levels.

Entrance Pool (Headquarters Pool) - 35 Acres

This area was gravity drained from March to June. A foot of water was added in July and again in August to reduce the botulism potential around the water control structure and to wet the pool. Precipitation filled the pool in the fall.

Excellent vegetation response with smartweed and millets developed in the lower areas. Unfortunately, purple loosestrife and invading hardwoods also developed.

Mini-Marsh - 16 Acres

Precipitation was allowed to fill the pool until mid March. After the stoplogs were pulled, the area drained as lake levels declined. It remained dry until September when lake levels rose. One board was replaced and precipitation partially filled the pool. Lake levels did not rise enough to bring pool levels as high as desired. (572 feet above sea level)

Nutsedge and smartweeds covered the east end of the marsh and muskrat eat outs. All carp died when the pool dried up.

This area is scheduled for construction funding within the Pool 7 Project if any flood damage funds remain after the current projects are obligated.

Moist Soil Unit (MSU-3) - 213 Acres

Water levels were allowed to remain high to provide much needed brood habitat until construction required that it be completely dry. The unit drained slowly through 1 or 2 unbroken tile that are functional when the ditch is low. Levels were kept below the general pool bottom August to December for dike construction.

There was an excellent response to the late drawdown with a good interspersion of cattail, smartweed, millet, bulrush and bullreed. Unit was well-used by waterfowl in the spring, but lack of water in the fall reduced duck use.

Moist Soil Unit (MSU-4) 106 Acres

Water control structure gates opened in March to allow the unit to gravity drain for construction. The unit was drawn down early so preliminary work could be done on the north end before refuge equipment was reassigned to wetland restoration activities. The unit was kept dry for the rest of the year as dike construction proceeded. Approximately 20 acres

of corn were planted in 3 plots for blackbird depredation research. Areas that were not planted to corn produced only a sparse covering of smartweed, reed canary grass and willow. The area was kept too dry to produce soil plants. The corn planted for black bird research did not develop any kernels on the cob. There was comparatively no waterfowl use this year.

Moist Soil Unit (MSU-5) - 213 Acres

This unit was drawn down in late Spring and kept dry for the rest of the year for dike construction as planned and the unit was not reflooded in the fall. Vegetation response was poor over the entire unit. The early drawdown and very dry conditions during the spring and summer encouraged more velvetleaf, cockleburr and established willow seedlings than moist soil plants. Some areas remained bare soil. A few small stands of smartweed grew in low areas or close to the ditch. Large areas of cocklebur/velvetleaf and saplings were mowed in August. The new sponge weed wick was used to apply Roundup to willow sprouts with variable results. The wick will have to be tested again next year to determine if it works adequately. A ten foot wick is not wide enough to cover large areas in short periods of time. It should be used in small localized areas only.

Approximately 200 acres of Moist Soil Units were treated with a wick application of Rodeo to control willow and cottonwood. Results were good. (JI)

Moist Soil Unit (MSU-6) - 65 Acres

The unit fluctuates with the lake through breached dikes. The lake levels dropped this year from their record levels in 1986-87, so the unit remained dry.

Excellent stands of smartweeds and millets interspersed with cattail developed. The cattail will be replaced if lake levels remain low. Willow, cottonwood and phragmites are expanding into the area.

The north and south dikes need complete rebuilding to make this a functional unit. The east and west dikes will also require major repairs. Minor extension of inlet/outlet culverts to the moist soil pump is all that's needed to provide active water level control if the dikes could hold water. There are no current funds to renovate this unit.

There is no way to control water levels in this unit. It is kept in the management regime as a reminder that it requires attention.

Moist Soil Unit (MSU-7A) - 49 Acres

A faulty water control structure delayed drawdown. It was pumped down with the Crisafulli pump in late March and kept down through December for construction.

The area was extremely dry all summer. Plans to farm part of the unit were dropped. Upland species such as goldenrod, cocklebur and asters covered most of the unit. Barley foxtail grew in the lower areas.

The faulty water control structure was repaired in November. Concrete for the new pump station was poured, but the remainder of the station will be completed in 1989. The north dike is severely eroded with some areas barely 3 feet wide. It is scheduled for reconstruction if there is enough money after all other projects are done. At this time, funding is unlikely to stretch that far.

The new pump station is covered under the Tank Ditch contract and will cost $42,500. Electricity for pumping cost $174.63 for 1988.

Moist Soil Unit (MSU-7B) - 44 Acres

This unit has no independent water control structure. All water level management is accomplished through MSU7A.

Low areas in the unit trapped enough water to produce several small stands of millet. Upland species dominated the rest of the unit and cottonwood was invading the north and west side. This area was plowed in early summer.

Moist Soil Unit (MSU-8A) - 47 Acres

Water levels from May to November were set to fluctuate within 6" of the general pool bottom. The ditch was completely drained when construction required it in November. Leaving the water at general pool bottom level or slightly above keeps the ground moist and

discourages velvetleaf and cocklebur from germinating.

Mixed results occurred with good stands of beggarstick and smartweeds mixed with even better stands of solid velvetleaf and cocklebur. Submerged aquatics developed on the east end. Excellent duck use occurred in the summer, when most marshes on and off the refuge were dry due to drought and drawdown.

Replacement of the farm pump started in November. The concrete walls were poured by the end of the year. The eroding west dike was shored up with muck from the canal and graded to provide better access for the contractors.

Moist Soil Unit (MSU-8B) - 85 Acres

Scheduled drawdown was delayed until June to provide more wetland habitat for the spring waterfowl migration. Water was added early fall to slowly flood the unit. Contractors pumped water into 8B to drain Radar ditch in October, completely flooding the unit.

The late drawdown resulted in excellent millet and Bidens response on the higher elevations and less velvetleaf and cocklebur. The unit was well used by waterfowl the entire year.

Cedar Point Units - Pool 1 - 1460 Acres

The pool was drained in the late Spring, although we expected to retain some water in low areas. These areas evaporated by late June and could not be refilled because of low lake levels. The low lake levels predominated throughout the fall keeping the pool levels lower than planned (572 feet). Water would have been retained at a higher fall level if sticks had not jammed the structure open. The dilapidated trash guards were replaced after a foot of water was lost.

Areas that were open water last year developed dense stands of Walter's millet, smartweeds and nutsedge. Loosestrife did not germinate or spread as feared because of competition with 6 foot smartweed. The area was too dry to encourage emergent vegetation as originally hoped, but the vegetation in the bays should keep wind and wave action to a minimum and improve water quality in the upcoming years.

Past high levels have caused erosion along the north, southwest and south dikes. The drainage canal between the Pheasant Farm and pool 1 is severely eroded and scheduled for renovation in early 1989. A majority of the road system needs gravel. The dike that borders the fishing barrow pit is becoming dangerously narrow in several spots.

Cedar Point produces lush stands of smartweed and .....

Fall rains added water, then came the ducks.....

. . . . . and more ducks. Peak population numbers during November were estimated at over 117,000 birds at Cedar Point. Many biologists indicated this was the highest population they had ever seen in this area.

Pool 2 - Pool levels are directly connected with Pool 1 through the interconnecting water control structure. The structure was opened last March, allowing Pool 2 to drain with Pool 1. The drought completely dried the pool. Fall rains added several inches to the water level, but there was no direct way to add water.

Excellent stands of smartweeds, millet and nutsedge developed in open areas. The centers of the bays grew only sparse clumps of nutsedge. Cottonwood seedlings germinated in the east end. The Phragmites stand continues to spread farther into the pool. The area should be burned next year.

Pheasant Farm - 155 Acres

Water levels dropped slowly from March to August. After the first 6 inches of water were drained, the rest leaked through the dikes or evaporated. The unit remained low until precipitation and rising lake levels flooded it again.

The objective of keeping water off the face of eroding dikes was accomplished. Vegetative response to the low water levels include good stands of smartweeds and bulrush and also purple loosestrife.

The dikes of this unit are in poor condition. Banks of the west and east dikes are severely eroded. The south and north dikes are eroded on the interior sides only.

Darby - Pool 1

The scheduled partial drawdown was delayed to provide resting/feeding habitat for spring migrants. Levels dropped lower than expected in summer due to the drought. Slightly higher lake levels did not bring pool levels up as desired.

Water not choked with spadderdock, pickerel weed or lotus was full of submerged aquatics (canals and east end). Exposed edges had good stands of smartweeds and millets. Rose mallow and purple loosestrife continue to be a problem in the unit. Waterfowl use was steady throughout the year.

American Lotus gives color to the marsh but chokes out other desired aquatic plants. (CM)

Darby - Pool 2

Drawdown was delayed to provide spring migration habitat. Low lake levels prevented re-flooding in the fall.

Excellent mixture of Walter's millet and smartweed throughout the pool. Purple loosestrife infestation remained stable despite efforts to control it.

Darby - Pool 3

A faulty water control structure made levels impossible to manage. Water levels rose and fell with the level of the canal.

Nutsedge, smartweeds and millets covered the entire unit.

The north, east and west dikes are eroded on both sides and need re-sloping and rip rap protection. The south dike is in good condition. The water control structure culvert is rusted all the way through and efforts to patch it with steel and tar were unsuccessful.

Darby - Pool 4

The spring drawdown by gravity drainage still left 70% of the unit covered with water. The drought dropped the water level another foot by August, exposing much of the unit and leaving only a shallow pool in the center. The area was reflooded in the fall to allow neighboring farmers to get water into their hunting areas.

The pool edges developed excellent stands of nutsedge, millets and smartweeds. Water quality should improve next year with reduction in wind and wave action and in the number of carp. The area was used by a variety of diving and dabbling ducks in the fall and winter.

Navarre - Pool 1 - 470 Acres

Water levels generally followed the water management plan for the year. The plan proposed a drawdown until the area was soggy to wet, then conducting vegetation transects and allowing rain to fill it in the fall or add water if necessary. There is still some problem in getting the union at Davis Besse to follow the plan closely.

Vegetation response was excellent as millets and smartweeds pioneered all available areas.

Navarre - Pool 2

Water levels were as planned (complete drawdown in the spring to encourage germination of annuals and shallow flooding in the fall) with a slight deviation in the summer. The level was drawn down 6 inches too much and the unit filled too soon.

The objective of encouraging annuals was accomplished. Smartweeds, millets and rushes grew in all available space.

Navarre - Pool 3

The lease agreement was finalized May 1988. The pool was drawn down in the spring. The summer drought conditions dried the soil enough to create large cracks on the pool floor. Water was added in November, when the gates to the Toussaint River were opened. When the gates were closed, pool levels had risen to the bottom of the culvert pipes.

A monoculture of 6-7 feet smartweed developed with cottonwood stems interspersed. The smartweed stems were not as dense as normal because of the lack of rain, but once their roots reached subsurface water, they grew quickly.

The environmental section of Davis Besse has ordered flap gates for the interior side of the structure to prevent water from flowing out when the lake is low.

4. Croplands

Cropland management was accomplished by cooperative farming agreements. Our cropland program is designed to provide rotational tillage of the moist soil units and support the goose hunting program.

TABLE 6 Crops Planted by Farm Unit - 1988

Unit	1	2	9	10	MS-4		Total
			Refuge Crops				
Corn	5.6	13.7	4.8	4.8			28.9
Switchgrass		10.1	14.0				24.1
			Cooperator's Crops				
Soybeans	10	43.8	20.8	28		102.6	
Corn	10.4	19.8	23.8	13.2	20		87.2
Total Row Crops	26	77.3	49.4	46	20	218.7	
Acres	26.0	87.4	63.4	46	20		242.8

The above mixture is designed to meet our objectives of providing research needs, brush control, moist-soil management, and crop rotation. However, the drought conditions led to severe losses on most of the crops. Several fields experienced complete failure and severely reduced yields occurred on all the others.

MS-4 was again farmed by the APHIS (old ADC) group for their blackbird deprivations research. Approximately 20 acres of corn were planted in three separate plots and then treated with different chemicals for evaluation of blackbird repellents. All work was done by a cooperative farmer with costs being paid by APHIS. Unfortunately, the dry conditions did not allow the crop to produce and the entire project was tabled for the rest of the year.

A number of acres were scheduled to be plowed in Moist Soil Units and planted to millet as our share of the crops. However, since drought conditions made heavy crop losses, these provisions were dropped and no moist soil work was done.

Approximately 30 acres in Unit 11 were plowed and scheduled to be planted to soybeans in 1988 and switchgrass in 1989. Because of the drought, the soybeans were not planted and this project will be delayed a year.

5. Grasslands

The Switchgrass fields in Units 8, 9, 10, and 11 produced some seed, but seed production is beginning to decline in these fields. We were planning to harvest a majority of this seed,

but lower production, and wet fall conditions prevented this. This loss of seed will interfere with plantings. Seed production will probably continue to decline until we can burn these fields.

9. Fire Management

Several of our grassland fields are in need of prescribed burning. Unfortunately, the manpower necessary for the writing of the required fire control and prescribed burning plans have not been available and this management tool is simply not an option to us until these plans can be completed.

10. Pest Control

A. Purple Loosestrife

Once again the struggle to contain and eliminate purple loosestrife on Ottawa has been touch and go. This summer's drought in unison with the construction drawdowns and re-vegetation drawdowns both helped and hindered efforts by improving access but also improved germination conditions. Individual scattered plants can be found in every wetland unit of Cedar Point, Darby, Navarre and most of Ottawa.

A light, maneuverable airboat was finally ordered in June, but not picked up until December. This late arrival of the airboat made little difference in spraying because only one unit contained enough water to use it. It will also be a welcome change from spraying on foot with backpack sprayers!

