Chapter 3 The Refuge Environment

Introduction

This chapter describes the general environment, natural resources, socioeconomic conditions, and special environmental features of Refuge lands and surrounding area. The descriptions center on those aspects of the environment that may be affected by management actions of this plan.

Geographic Setting

The Ottawa National Wildlife Refuge Complex and the surrounding area lies in the western basin of Lake Erie, stretching from just east of Toledo, Ohio, to 75 miles west of Cleveland, Ohio, in Lucas and Ottawa counties. The area is generally flat with predominantly hydric, or wetland, soils. Agriculture is the predominant feature of the surrounding landscape with small towns and cities scattered throughout. An estimated eight million people live within a 2-hour drive of the Refuge.

Photo by Sharon Cummings

The Refuge and surrounding land are part of what was traditionally known as the Great Black Swamp, which once included 300,000 acres of wetlands along Lake Erie and extended inland. This vast area comprised coastal wetlands, riverine marshes, wet prairies, hardwood swamps and oak savanna. Only about 10 percent of this original wetland habitat remains, and this resource supports a tremendous diversity of wildlife.

Climate

The climate of northwest Ohio is continental in nature, with moderate extremes of heat, cold, wetness and dryness. The proximity of the Refuge to Lake Erie moderates temperature extremes and can delay both the onset of

winter cold and the return of spring warmth. The average annual rainfall is approximately 32 inches. Precipitation is distributed throughout the year, with spring being the wettest season. The area receives about 30 inches of snow per year.

Refuge Resources

Wetlands

Much of the area including and surrounding the Ottawa National Wildlife Refuge Complex was originally wetlands of various types with variable yearly water regimes. Many of the inland wetlands were probably seasonal in nature, while along the coast of Lake Erie more permanent wetlands formed behind protective barrier beaches. Most of these beaches disappeared as a result of high lake levels in the 1970s and lakefront development, which has changed sand deposit dynamics. Approximately 30,000 acres of wetlands remain in the area, mostly in Federal refuges, State management areas, and private hunting clubs just inland from the shores of Lake Erie.

These remaining wetlands are often surrounded by man-made dikes. The dikes are especially important for wetlands adjacent to Lake Erie to protect the wetlands from wave damage during high water periods or storm events. Dikes around wetlands allow for the pumping in or out of water for crop or other plant and invertebrate production. Gravity flow and pump systems are used to raise or lower water levels to achieve desired mixes of aquatic plants, thus enhancing their value to wildlife.

Managing the marshes for wildlife is essentially based on controlling plant succession to meet seasonal needs. Intensive management is best achieved by controlling water levels, since fluctuating water levels has a marked influence on *aquatic plant succession*. Current marsh management practices for waterfowl and other wetland wildlife include the use of pumps and/or dikes to provide