As mentioned, many units were drawn down this summer to allow reconstruction of dikes damaged by high lake levels. The drawdowns took place from May to July (with some help from the drought) and facilitated the spread of loosestrife in two areas that were already heavily infested. Most areas, however, either remained status quo or spread slightly. These areas were dry and readily accessible by foot or vehicle. Unfortunately, the ATV was tied up with wetland restoration work and was not available for a majority of the spraying season. Wetland restoration also hindered spraying efforts by making much needed vehicles and maintenance personnel unavailable at critical times. The remaining crew had less time to devote to spraying due to the absence of staff members supervising construction crews.

Despite lack of transportation, and equipment failures, total man hours devoted to spraying increased slightly in 1988. Unfortunately, more time was devoted to spraying on foot, rather than with the more time efficient 55 gallon sprayer.

There was a priority change in regional policy from spraying heavily infested areas to surveying areas of little to no infestation. Areas such as the pheasant farm will be virtually abandoned to protect areas that still have a chance of being saved.

Volunteers accounted for 55% of the spraying effort this year, a 4% drop from the last year. The attempt to get local conservation clubs to assist in controlling loosestrife fell through when communications got crossed. Two dedicated volunteers assisted regularly as well as the YCC enrollees. Both volunteers and YCC should be commended this year for work well done. High temperatures and difficult terrain made the foot work almost unbearable. The refuge staff's ability to cope with the spraying program at its current level would be severely hampered if the level of volunteer time should drop.

Cedar Point Control Efforts

Pool 1 and Pheasant Farm received comparable amounts of time and spray this year. Originally, it was intended that the pheasant farm would hold enough water to discourage purple loosestrife germination. Unfortunately, the water either drained out through muskrat holes or evaporated by mid June, allowing for a marked increase in germination. This area is not a complete loss, but is fast approaching it. The best control now would be to mow or farm the area to reduce the seed source and help keep it from spreading. To control the loosestrife by spraying now would require a helicopter or two weeks with a large crew.

Loosestrife did not spread much in Pool 1, possibly because the drawdown occurred later when conditions were favorable for competing species. In fact, mature plants that had 6 foot high smartweed to compete with, exhibited smaller leaves and less vigorous growth patterns than normal. Spraying efforts were primarily concentrated on the areas closest to the dikes for several reasons; tall, dense vegetation, large cracks, high temperatures and humidity made it impossible to venture far. Not to mention the logistics of covering a 1,500 acre marsh with 2 to 4 people and 3 gallon backpack sprayers. The ATV was utilized for 3 days towards the end, but it was unreasonable for one person to cover that much area with so much to do elsewhere. Even with the airboat last year and 55 gallon sprayer, we were hard pressed to cover Pool 1. As a result, there will be many heavily infested areas in the center of Pool 1 next year.

Pool 2 showed a slight overall increase in infestation. The large patch sprayed last year did not resprout, but first year plants did grow up under it. The smaller patches near the north dike reacted the same way. A few mature plants were discovered further into the cattails indicating the infestation is slowly spreading into more inaccessible areas.

Assistant Manager Fehribach put many arduous hours in hand spraying purple loosestrife with the assistance of volunteers. (MT)

Darby Control Efforts

Pool 1 was the only pool in the complex with enough water to make it accessible by airboat. However, the water was low enough to reach the worst areas on foot. One patch was still unreachable because of deep muck that had not solidified. Areas near the dike were sprayed with the 55 gallon sprayer and 2 lengths of hose.

Pool 2 is heavily infested in the middle and along the interior and south dikes. Lower water levels allowed us to cross canals to most sections of the interior dikes, but the center of the unit was sprayed only once. All of the outer dikes were sprayed with the truck mounted sprayer. The airboat will be a great help in this pool next year.

Pool 3 had only a few scattered plants on the western dike. The interior was surveyed, but no more plants were found.

Pool 4 itself has only scattered plants around the toe of the dikes, but the barrow pit and areas surrounding it consume a great deal of effort. These patches were sprayed heavily with the truck mounted sprayer and 2 lengths of hose. The kill percentage on all areas was excellent.

Ottawa Control Efforts

Twenty-four units were surveyed at Ottawa this year, with at least one plant occurring in twelve of them. Four units, Pools 1, 3, 9 and the goose pen, had moderate to heavy infestations. Pools 1 and 3 were revisited at least once to catch late flowering plants. Pool 9 had a very large mature patch close to the lake that is not accessible by airboat or truck. It would be unreasonable to try to spray this area with anything less than the 55 gallon sprayer. Slight to moderate infestations occurred in the Entrance and Show pools, MSU5, 7A&B and MSU 8B, and Pools 2S&C. All areas were revisited more than once and are considered "clean" by the end of the spraying season. However, a viable seed source is found in each unit, so they should be revisited twice a year to insure that loosestrife does not establish itself on a permanent basis. It should be noted that spraying of the Goose pen area has been turned over to Crane Creek State Wildlife Experiment Station. We provided them with the spray and equipment, and they did the rest.

Navarre Control Efforts

Loosestrife surveys and spraying is accomplished by the Environmental Division of the Davis Besse Nuclear Power Plant. This year they reported a slight increase in the number of plants sprayed; from 15 to 18 plants. They also began an active control program on the private land next door that was the seed source for the infestation - approximately 210 plants were eliminated with Rodeo.

Funding from the Regional Office to control purple loosestrife has remained at $9,000 for the past three years, but was eliminated for FY89. This, compiled with other reduced funding, will have a severe impact on this management program.

B. Contaminants

Two electrical transformers were located on the refuge and removed. One was found on an old power pole covered with brush and the other lying in the water by Pool 9. Both were

old power pole covered with brush and the other lying in the water by Pool 9. Both were removed by the local power company, who accepted responsibility for removal and disposal. The company brought in a specialized team to safely remove the potentially hazardous transformers. Bill Kury, (ES contaminants specialist - Columbus) was contacted and informed of their recovery and removal. Both transformers contained low levels of PCB's (well below safety standards) but had not leaked.

12. Wilderness Areas

West Sister Island NWR is a wilderness island located 9 miles off the shore of Lake Erie. This island was visited several times during the summer.

G. WILDLIFE

1. Wildlife Diversity

The 8,504 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 on the refuge. Volunteers conduct bird species counts on all units once each month. Ohio Dept. of Natural Resources flies refuge units every other day for waterfowl census in the fall. Refuge personnel conduct an on land waterfowl population census biweekly in addition to the aerial counts.

2. Endangered and Threatened Species

Bald Eagles

The complex has had two active bald eagle nests for the past several years, one at Ottawa NWR, and one at Cedar Point NWR.

The eagle pair at Cedar Point abandoned the nest used for the past 3 years and built a new one down the dike in Lambs woods. The nest was successful with two fledged eaglets.

The Ottawa Division pair did not breed this year for unknown reasons.

3. Waterfowl

A. Ducks

Total duck use for the complex was 5.04 million use days, an increase of 27% over 1987. This exceeds the objective level of 4.0 million use days. Approximately 45% of the use occurred at Ottawa NWR with the remainder occurring at Cedar Point. Total use at Ottawa was 2.25 million use days as compared to 2.24 million in 1987 and 2.08 million in 1986. The largest increase in use days occurred at Cedar Point.

Spring peak occurred in March at Ottawa (4,249) and April at Cedar Point (22,425). Fall populations peaked at approximately 54,000 birds at Ottawa as compared to 40,000 in 1987. Dike rehabilitation occurred at Ottawa during the year with most of the pools being dry. As a result, total fall duck use was significantly lower than in 1987. The reverse was true of Cedar Point. It was in drawdown in the spring and accumulated large quantities of smart weed then was flooded in the fall there, increasing duck use over 1987. Cedar Point peaked at approximately 82,000 birds as compared to 28,000 birds in 1987.

B. Geese

Goose use for the complex was 1.36 million use days as compared to 2 million in 1987 and 1.55 million in 1986. This is well below the objective level of 1.5 million use days. Approximately 57,035 use days occurred at Cedar Point and 1.3 million use days on Ottawa NWR. A significant decrease in goose use was observed at both Ottawa and Cedar Point as compared with 1987 when 160,000 use days occurred at Cedar Point and 1.85 million at Ottawa.

C. Swans

Refuge use by whistling swans has been dropping consistently for the last four years. The estimated use days for 1988 totalled 2,450 use days compared to 7,200 use days in 1987, 14,000 use days in 1986 and 28,000 use days in 1985. Reports from the 1970's show hundreds of swans utilizing refuge units for an extended period. For the last few years, the swans have bypassed the refuge completely, or have stayed for only a few days in small numbers (2 - 30 birds). One explanation might be that the recent mild winters have allowed the swans to fly straight to their destination and not land for bad weather.

4. Marsh and Water Birds

Great blue herons, great egrets, and black-crowned night herons were abundant on the refuge 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 10,000 nests, and is the largest heron/egret colony 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 mudflats created by Lake Erie wind tides. Species found less commonly in the area include snowy and cattle egrets and little blue and green herons.

5. Shorebirds, Gulls, Terns, and Allied Species

Shorebirds/Gulls

Several shorebird species use mudflats throughout spring and fall. Ring-billed and herring gulls are common on the Lake Erie shoreline and nest on West Sister Island. Bonaparte and great black-backed gulls are found occasionally on the refuge.

Common Terns

Historically, common terns nested in several colonies around the island region in Western Lake Erie and on mud islands dredged up in Maumee Bay near Toledo. In Maumee Bay alone, there were an estimated 2,500 pairs of nesting terns in the 1960's. By 1987, those numbers were reduced to a few unsuccessful nesting attempts; due partially to the direct competition with ringbill and herring gulls for nesting sites and food. Several thousand ringbill and herring gulls now successfully nest at the Maumee Bay dredge site.

To combat the declining trend in the common tern population, Ottawa NWR, in cooperation with the Ohio Department of Natural Resources, attempted to reestablish a common tern nesting colony on the refuge in 1987 and 1988. Methods to encourage tern nesting include: site enhancement, social attractants (decoys and vocalizations), gull harassment, and predator control.

In 1987, the project consisted of one area at the end of the lake front dike. The second site, added in 1988, is a small sand bar that became available due to low lake levels. To make the area more attractive, both sites were dressed with rock to provide a suitable nesting substrate and excessive vegetation removed or sprayed with herbicide. Tern decoys were placed, and vocalizations of a nesting colony played to attract terns migrating through.

An exposed sand bar became available due to low Lake levels and was the site of the common tern nesting project. Gulls were a serious problem. (DK)

Summer public use activities created an increase in the number of visitors illegally hiking in the common tern nesting site. (DK)

To keep human disturbance of the site down to a minimum, the car cassette player with two outdoor speakers was shut off at night by a photo electric cell. Two solar chargers were hooked to the marine batteries to keep them charged longer. The player was kept in a light colored, ventilated, wooden box to keep the tapes from being distorted by heat. The area was also signed and patrolled regularly to keep fishermen and sunbathers out of the area.

Gulls were harassed by repeatedly destroying all nests within a one-mile radius and placing mylar strips zig-zag across the island to confuse the gulls. Cracker shells and dead gulls were used to discourage them from coming back to the island. When all this failed to keep gulls from nesting in the area, the gulls were shot.

Predator control consisted of placing five live traps within a one mile radius of the nesting sites. Targeted species were skunk, opossum, and raccoon. Traps were checked daily and all predators taken to Cedar Point and released. An electric fence was constructed along the lake front dike in 1988 to exclude predators that avoided the traps.

Observations of the project site were made on a nearly daily basis, April through July. Over 260 observation hours were put in by the staff and eight volunteers.

The 1987 attempt was successful in that two nests were discovered. The first nest with two eggs was found in early June, but disappeared within 11 days. In July, another nest containing three eggs was discovered. Unfortunately this nest was destroyed by predators by the next day.

In 1988, there was no regular use of the area until the middle of June. From then on, terns were sighted in small numbers on a daily basis, but did not use the project site.

Other Tern Species

The refuge is also used as a migratory stop over for Forster, Caspian and black terns.

6. Raptors

The spring raptor migration is recorded by volunteers from the visitor's parking lot. Unfortunately, the number of observation hours varies greatly each year, depending on the weather. This year's "watch" proved difficult because of the lack of south west winds during observation hours. Results for the last four years are as follows:

TABLE 7 Four Year Raptor Observations

Species	1985	1986	1987	1988
Turkey Vulture	337	458	48	33
Unidentified Accipiter	4	1	0	0
Goshawk	2	0	0	0
Sharpshinned	381	232	49	183
Coopers hawk	65	37	14	10
Unidentified buteo	49	19	30	7
Red-Tail	525	397	46	38
Red Shouldered	168	137	43	1
Broad-Winged	15	1226	99	25
Rough-Legged	15	20	10	10
Unidentified Eagle	1	0	0	0
Golden Eagle	8	0	0	0
Bald Eagle	4	4	4	1
N. Harrier	53	36	7	5
Peregrine	1	0	0	0
merlin	2	0	0	0
American Kestrel	62	34	2	13
Osprey	28	5	1	16
Total # Birds Observed	1,720	2,606	349	332
Observation Time (Hrs.)	118.8	103.4	24.5	19.42

7. Other Migratory Birds

The USDA, APHIS, Ohio Field station, Sandusky, Ohio, (formerly FWS-ADC) continued its research with blackbird depredations in field crops.

8. Game Mammals

Visual observations made of mammals indicate a slight rise in raccoon, fox and deer populations from last year. Muskrat populations dropped dramatically due to the drought and a high number of drawdowns.

14. Scientific Collections

Several blue-wing teal were collected from MSU 3 in connection with the invertebrate study done by Terry Riley this year. Gypsy moth traps were placed at selected locations on the refuge with negative results.

16. Marking and Banding

Approximately 1000 geese were banded by state personnel during the annual flightless goose round-up in June.

The Ohio Dept. of Natural Resources biologist, Mark Shieldcastle banded black-crown night herons on West Sister Island and numerous songbirds at Ottawa and Navarre.

Only 147 of 600 goose neckband observations were completed by the end of the year. Volunteers contributed many hours with little success. The mild winter conditions allow the birds to remain dispersed and in fields off refuge, making observations extremely difficult to obtain.

Joe Komorowski, a local volunteer, in cooperation with the Ohio Dept. of Natural Resources biologist planned to mist net and band hawks during the spring migration. Unfortunately, uncooperative winds provided only one good banding day and no hawks were caught.

II. PUBLIC USE

1. General

Public use at the refuge declined again in 1988. Visits totalled 58,087 based on a car count of 10,550 cars traveling the entrance road. Visitation reported in 1987 totalled 79,542 based on a car count of 26,514 cars. The 1988 visitation is a decline of 27% from 1987 figures. Uncontrolled factors to contribute to the visitation decrease could include: 1. Dike repair in the vicinity of the trails utilized by the public created parking inconveniences throughout the year. 2. Unusually hot, humid, weather created uncomfortable summer days. 3. First-time Entrance Fees being collected from April 1, to November 1. 4. Vacancy of ORP position.

Ottawa's Interpretation and Recreation programs were officially assumed by Outdoor Recreational Planner (ORP) Charles Marshall. ORP Marshall's first project was implementing the entrance fee program. It took considerable time to get everything ready for the April 1 start date with frequent rains not helping. Entrance fee collection started as scheduled. Fee collection monitoring during the program indicated good compliance. Fees were $2.00/car or $1.00/person for vans and buses. Exceptions are for those who possess a valid duck stamp, golden eagle, golden age, or golden access passport. School groups, educational groups, and official business groups were exempt from the fee collection at the manager's discretion.

The honor system collection method was used and monitoring during the program indicated good compliance. (CM)

TABLE 8 Fee collection receipts for April 1 - November 1 (in dollars)

	April	May	June	July	August	Sept.	October	Total
Daily Entrance Fee Passes:	$290.68	$640.00	$294.66	$227.30	$311.55	$217.00	$253.62	$2,322.00
Duck Stamps:	90.00	-0-	-0-	-0-	170.00	220.00	60.00	540.00
Golden Eagle:	50.00	25.00	125.00	-0-	-0-	-0-	-0-	200.00

Other Passports issued for 1988: (numbers)

Golden Age 92
Golden Access 2

2. Outdoor Classrooms - Students

The Butternut Lodge Environmental Education site was utilized on a limited basis during the year. Management planning currently outlines the removal of the Lodge due to poor condition of the building and it's location. Funding did not permit any rehabilitative upgrading of the three adjacent on-site cabins for visiting Environmental Education groups. Students visiting the refuge, to participate in outdoor classroom activities and on-site programs totaled 887 students for 2,251 activity hours. Students visiting varied in size, number, education level and localities. A general refuge orientation and wildlife program was presented to 30 students visiting from France.

Future Biologists at work! (CM)

The annual Fifth Grade Conservation Tour was completed with over 500 students visiting the refuge on September 23. This event has been conducted on the refuge for 18 years. Ottawa County Fifth Grade Conservation Day is sponsored by the refuge in cooperation with the County Office of Education, Soil and Water Conservation District and County Extension Service. Guest educators speak to the students on resource awareness topics.

The annual Fifth Grade Conservation Tour makes learning outdoors a lot of fun for students. (JI)

Approximately 200 National Wildlife Week packets were mailed to local schools. This years theme "Forests Are More Than Trees", was presented to several schools with encouragement to visit the refuge and conduct activities with students.

3. Outdoor Classrooms - Teachers

A total of 120 teachers with 425 activity hours participated in environmental education programs. Teachers visited for overview orientations of interpretive and resource site study areas for students. A Project Wild and Project Wild Aquatics workshops were held in the fall. Professor Gerry Underfer from the University of Toledo and teachers Ana Pope and Tom Vance were instrumental in helping to coordinate and conduct both workshops for a total of 33 participating teachers.

4. Interpretive Foot Trails

This years visitation decrease was reflected in visitor trail usage. The previous year visitor trail usage recorded 47,724 visitors for 143,172 activity hours. Hiking the trails and observing wildlife were the activities that occurred. 1988 visitor trail usage recorded 18,988 visitors for 56,968 activity hours. This was a 60% decrease from last year. Hot humid summer weather, contractor activities and entrance fees could have contributed to this decrease.

The visitor parking lot and interpretive kiosk were improved. The kiosk area had a hand rope railing and a bench installed. Interpretive panels with a leaflet dispenser were attached to the kiosk completing the planned work projects. This provides initial refuge information to visitors who are hiking foot trails. Other improvements included landscaping and transplanting two pin oak trees near the kiosk.

Visitors are now provided general refuge information more readily from the newly completed Kiosk. (CM)

Five sitting benches were constructed and installed on dike trails on sites where wildlife are highly visible. Many visitors enjoy resting from long hikes at these sites.

Five interpretive panels were purchased and will be installed on trails for awareness of management programs and wildlife found on the refuge. Two panels, wading and shore birds and waterfowl identification were purchased from Wilderness Graphics, Inc. located in Florida. The Ohio Audubon Council was instrumental in obtaining the panels for $750 and donating them to the refuge through the adopt a refuge program. Three other water management panels were purchased through the service's sign shop in Winona.

6. Interpretive Exhibits/Demonstrations

Two offsite exhibits were developed utilizing the System 70 panels. Staff participated in the Bowling Green University "Earth Day". Bald Eagle panels on loan from the Washington Public Affairs Office were incorporated in the standard system 70 text panels. General refuge information was also available. System 70 panels were displayed by staff at the Toledo Zoo's "Vanishing Horizons" conservation day. Several thousand people attended the affair.

An exhibit was staffed at Crane Creek Wildlife Experimental Station Visitor Center for the Waterfowl festival. This was the refuge's first year participating. The refuge can gain much exposure in this rapidly developing event.

A refuge open house was held on October 30, with films shown and items of interest discussed. A local carving club set up a table of waterfowl carvings. Approximately 40 people attended.

7. Other Interpretive Programs

A total of 14 programs and presentations were given during the year. Interest groups visiting the refuge included kindergarten through 12th grade school students, teachers requesting an update on Interpretive and Recreational programs, Ohio State wetlands class and agricultural vocational students. Other programs were given to Port Clinton Rotary Club, Fremont Lions Club and Firelands Audubon Club.

The Regional Office provided a national public service announcement video tape entitled "Wildlife Refuge Volunteer". Local TV stations in Toledo were given copies and asked to include them in their programing to encourage refuge volunteer project participation. At least one station did run the advertisement segment.

8. Hunting

Canada, snow and white-fronted geese and ducks are hunted by permit on portions of Ottawa Refuge. Snow and white-fronted geese occur in such small numbers on the refuge that they are rarely taken during the hunt. Ducks are included in the permitted bag with geese. The hunt is conducted from blinds in and around agricultural fields. Hunting occurred on non-consecutive days from October 13 to November 26 and this year was the 13th consecutive year for the hunt. A cooperative agreement provides for the hunt to be administered by the Ohio Department of Natural Resources and personnel from the Magee Marsh Wildlife Experimental Station run the program completely.

In 1988, 566 hunters harvested 163 geese for a hunter success of 29% in 26 hunt days. Hunt days were limited to shooting hours from sunrise through 12:00 Noon only. Ducks harvested totalled 12. There were 7 mallards, 1 black duck, 1 wood duck, 1 gadwall and 2 mallard black hybrids. The 1988 season marked the 3rd year ducks could also be harvested. This season 2,675 hunters applied to hunt on the Ottawa Refuge. The 566 hunters participating in this years hunt accumulated 2,830 activity hours. Hunters participated from 41 Ohio counties and 3 states (Georgia, Tennessee and Michigan) participated in the hunt.

TABLE 9. Canada goose populations, Ottawa National Wildlife Refuge, September 1, 1988 to January 15, 1989.

09/01	09/15	10/01	10/15	11/01	11/15	12/01	12/15	01/01	01/15
1,000	3,620	4,300	4,300	8,630	8,900	5,575	5,100	2,550	8,900

TABLE 10. A comparison of the goose harvest on Ottawa National Wildlife Refuge, 1986, 1987 and 1988.

	Number of Hunters	Number of Geese Harvested	Goose Hunter Success
1986	529	144	.27
1987	518	207	.40
1988	566	165	.29

9. Fishing

Refuge sport fishing is limited to one 15 acre barrow pit at Cedar Point NWR from June 1st to August 31st. Visitors have been permitted to fish at the site if they hold a valid state fishing license. Fishermen were not very successful this summer season. Hot humid weather during the summer of 1988 may be partly responsible for the minimal catch success.

10. Trapping

The complex trapping units are divided into 19 units. Drawdowns of most units were accomplished during the late spring and early summer period for the purpose of re-establishing vegetation in open water areas. Excellent moist soil plant production was achieved as planned. With little or no water, muskrat conditions were very poor at the Cedar Point trapping units (1, 2, 3 and 4), in Ottawa units 5, 6, 7, 8 and 10 and in unit 13 at Darby. A partial drawdown at Navarre (unit 12) reduced muskrat numbers in this unit. Major construction at Ottawa in units 5, 6, 10 and 11F, G, H required the units to be dry. These units were trapped on a limited basis due to heavy equipment and truck traffic work activity from construction.

Even though units 1, 2, 3, 4, 7, 8, 12 and 13 will experience major muskrat decreases, trapping should not adversely effect the base breeding population. Trapper effort was low and a decreased muskrat population is needed as the refuge re-establishes emergent vegetation next year and in the following years. As ever increasing water levels are instituted over the next few years muskrat numbers will rebound with the increasing emergent vegetation. Excellent hemi-marshes are the goal in three to four years with muskrats planned to open up the vegetation.

Trapping of mink, racoon, fox opossum and skunk was permitted with regulations remaining the same as the previous year. Trapper selection was made on open units by sealed bids. Six bidders gave bids totalling $4,101.25 to trap units on the refuge. Six youth trappers were selected to trap refuge units this year.

Table 11. Reported fur harvest for the past five seasons has been:

	1984-85	1985-86	1986-87	1987-88	1988-89
Muskrats	5,603	4,921	8,776	6,916	226
Racoon	64	75	104	144	34
Mink	9	16	17	42	10
Skunk	8	5	4	3	1
Opossum	21	56	34	43	12
Fox	10	7	7	24	5

Table 12. Income from the last five seasons:

1984-85	$12,694.29
1985-86	$ 7,726.60
1986-87	$10,675.89
1987-88	$13,420.38
1988-89	$ 4,101.25

11. Wildlife Observation

Birding continues to be the most popular non-consumptive recreational activity that occurs in the refuge complex. Approximately 95% of all the wildlife observation occurring at the Ottawa Complex occurs on the Ottawa Division. The remaining 5% occurs on the Cedar Point Refuge.

Refuge volunteers held an evening Owl hoot for the public in the fall. However, due to inclimate weather the attendance was small. Future evening owl walks will be scheduled for next fall.

17. Law Enforcement

Manager Tansy and Assistant Manager Cornelius attended law enforcement refresher training at Fort McCoy, WI. Manager Tansy qualified with his revolver on 10/05/88.

Two days assistance was given to Special Agents during the opening days of waterfowl season. Agents from Michigan and Louisiana were in the area for opening day. Efforts were directed at duck concentration areas with no problems noted on excessive harvest. Only two citations for early shooting were issued by the refuge officer.

ORP Marshall reported to Federal Law Enforcement Training Center on 10/17/88 for 9 weeks of basic law enforcement training. Marshall completed all initial requirements of the basic police training course work. Final follow-on training will be completed at FLETC in March of 1989.

I. EQUIPMENT and FACILITIES

1. New Construction:

The Flood Damage construction projects got underway during the late summer and fall period with two major contracts in full swing. A third contract was awarded and ready to start and another pending the award.

Tank Ditch/Dike Reconstruction: This contract was awarded to Gradel Construction Co. in August for a amount of $1.5 million and included the rebuilding and rip-rapping of 3.4 miles of dike in the Tank Ditch area. This included the north dike along MS-3, MS-4, MS-5, and Farm Unit 2 (2.3 miles), the south dike of Pool 3, and the cross dike between MS-4 and MS-5. Also included were five water control structures and 4 new pump stations. All dikes are being built to an elevation of 479 feet of sea level (Geological Survey) and are being rip-rapped wherever water will be placed against them. Hopefully, this will prevent the erosion that has damaged the dikes so heavily in the past. At the years end, most of the dirt work was completed, except for some additional raising of the dike along the farm unit. Rip-rapping was well underway and two of the pump stations structures were poured.

Pool 1 Dike Reconstruction: This contract was also awarded to Gradel Construction in late August for an amount of $ 1.24 million and included the rebuilding and rip-rapping of approximately 3.2 miles of dike in the Pool 1 area. This contract will rebuild the toes of the west Pool 1 dike, rebuild the Northwest and south dikes of this pool, and the north dike of the Entrance Pool, and the old unit 12 dike along the entrance road. Also included is large rip-rap for the lakefront dike of Pool 1, one water control structure, and one new pump station. At the close of the year, the dirt work was approximately 50% complete and the rip-rapping had begun.

Cedar Point Dike Reconstruction: This contract was awarded to Gradel Construction Co. in late December for an amount of $579,500. Work started right after the end of the year. This contract will upgrade and rip-rap approximately 2.2 mile of dike between the Main Pool and Pheasant Farm, primarily repair of the dike toes.

Mannig Enterprises of Alpena, Mich. was the low bidder on this project. However, it was learned that this company was a subsidiary of Glove Construction Co. who was associated with the Pool 4 project in 1983-86. This project went though numerous delays and was finally defaulted to the bonding company. We expressed concern that this company did not have the resources to accomplish this work and asked for an investigation by the Small Business Administration. This bid was ultimately rejected since the company did not submit the necessary documentation to properly evaluate it.

At the end of the year, a fourth contract was pending award for the rehabilitation of 0.8 mile of dike and ditch on the Darby Unit. Mannig Enterprises was again the low bidder and a Small Business Administration investigation was in progress. This bid was accepted after the first of the year and work will start in June.

Engineering work is under way on a large pump station for Cedar Point which will have a total capacity of approximately 30,000 gallons per minute using two 60 horse power pumps, and a smaller pump station at Darby.

Much of this work is primarily the result of not building some of our original dike with adequate rip-rap protection and the effect of the high Lake Erie water levels over the past 10 years. Several dikes of less than 10 years had severely eroded on the toes to the point where there was less than a driveway road on top with 6-8 foot vertical banks on each side. In addition, several dikes are being rebuilt that were acquired with the property in the 1960's and were at or beyond the failure stage. These funds will ultimately provide use with two new pump stations and replace five of the old farm pumps that we acquired with the land purchase. It will rehabilitate or rebuild approximately 10 miles of dike, use 120,000 tons of rip-rap, and 7,500 tons of gravel for road surface.

Unfortunately, this is less than one-half of what was really needed to restore our dike system to our current maintenance standards. An additional 6-8 miles of rehabilitations is needed to restore our marsh system to the point that it was when the refuge was established in the 1960's.

The Gradel Construction Company has proven to be an excellent contractor. They immediately mobilized to start the work and have worked steadily with little or no shut-down for winter weather. Their work has shown excellent planning to take advantage of the weather with work progressing at every opportunity. The contractor has built the dikes that usually far exceed our specifications and has cleaned and demucked the adjacent ditches much more than required under the contracts.

Many of our dikes had not been properly rip-rapped and protected from the high water levels and were severely eroded with vertical sides. Many were no longer wide enough for maintenance equipment.

The Special Appropriation for Flood Damages allowed us to start some of this repair work via contract. Work started with cleaning of muck from adjacent ditches and slopes. Dike on far side is completely gone in most areas.

Dikes were then rebuilt by replacing material along eroded toes, raising and widening dikes as necessary. Material was transported in from more upland sites.

Filter fabric and stone rip-rap was then placed to complete the project.

Many of our pumps were acquired with the property in the early 60's and were designed to pump the water off for agriculture. Not only did they not meet current standards, many are just plain "wore out".

Five of the worst pumps are being replaced by new structures and pumps which can be used to pump in or out. A pump will be added to these structures before completion.

2. Rehabilitation

MS-3 West Dike: The Ohio Air Guard completed most of the dirt work on the raising and widening of the west MS-3 dike. This work progressed very slowly since it was a training exercise with mostly inexperienced operators. The dirt work is essentially complete, but is still largely unprotected, with considerable finishing, rip-rapping,and/or seeding yet to be done. This will have to be done with refuge personnel and funds.

Stange Road: The northern 500/600 feet of this road was not rebuilt in 1986 due to a lack of construction funds. Refuge personnel raised and widened the road, repaired and rip-rapped the toe slopes, and graveled the road surface.

Small Projects: A new culvert crossing with flapgate was installed on the east end of Krause Ditch. The screwgate in the Show Pool developed a bad leak, was removed from the exterior side of the structure, repaired, and reinstalled on the interior side. Several other screw gates were repaired.

Equipment Repair: The 1010 John Deere tractor received major water pump work and gearboxes in the Woods Batwing mower were replaced. Two small pumps were repaired. The engine of the crew cab pickup seized up and was replaced with a rebuilt engine.

Refuge personnel also rebuilt two of our dike pumps in the refuge shop.

4. Equipment Utilization and Replacement

A new 4x4 3/4 ton pickup was received and put into service. A airboat was purchased by formal bid from Airboat Engineering of West Palm Beach, Florida, for $16,300.00. The 14 foot boat is all aluminum with a 180hp Lycoming rebuilt aircraft engine. It will greatly assist our access in the marshes and improve our purple loosestrife control efforts.

The JD450 dozer, the Case 580C backhoe, and the dump truck and trailer received heavy use in the wetland restoration program in Indiana and Michigan. Use started in late May and continued into October. Unfortunately, this heavy use took its toll and major repairs are again required. Plans are underway for replacement of rear sprockets, tracks and rollers, and rebuilding of the blade on the 450, and major hydraulic work on the backhoe. The heads on the dump truck engine developed a coolant leak and will require major repair. This repair work is being planned before the 1989 farm bill season. The crew cab truck was also heavily utilized by the farm bill teams by setting it up as a fuel/service truck. It was equipped with a 100 gallon diesel fuel tank, tool boxes, and a rack for hauling plastic drainage pipes.

The ATV also found a home in the farm bill program and provided an excellent tool in surveying lands for potential wetlands. It was used heavily by Asst. Manager Cornelius, who could not otherwise have done this work.

A new 4x4 - 3/4 ton pick-up was acquired to replace an aging 10 plus year old vehicle. It was equipped with side tool boxes.

We finally received an airboat which will be adequate for our needs. It is equipped with aluminum/polymer plastic hull and 180hp Lycoming aircraft engine. This will give us the performance we need for work in the marshes, especially purple loosestrife control.

5. Communications System

Mobile and portable radios were serviced and repaired as need. A new radio was purchased and installed in the new pickup.

6. Computer System

Our IBM-AT Computer System continued to function well and is being used for word-processing and a variety of data processing items. Budget information, water level records, trapping and farm bill information are the primary uses. With up to three people wanting to use it, there are often conflicts over its use. With only 30mb of disk storage, we are also getting frequent "DISK FULL" messages and alternatives will have to be developed very shortly.

The Rbase for Dos was purchased and WordPerfect upgraded to 5.0. A HP Laser printer was ordered (received after 1st of year). The Region 3 Rbase accounting system was received and installed. Some data has been entered, but little use made of it since it does not provide the information as does the Ottawa Dbase system.

ProComm Plus was purchased and a telephone line connected to the modem, putting us on-line with the Regional office and other stations. Data transfers between computers and via CompuServe have been accomplished.

J. Other Items

1. Cooperative Programs

Four Memorandums of Understanding between the Ohio Department of Natural Resources and the United States Department of the Interior, U.S. Fish & Wildlife Service are active today. One is for cooperation in the production of Canada geese in the State of Ohio, the second is for cooperation in the managed hunting program of Canada geese on the refuge, the third provides for state pumping of Ottawa Pool 1 unit, with reimbursement to the state for electric pumping costs, and the fourth involves tern management with reimbursement to the Service from the State of Ohio.

A cooperative program exists between the Toledo Edison Company and the U.S. Fish & Wildlife Service for management of the Toledo Edison owned Navarre Marsh as part of the Ottawa NWR. Refuge personnel provide a management plan for water manipulation of the unit and Toledo Edison personnel regulate the water levels.

A cooperative program also exists between the U.S. Department of Commerce Weather Bureau and the U.S. Fish & Wildlife Service. The Weather Bureau provides all the weather recording instruments plus a shelter for the instruments and the refuge personnel record data daily.

3. Items of Interest

Revenue sharing checks for FY 88 were given to Ottawa and Lucas County treasurer's totalling $40,600.00.

Training Attended for the Year:

Tansy:
- Academy, Washington, D.C.
- Law Enforcement, La Crosse, WI
- Time Management, Toledo, Ohio

Cornelius:
- Law Enforcement, LaCrosse, WI

Reynolds:
- Fire Training,

Marshall:
- Basic Refuge Academy, Blair, NE
- Basic Law Enforcement, Glynco, GA

Fehribach:
- Basic Refuge Academy, Blair, NE
- Federal Women's Day, Minneapolis, Mn.

Equipment Operator Day, Maintenance Worker Robert Reynolds, and Asst. Manager Stan Cornelius received Special Achievement Awards for their work on farm bill wetland restoration activities.

4. Credits

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

Cornelius:	Sections C, D, E1;3, 5-8, F, I, J1-3, K, Typing and Editing
Fehribach/Siekaniec	Sections B, F1-2, 10, G
Marshall:	Sections A, E2; 4, 6, H, J4, K, L
Maguire:	Typing and putting it all together
Siekaniec:	Typing, editing and helping put it all together.

Photo Credits

Michael Tansy - MT
Stanley Cornelius - SC
Charles Marshall - CM
Art Weber - AW
Julie Indorf - JI
Dave Kruger - DK

K. FEEDBACK

Farm Bill Activities and Wetland Restoration:

We are all glad to see this wetland restoration work occur, but we need also to access the real cost of this program to our overall refuge mission. We restored approximately 60 wetlands and spent approximately $15,000.00 in direct costs of travel, supplies, fuel, etc. or approximately $250.00 per wetland. This is the figure we talk about and call this cheap.

But now lets add in the real costs - those we don't want to talk about. We estimated that we spent over $35,000 in salaries from the personnel from this station plus approximately $6,000.00 in salaries for other station personnel -- add another $41,000.00. Also there are telephone costs, gasoline from our refuge pumps, other office overhead, etc. that are incorporated into our overall refuge budget and very hard to separate -- add another $4,000.00.

This brings the figure to $60,000.00 for the 60 wetlands or $1,000.00 per wetland. And now lets add in some more real costs - The costs of our equipment. We had $200,000 - $300,000 worth of equipment involved in this program (dozers, dump trucks, pickups, etc). This equipment suffered a lot of abnormal wear and tear, probably more in this summer than it would have received in 3-4 years of normal refuge use. This will add up to much more repair and maintenance costs in the future as the times get older. In short, we are wearing out our equipment in this program. At the end of the Farm Bill wetland program, will we be left with a worn-out dozer and no funds to replace it? Probably so.

We need to access an equipment depreciation charge to this work like a private contractor must do. Had we leased all the equipment used, I feel it would have costs us approximately $30,000.00 for it and this cost should be assessed to the program.

Now the wetland which costs us a mere $250.00 is costing us $1,500.00 or more. We will be paying for this in terms of higher equipment repair costs, in terms of work undone, etc for many years to come.

Now I'm not saying we shouldn't be doing this work-- I'm all for it. But let's just consider and talk about it in real costs!

At the start of the year, we were asked what we should give up to support the farm bill program. We listed several items, such as new shingles on the shop, a new vehicle, etc. These were direct dollar items and this was fine. But we also said we would have to give up some time type items, such as no property report, no narrative report, and some of the other paperwork which we must do. The answer -- you can delay it, but still must do it. In short, you must continue to do all the things you normally would do and still find time to contact farmers, supervise work crews, etc. This way we can say that we did not give up anything. That is - we did not give up anything that can be positively measured. What did we give up to do this work? Things like adequate supervision of our employees - leaving them to work without supervision and guidance-- Did they work as efficiently, probably not. Like contacts with the public-- What did we lose here? Again what it is costing us is somewhat immeasurable, but we need to address it anyway as part of the real costs of this

program. We cannot continue to take on these additional workloads without additional manpower if we are ever going to continue our other work at a quality level.

What about the upkeep of these wetlands in future years? We must remember that the monitoring and maintenance of these wetlands will be added to our workload. Will additional funds and manpower be available for this or is this another item that we will have to "sandwich" in! If so, will it be done properly or hap-hazardly and what other work will also suffer. What about the additional workloads coming to us as the result of FmHA debt restructuring, loan application reviews, commenced drainage determinations, etc. Can we continue to keep adding this additional work without reducing or abandoning our present work programs.

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 predominately 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 at Cedar Point NWR did successfully nest this year in the artificial nest put up by the state. Eaglets were fledged at the refuge this year (see G.2 for details).

Duck populations peaked during the fall migration and in the spring. Canada geese peaked in spring and in the fall.

Lake levels were very low in the summer of 1988 and allowed enough water to be removed from Pool 1 to revegetate areas that had drown during the last years of record high lake levels. The Pheasant Farm was pumped down two feet in March to prevent any more erosion on the severely weakened dikes. This drawdown also allowed the vegetation in this pool to recover. Unfortunately, purple loosestrife was one emergent that revegetated both pools, causing much heartache for refuge staff. Pool 2 is drained through Pool 1 because the water control structure that gives access to the lake is silted in with rock and organic particles.

Roads were not graded or mowed due to manpower shortages and Farm Bill work. Roads are expected to be graded and rocked in 1989. Dike repairs for the pheasant farm will begin in 1989.

WEST SISTER ISLAND NATIONAL WILDLIFE REFUGE

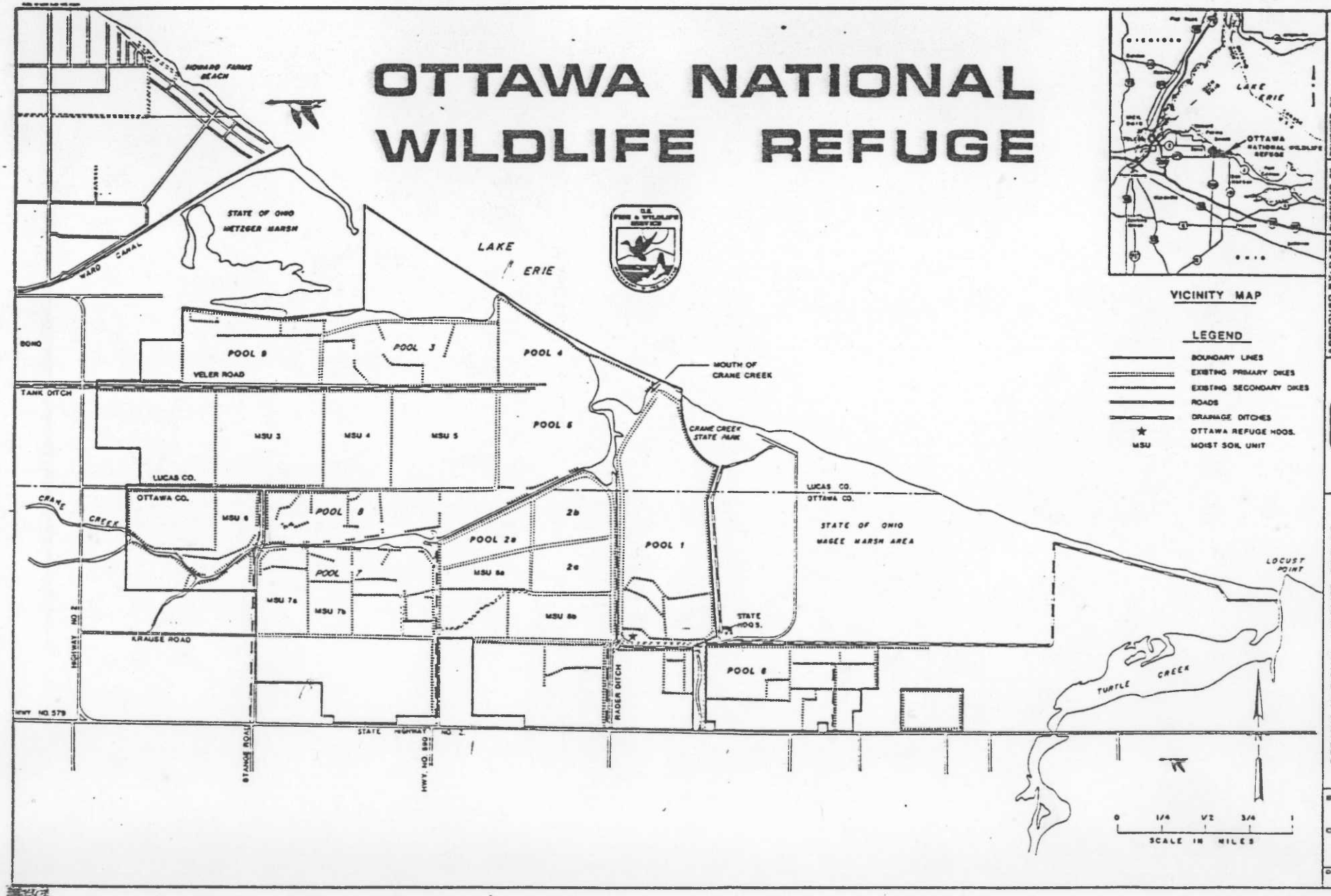
West Sister Island is an 82 acre island located in the western basin of Lake Erie. It is jointly owned by the U.S. Coast Guard and the Fish and Wildlife Service. Five acres, including the lighthouse, are owned by the Coast Guard but managed along with the other 77 acres by the Fish & Wildlife Service as a wilderness area. Tall hackberry trees with an understory 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, wildflowers, mushrooms, and 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 and loam and humus layer which annually receives a topically applied layer of nitrogen supplied by the thousands of nesting birds.

West Sister Island is noted for having the largest heron/egret rookery in the Great Lakes. Great blue herons and black-crowned night herons comprise 90% of the nesters.

Herring and ring-billed gulls are the second largest group of nesters. Cattle egrets, snowy egrets, little blue herons, Canada geese and assorted ducks also nest there.

OTTAWA NATIONAL WILDLIFE REFUGE



VICINITY MAP

LEGEND

- BOUNDARY LINES
- EXISTING PRIMARY DIKES
- EXISTING SECONDARY DIKES
- ROADS
- DRAINAGE DITCHES
- ★ OTTAWA REFUGE HDQS.
- MSU MOIST SOIL UNIT

APPROVED BY: DATE:
SUBMITTED BY: CHIEF, DENVER SERVICE CENTER
REVIEWED BY:
DESIGNED J.V.R.
CHECKED J.V.R.
DRAWN M.C.G.
DATE JAN. 1988

OTTAWA NATIONAL WILDLIFE REFUGE
STATION LAYOUT & VICINITY MAP
LUCAS and OTTAWA COUNTIES OHIO

SHEET NO. 1 OF 1

DRAWING NO. DEC-OH-569-37.0

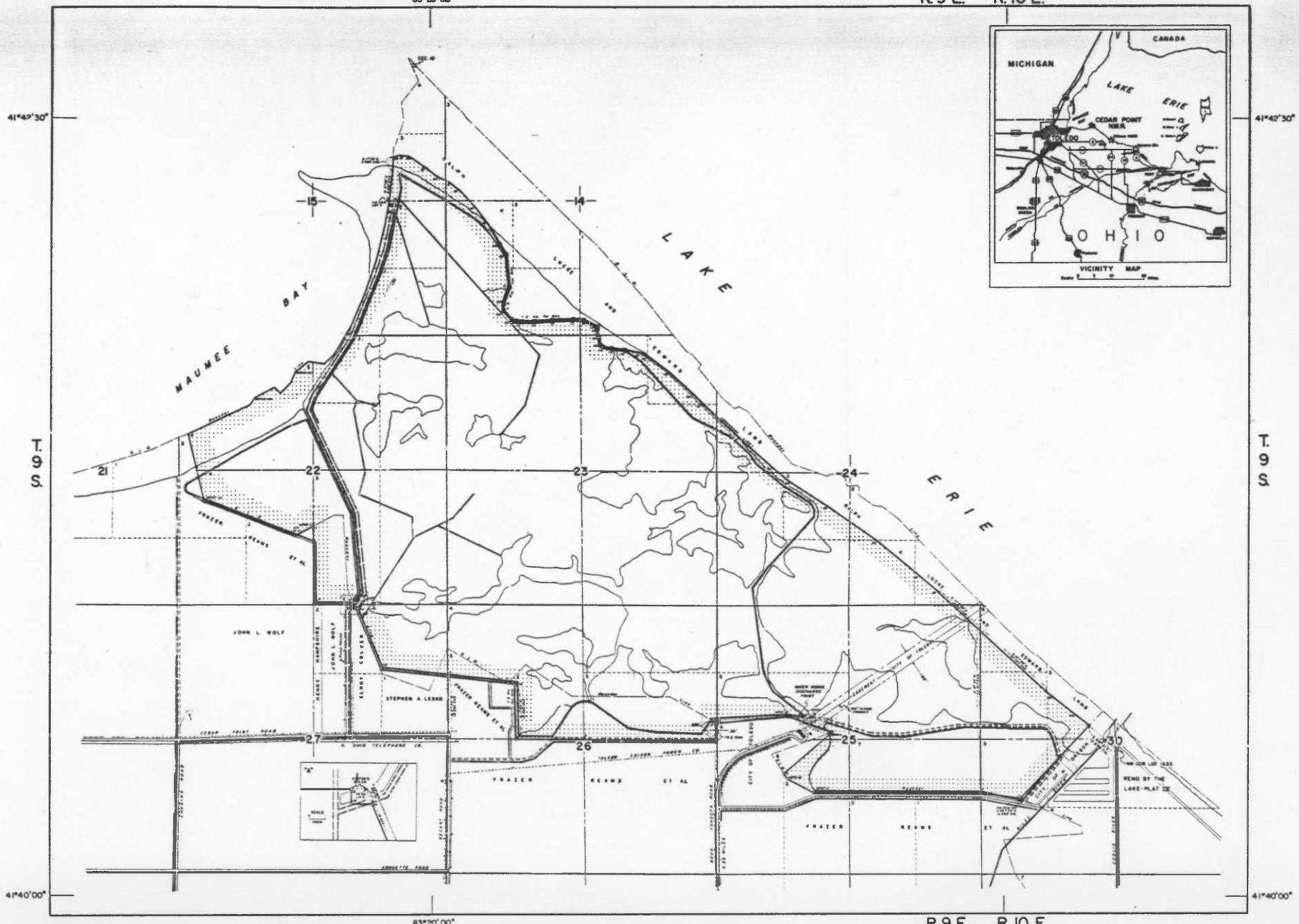
UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
Region 3 Minneapolis, Minn.

CEDAR POINT NATIONAL WILDLIFE REFUGE

LUCAS COUNTY, OHIO

UNITED STATES
DEPARTMENT OF THE INTERIOR

FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE



COMPILED IN THE DIVISION OF ENGINEERING
FROM AERIAL PHOTOGRAPHS AND SURVEYS
BY THE B.S.F.&W. & B.L.M.

MINNEAPOLIS, MINNESOTA

APRIL, 1967

MICHIGAN MERIDIAN

0 10 20 40 60 80 CHAINS
0 1/8 1/4 1/2 3/4 1 MILE

TOWNSHIP DIAGRAM

MEAN DECLINATION 1965

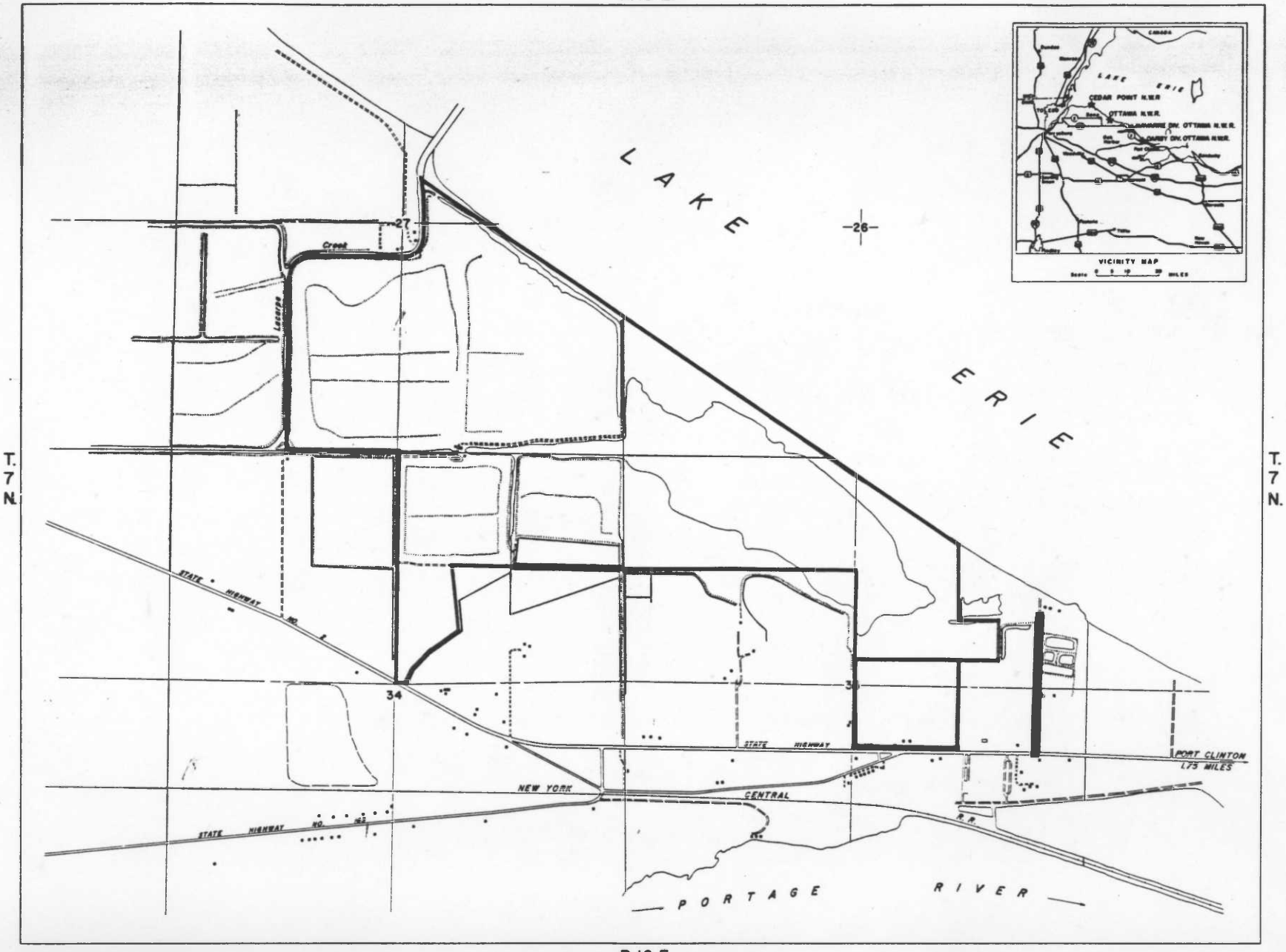
OTTAWA NATIONAL WILDLIFE REFUGE (DARBY DIVISION)

OTTAWA COUNTY, OHIO

R. 16 E.

UNITED STATES
DEPARTMENT OF THE INTERIOR

FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE



R. 16 E.
FIRST PRINCIPAL MERIDIAN

Scale 0 400 800 1600 2400 3200 FEET

TOWNSHIP DIAGRAM

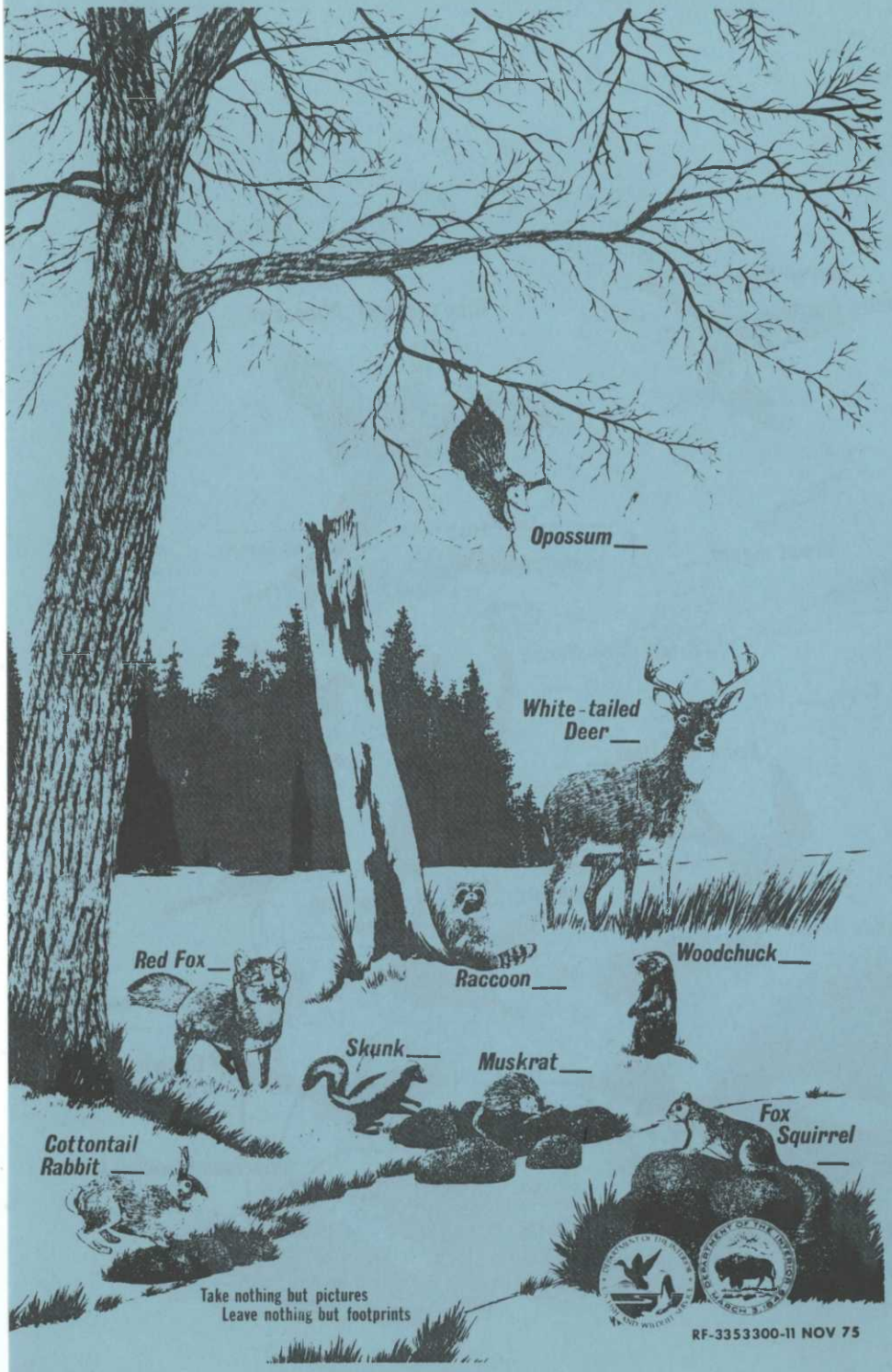
MEAN DECLINATION 1965

COMPILED IN THE BRANCH OF ENGINEERING
FROM AERIAL PHOTOGRAPHS, SURVEYS BY
THE G.L.M. & G.M. BARTON SURVEY CO.

MINNEAPOLIS, MINNESOTA

SEPTEMBER, 1967

3R. OHIO

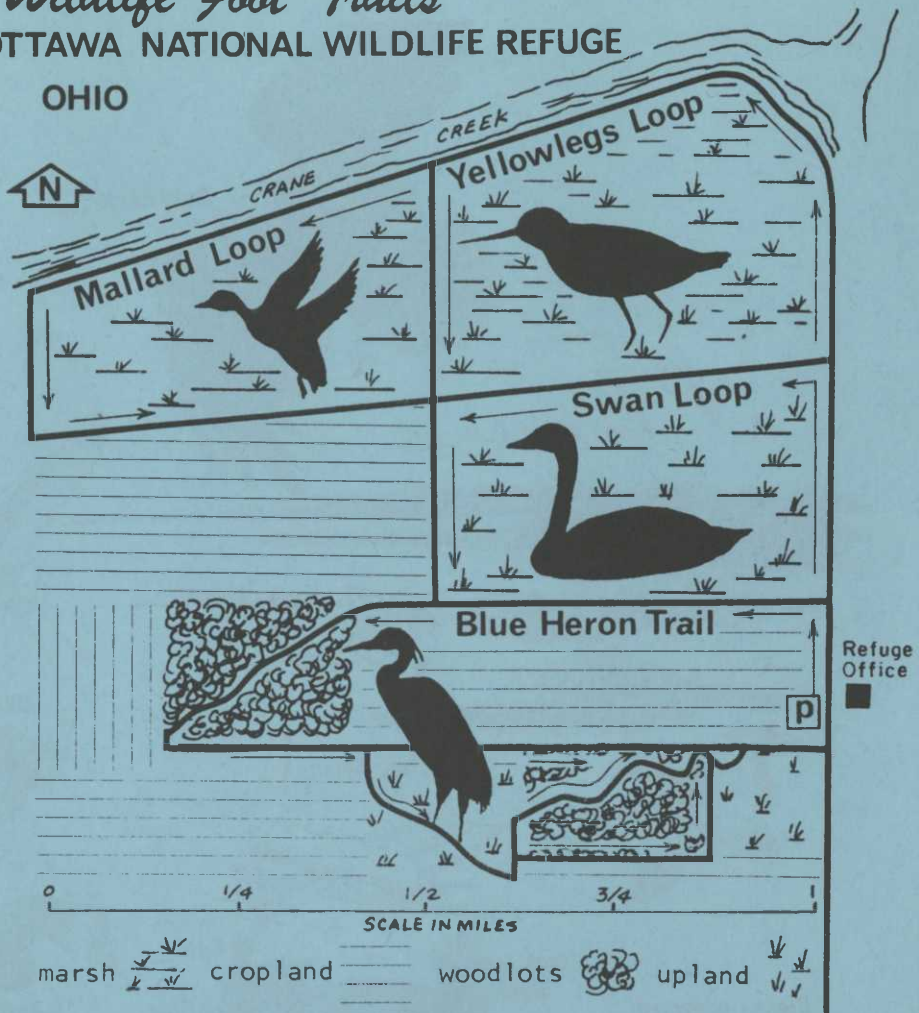


RF-3353300-11 NOV 75

Wildlife Foot Trails

OTTAWA NATIONAL WILDLIFE REFUGE

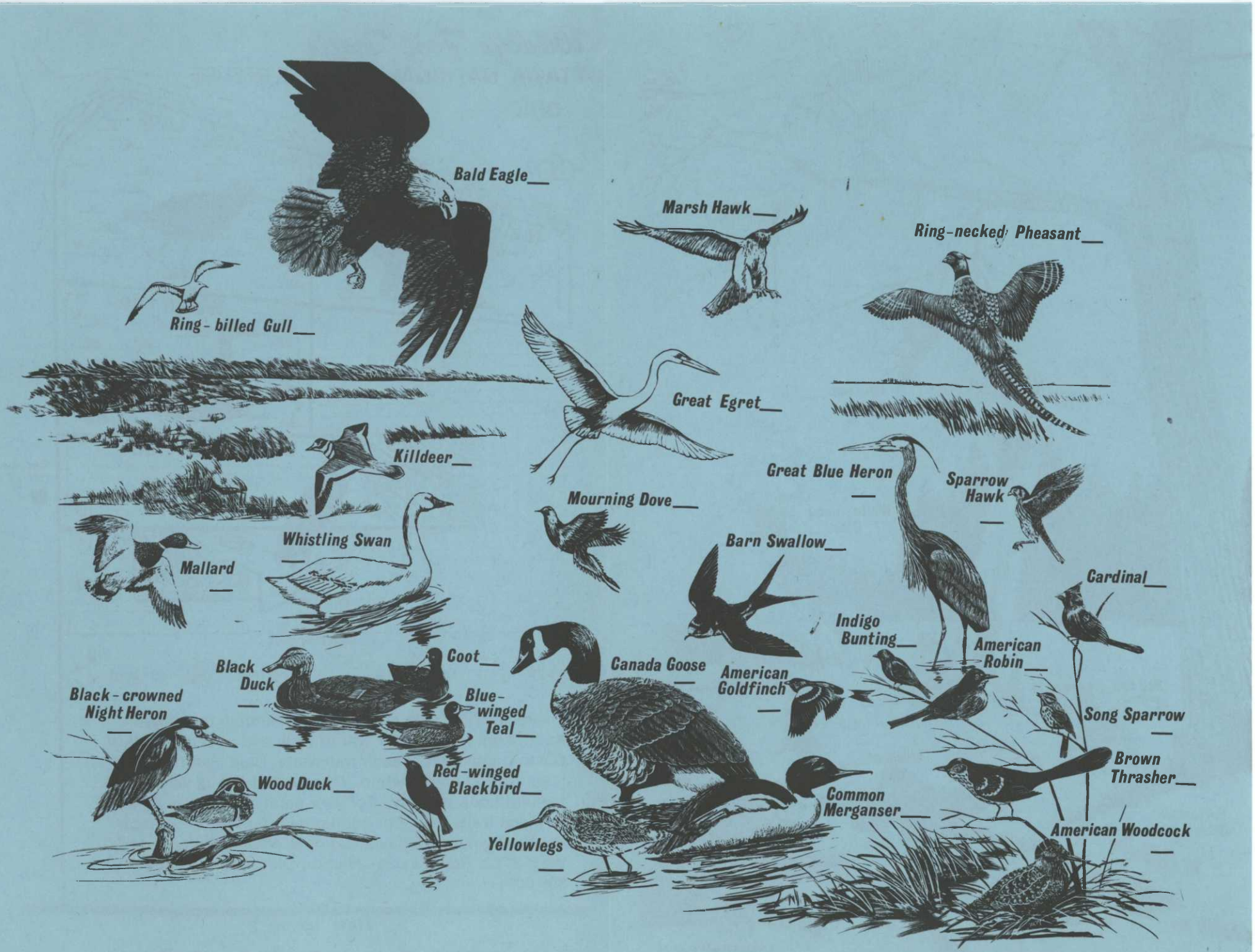
OHIO



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 →


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

HUNTING

MAP & REGULATIONS

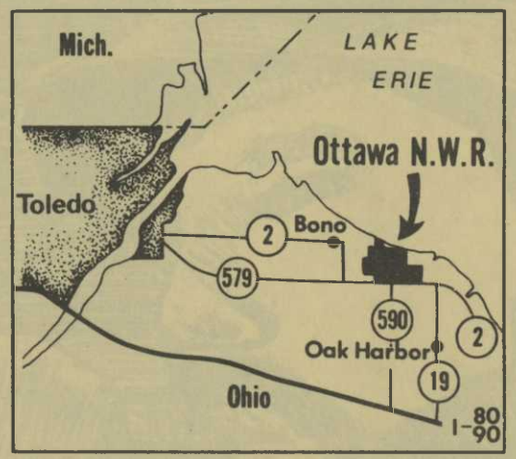
OTTAWA

National Wildlife Refuge/OH

HUNTING MAP

Ottawa Controlled Waterfowl Hunt

REGULATIONS ON BACK SIDE OF MAP



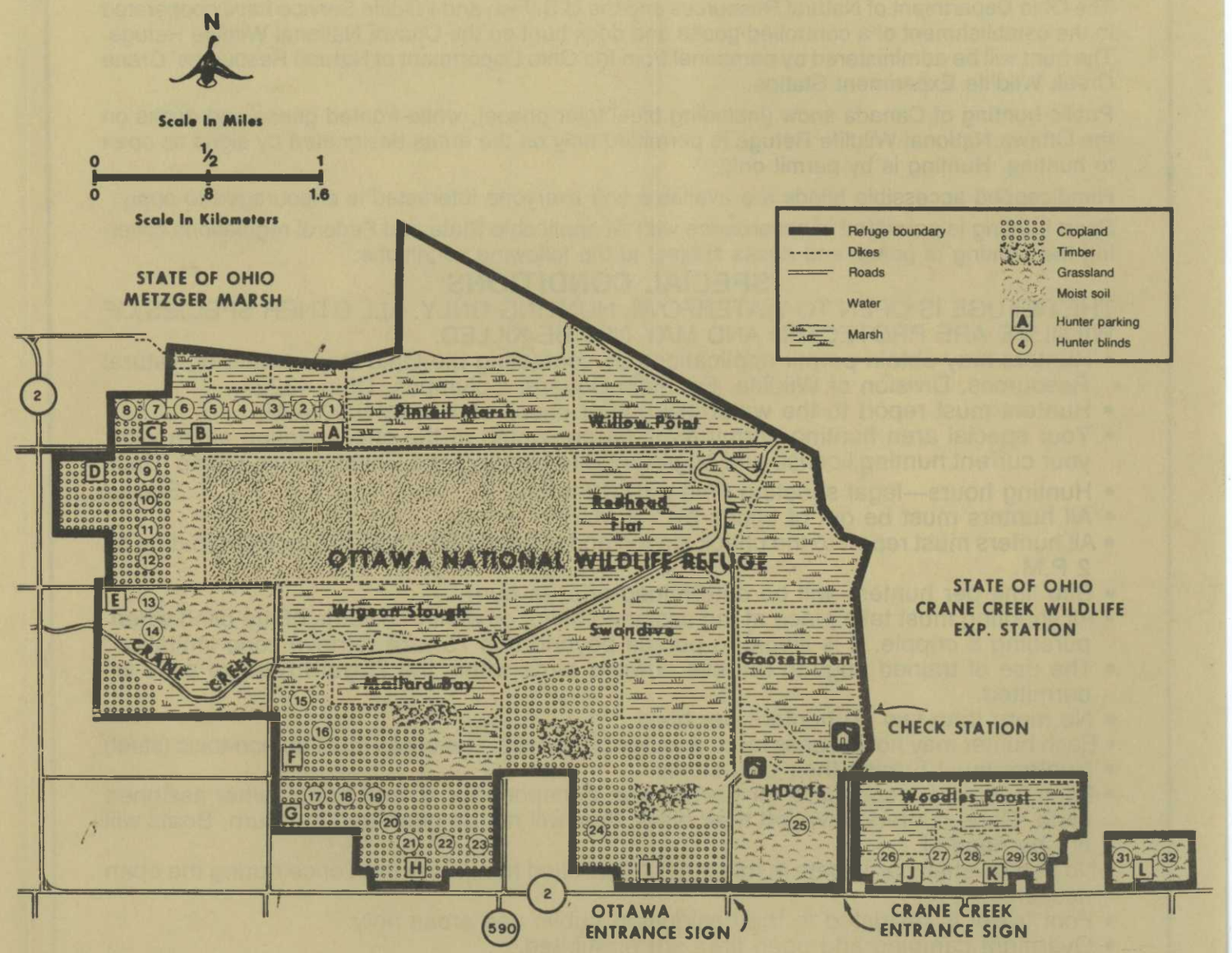
REFUGE SIGNS — KNOW THEIR MEANING

REFUGE BOUNDARY SIGN — ENTRY BY PERMIT ONLY

SANCTUARY AREA — OFF LIMITS TO THE PUBLIC UNLESS OTHERWISE SPECIFIED

HUNTER PARKING AREA

DIRECTION TO HUNTER BLIND



HUNTING REGULATIONS

Ottawa Controlled Waterfowl Hunt

The Ohio Department of Natural Resources and the U.S. Fish and Wildlife Service have cooperated in the establishment of a controlled goose and duck hunt on the Ottawa National Wildlife Refuge. The hunt will be administered by personnel from the Ohio Department of Natural Resources' Crane Creek Wildlife Experiment Station.

Public hunting of Canada snow (including blue color phase), white-fronted geese and ducks on the Ottawa National Wildlife Refuge is permitted only on the areas designated by signs as open to hunting. Hunting is by permit only.

Handicapped accessible blinds are available and everyone interested is encouraged to apply.

Sport hunting is permitted in accordance with all applicable State and Federal regulations covering the hunting of geese and ducks subject to the following conditions:

SPECIAL CONDITIONS

THE REFUGE IS OPEN TO WATERFOWL HUNTING ONLY. ALL OTHER SPECIES OF WILDLIFE ARE PROTECTED AND MAY *NOT* BE KILLED.

- Hunters may obtain permit applications by contacting the Ohio Department of Natural Resources, Division of Wildlife, Fountain Square, Columbus, Ohio 43224.
- Hunters must report to the waterfowl hunter check station by 5:00 A.M.
- Your special area hunting permit must be presented at the check station along with your current hunting license and Migratory Bird Hunting and Conservation stamp (Duck Stamp).
- Hunting hours—legal shooting time until 12 noon.
- All hunters must be out of blinds by 1 P.M.
- All hunters must report to the check station and submit their waterfowl for examination by 2 P.M.
- Bag limit per hunter—will be determined prior to hunt.
- All shooting must take place at the assigned blind, or within 75 yards of the blind when pursuing a cripple. It is illegal to pursue beyond this 75-yard retrieve zone limitation.
- The use of trained dogs to retrieve downed birds within the 75-yard retrieve zone is permitted.
- No more than two (2) hunters per blind.
- Each hunter may not possess more than ten (10) shells. The shells must be non-toxic (steel)
- Hunters must furnish their own shells.
- Each hunter is responsible for his/her own transportation to and from his/her assigned blind. Once hunters have left their blind, they will not be permitted to return. Boats will not be needed.
- No person shall participate in this area's controlled hunt more than once during the open season.
- Foot travel is restricted to the designated public use areas only.
- Overnight camping and open fires are prohibited.

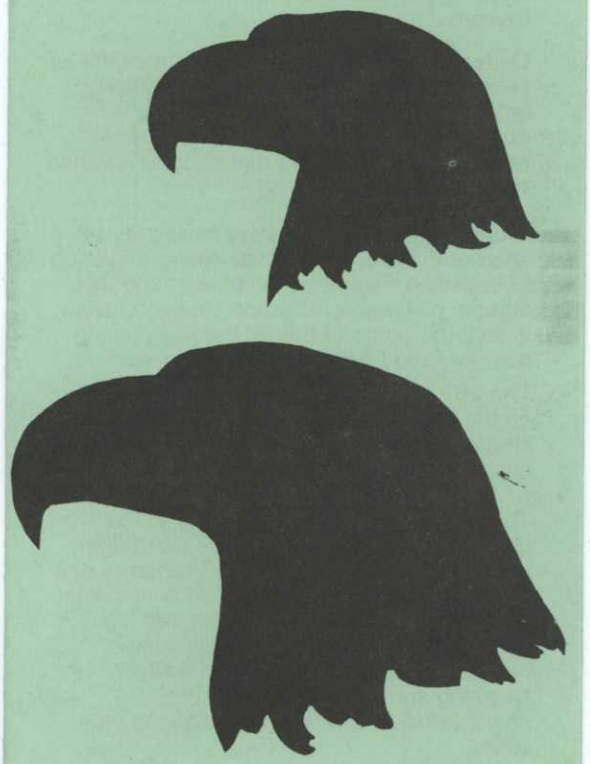
All injuries or accidents occurring on the refuge must be reported immediately to the Refuge Headquarters, Ottawa National Wildlife Refuge, 14000 W. State Route 2, Oak Harbor, Ohio 43449. Phone 419/898-0014.

QUALITY HUNTING DEPENDS ON YOU PLEASE RESPECT ALL REGULATIONS

BIRDS of OTTAWA

NATIONAL WILDLIFE REFUGE COMPLEX

Ohio



BIRDS

The Ottawa National Wildlife Refuge complex, located 15 miles east of Toledo, Ohio, contains the remnants of a vast marsh that once bordered western Lake Erie. Today, the complex is an important resting spot for migratory waterfowl and other birds traveling the Mississippi and Atlantic flyways.

Cedar Point, West Sister Island, and Ottawa National Wildlife Refuges, including the latter's Darby and Navarre divisions, comprised over 8,000 acres of marshes, meadows, and uplands that support a varied wildlife community.

Dramatic flights of migratory birds may be seen at Ottawa, notably the spring migration of Whistling Swans and warblers, and the autumn passage of Canada Geese. Ottawa is also the home of one of the few nesting pairs of Bald Eagles in Ohio.

The 267 birds listed here have been seen on the Ottawa NWR complex. Another 45 species have been seen in the vicinity of the complex. Watch for these!

The birds are grouped according to their taxonomic status, 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 are in accordance with the American Ornithologists' Union "Checklist of North American birds" revised in 1976.

Symbols used are as follows:

RESIDENT STATUS

S — spring	March-May
s — summer	June-August
F — fall	September-November
W — winter	December-February
* — nests locally	

ABUNDANCE

a — abundant	a common species which is very numerous
c — common	certain to be seen in suitable habitat
u — uncommon	present, but not certain to be seen
o — occasional	seen only a few times during a season
r — rare	seen at intervals of 2 to 5 years
x — accidental	has been seen only once or twice

	S	s	F	W
Common Loon	o	r	o	r
Red-necked Grebe	r		r	
Horned Grebe	c		u	r
Eared Grebe	r		r	
Pied-billed Grebe*	c	c	c	r
White Pelican	r	r	r	
Double-crested Cormorant	o	o	o	r
Great Blue Heron*	c	a	c	u
Green Heron*	c	c	c	
Little Blue Heron	r	o	o	
Cattle Egret*	u	u	u	
Great Egret*	c	a	c	x
Snowy Egret	r	r	r	
Louisiana Heron	r	o	r	
Black-crowned Night Heron*	c	a	c	o
Yellow-crowned Night Heron	r	r		
Least Bittern*	u	u	u	x
American Bittern	u	u	u	r
Glossy Ibis	r	r	r	
Mute Swan	r	r	o	r
Tundra Swan (Whistling)	a	x	c	o
Canada Goose*	a	a	a	a
Brant Goose	x		r	
Barnacle Goose	x		x	x
Bar-headed Goose	x			x
Greater White-fronted Goose	x		r	x
Snow Goose	o		c	u
Snow Goose (Blue form)	o		c	u
Mallard*	a	a	a	a
American Black Duck*	a	c	a	a
Gadwall*	c	u	a	r
Northern Pintail*	a	u	a	o
Green-winged Teal*	c	u	a	o
Blue-winged Teal*	a	c	a	x
Eurasian Wigeon	r		r	x
American Wigeon*	a	u	a	o
Northern Shoveler*	c	u	c	r
Wood Duck*	c	c	a	r
Redhead*	c	u	c	o
Ring-necked Duck	c	x	c	r
Canvasback	a	x	c	c
Greater Scaup	u		u	u
Lesser Scaup*	a	u	c	u
Common Goldeneye	c		c	c
Bufflehead	c		c	u
Oldsquaw	r		o	r
White-winged Scoter	o		o	o
Surf Scoter	o		o	o
Black Scoter			o	r
Ruddy Duck*	c	u	c	u
Hooded Merganser*	c	u	c	u
Common Merganser	a	r	a	a
Red-breasted Merganser	c		c	r
Turkey Vulture*	c	o	u	
Northern Goshawk	r		r	r
Sharp-shinned Hawk	c		u	r
Cooper's Hawk*	c		u	r
Red-tailed Hawk*	c	c	c	c
Red-shouldered Hawk*	c	u	u	o
Broad-winged Hawk	c		c	
Rough-legged Hawk	u		u	c
Golden Eagle	r		r	r
Bald Eagle*	u	u	u	u
Northern Harrier (Marsh Hawk)	c	u	u	c
Osprey	u	r	u	
Peregrine Falcon	o		o	r
Merlin	o		o	r
American Kestrel*	c	c	c	c
Ring-necked Pheasant*	c	c	c	c
Sandhill Crane	r		x	
King Rail*	o	o	o	r
Virginia Rail*	o	o	u	r
Sora*	c	u	c	r
Common Moor hen* (Gallinule)	c	c	c	x
American Coot*	a	c	a	o
Semipalmated Plover	c	x	c	
Piping Plover	r	r	r	
Killdeer*	a	a	a	r
Lesser Golden Plover	c	u	u	
Black-bellied Plover	c	u	u	
Ruddy Turnstone	c	u	c	
American Woodcock*	c	u	u	
Common Snipe*	c	u	c	r
Whimbrel	r	r	r	
Upland Sandpiper*	u	u	u	
Spotted Sandpiper*	c	c	c	
Solitary Sandpiper	c	u	c	
Willet	r	x	r	
Greater Yellowlegs	c	u	c	
Lesser Yellowlegs	c	c	c	
Red Knot	u	o	o	
Ruff		r	r	
Pectoral Sandpiper	c	c	c	
White-rumped Sandpiper	r	r	r	
Baird's Sandpiper	r	r	r	x
Least Sandpiper	c	c	c	
Dunlin	a	c	a	r
Short-billed Dowitcher	c	c	c	
Long-billed Dowitcher	u	u	u	
Stilt Sandpiper	x	u	u	
Semipalmated Sandpiper	a	c	c	
Western Sandpiper	r	r	o	
Buff-breasted Sandpiper	x	r	r	
Marbled Godwit	r	r	o	
Hudsonian Godwit	x	r	r	
Sanderling	o	c	c	x
Red Phalarope			r	x
Wilson's Phalarope*	o	o	o	
Red-necked Phalarope (Northern)	o	o	o	x
American Avocet	r	r	r	
Parasitic Jaeger		x	r	
Glaucous Gull	r	x	r	r
Iceland Gull			r	r
Great Black-backed Gull	c	u	c	c
Herring Gull*	a	a	a	c
Ring-billed Gull*	a	a	a	c
Franklin's Gull	a	a	a	c
Laughing Gull			r	
Bonaparte's Gull	c	o	a	a
Forster's Tern	r	o	c	
Common Tern*	c	c	c	x
Caspian Tern	u	c	c	
Black Tern*	c	c	c	
Rock Dove*	u	u	u	u
Mourning Dove*	c	c	c	c
Yellow-billed Cuckoo*	u	u	u	
Black-billed Cuckoo*	u	o	o	
Barn Owl*	r	r	r	r
Eastern Screech Owl*	c	c	c	c
Great Horned Owl*	c	c	c	c
Snowy Owl	o		o	o
Long-eared Owl*	o	o	o	o
Short-eared Owl*	u		u	u
Northern Saw-whet Owl	o	x	o	r
Whip-poor-will	u		r	
Common Nighthawk*	c	a	c	
Chimney Swift*	c	u	a	
Ruby-throated Hummingbird*	u	u	u	
Belted Kingfisher*	c	c	c	o
Common Flicker* (yellow-shafted)	c	c	c	u
Red-bellied Woodpecker	r	r	r	r
Red-headed Woodpecker*	c	c	c	u
Yellow-bellied Sapsucker	c		c	r
Hairy Woodpecker*	u	u	u	u
Downy Woodpecker*	c	c	c	c
Eastern Kingbird*	c	c	c	
Great Crested Flycatcher*	c	c	c	
Eastern Phoebe*	c	u	u	
Yellow-bellied Flycatcher	c		u	
Acadian Flycatcher*	r	r	r	
Willow Flycatcher*	c	c	c	
Alder Flycatcher	r			
Least Flycatcher	c	c	c	
Eastern Wood Pewee*	c	c	c	
Olive-sided Flycatcher	u	o	u	

	S	s	F	W
Horned Lark*	c	u	c	c
Tree Swallow*	c	a	a	x
Bank Swallow*	c	c	c	
Northern Rough-winged Swallow*	c	c	c	
Barn Swallow*	c	a	c	
Cliff Swallow*	u	o	u	
Purple Martin*	c	a	c	
Blue Jay*	a	u	c	u
American Crow*	c	o	u	o
Black-capped Chickadee	u		u	u
Tufted Titmouse*	u	u	u	u
White-breasted Nuthatch*	o	o	o	u
Red-breasted Nuthatch	u		u	o
Brown Creeper	c		c	u
House Wren	c	c	c	x
Winter Wren	u		u	u
Carolina Wren*	r	r	r	r
Marsh Wren*	c	a	c	r
Sedge Wren*	r	u	r	x
Northern Mockingbird*	r	u	r	r
Gray Catbird*	c	c	c	r
Brown Thrasher*	c	c	c	r
American Robin*	a	a	a	u
Wood Thrush*	c	u	u	
Hermit Thrush	c		c	r
Swainson's Thrush	c		c	
Gray-cheecked Thrush	u		u	
Veery	u	o	o	
Eastern Bluebird*	o	o	o	r
Blue-gray Gnatcatcher	c	u	c	
Golden-crowned Kinglet	c		c	u
Ruby-crowned Kinglet	a		c	r
Water Pipit	u		u	r
Cedar Waxwing*	c	u	c	u
Northern Shrike	r		r	r
Loggerhead Shrike*	o	o	o	r
European Starling*	a	a	a	a
White-eyed Vireo*	o	o	o	
Yellow-throated Vireo*	u	u	u	
Solitary Vireo	u		u	
Red-eyed Vireo	c	c	c	
Philadelphia Vireo	c		c	
Warbling Vireo*	c	c	c	
Black-and-white Warbler*	c	o	c	
Prothonotary Warbler*	u	u	u	
Worm-eating Warbler	o		x	
Golden-winged Warbler	o		u	
Blue-winged Warbler	u	r	u	
Tennessee Warbler	c		c	
Oranged-crowned Warbler	o		o	x
Nashville Warbler	c		c	
Northern Parula	o		o	
Yellow Warbler*	c	c	c	
Magnolia Warbler	a	x	c	
Cape May Warbler	c		c	
Black-throated Blue Warbler	c		c	
Yellow-rumped Warbler	a		a	o

	S	s	F	W
Black-throated Green Warbler	c		c	
Cerulean Warbler	u	x	o	
Blackburnian Warbler	c		c	
Yellow-throated Warbler	r			
Chestnut-sided Warbler	c	o	c	
Bay-breasted Warbler	a		c	
Blackpoll Warbler	u		c	
Pine Warbler	o		o	x
Kirtland's Warbler	x			
Prairie Warbler	x		r	
Palm Warbler	c		c	
Ovenbird*	c	u	c	
Northern Waterthrush	c		c	
Louisiana Waterthrush	r	x	x	
Kentucky Warbler	r	r	r	
Connecticut Warbler	r		r	
Mourning Warbler	u		u	
Common Yellowthroat*	c	c	c	r
Yellow-breasted Chat*	u	u	u	
Hooded Warbler	r	r	r	
Wilson's Warbler	c		c	
Canada Warbler	c		c	
American Redstart*	c	r	c	
House Sparrow*	a	a	a	a
Bobolink*	u	u	u	
Eastern Meadowlark*	c	u	c	r
Western Meadowlark*	r	r	r	
Yellow-headed Blackbird*	r	r	x	
Red-winged Blackbird*	a	a	a	u
Orchard Oriole*	o	o	r	
Northern Oriole*	c	u	u	
Rusty Blackbird	c		c	u
Brewer's Blackbird	o		o	r
Common Grackle*	a	a	a	u
Brown-headed Cowbird*	c	c	c	u
Scarlet Tanager*	c	u	c	
Summer Tanager	r	x	x	
Northern Cardinal*	c	c	c	c
Rose-breasted Grosbeak*	c	r	c	
Indigo Bunting*	c	a	c	
Dickcissel*	o	o	o	
Evening Grosbeak	o		o	o
Purple Finch	u	x	u	u
Common Redpoll	o		o	o
Pine Siskin*	u		u	o
American Goldfinch*	a	c	c	c
Rufous-sided Towhee*	c	c	c	u
Savannah Sparrow*	c	c	c	x
Grasshopper Sparrow*	o	o	o	
Henslow's Sparrow	r	x		
Sharp-tailed Sparrow	r		r	
Vesper Sparrow*	u	u	u	x
Dark-eyed Junco	c		c	u
American Tree Sparrow	c		c	c
Chipping Sparrow*	u	u	u	
Field Sparrow*	u	u	u	r
White-crowned Sparrow	c	x	c	u
White-throated Sparrow	a	x	a	u
Fox Sparrow	c		c	r
Lincoln's Sparrow	u		u	x
Swamp Sparrow*	c	r	c	o
Song Sparrow*	c	c	c	u

	S	s	F	W
Lapland Longspur	u		u	u
Snow Bunting	c		c	c

Accidental Bird Sightings

Red-throated Loon	Least Tern
Red-necked Grebe	Groove-billed Ani
Gannet	Barred Owl
Wood Stork	Red-shafted Flicker
American Flamingo	Western Kingbird
Ross Goose	Black-billed Magpie
Ruddy Shelduck	Boreal Chickadee
Fulvous Whistling Duck	Benwick's Wren
Cinnamon Teal	Townsend's Solitaire
Harlequin Duck	Bohemian Waxwing
Muscovy	Townsend's Warbler
Barrow's Goldeneye	Black-headed Grosbeak
King Eider	House Finch
Swainson's Hawk	Pine Grosbeak
Gyrfalcon	Hoary Redpoll
Northern Bobwhite	Red Crossbill
Yellow Rail	White-winged Crossbill
Black Rail	Oregon Junco
Wilson's Plover	Le Conte's Sparrow
Purple Sandpiper	Lark Sparrow
Black-necked Stilt	Bachman's Sparrow
Pomarine Jaeger	Clay-colored Sparrow
Long-tailed Jaeger	Black-chinned Sparrow
Great Skua	Harris' Sparrow
Little Gull	Smith's Longspur
Black-legged Kittiwake	

Additional information may be obtained by writing Refuge Manager, Ottawa National Wildlife Refuge, 14000 West State Route 2, Oak Harbor, Ohio 43449.

Phone: (419) 898-0014

Notes

Date _____ No. Species _____

Time Afield _____

Observers _____

Weather _____

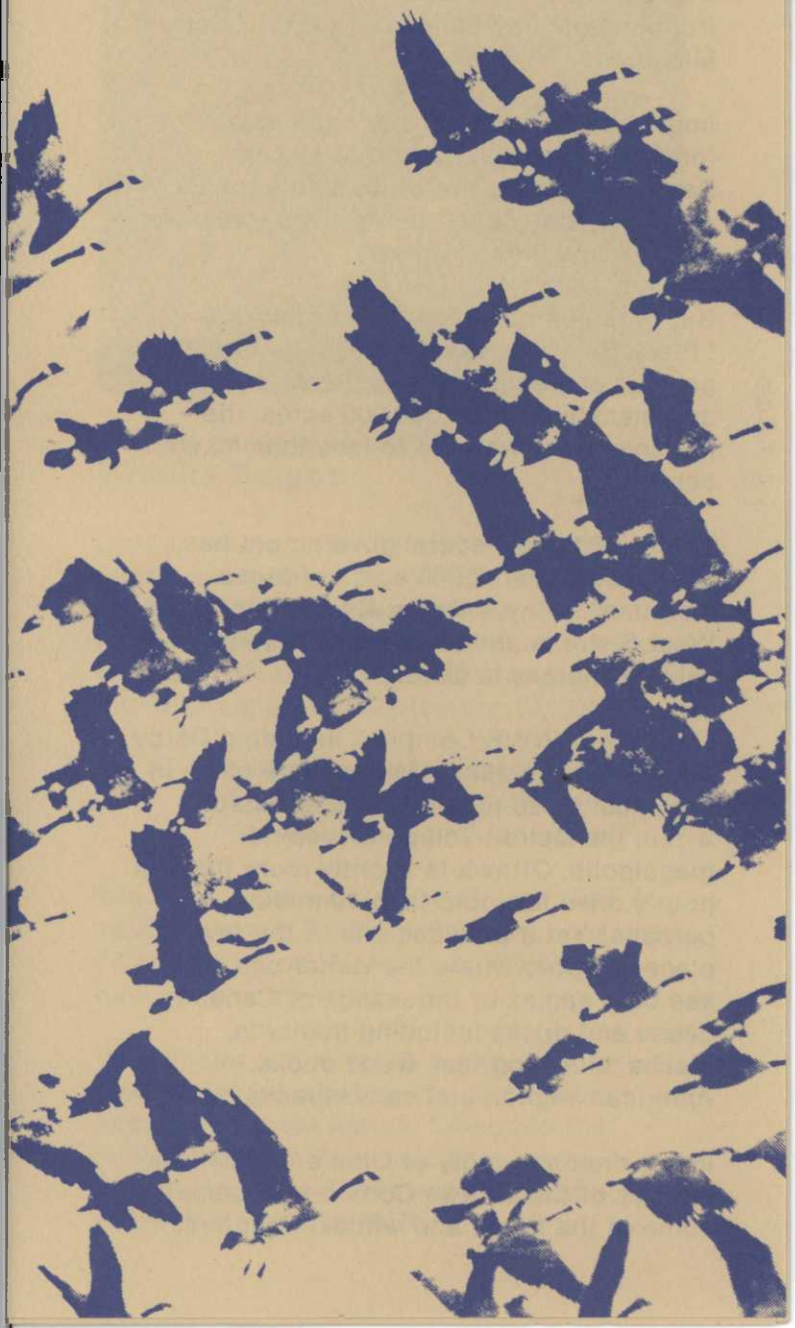
Remarks _____

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

RF-31540-2 **OCTOBER 1982**

Ottawa National Wildlife Refuge Complex

Ohio



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.

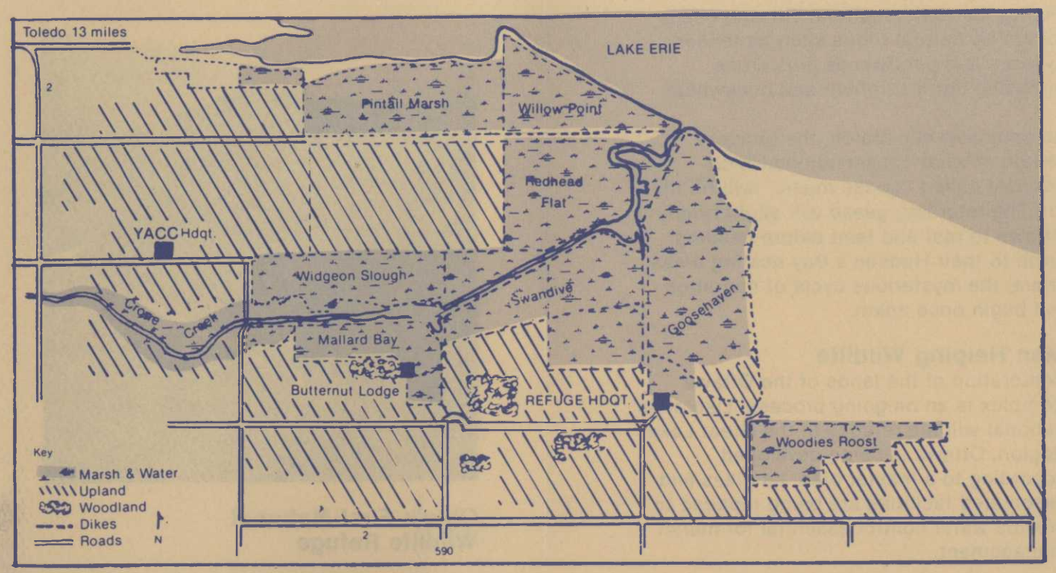
Ohio's First National Wildlife Refuge

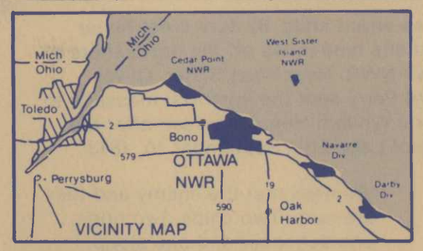
Like an errant child, 82-acre West Sister Island sits nine miles off the north shore of Ottawa NWR. Near West Sister, Oliver Hazard Perry sent the immortal message to General William Henry Harrison after the battle of Lake Erie, September 10, 1813:

> "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.

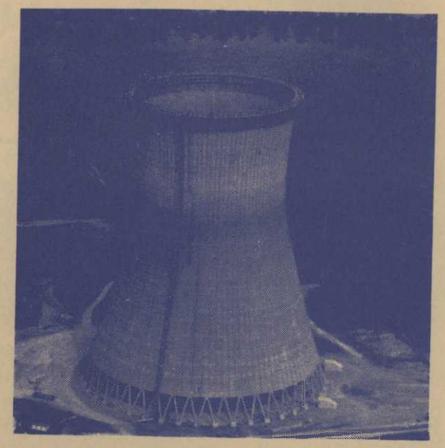
Navarre Marsh

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

FOR FURTHER INFORMATION WRITE
Refuge Manager, Ottawa National Wildlife Refuge Complex
1400 West State Route 2
Oak Harbor, Ohio 43449
Telephone: (419) 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.

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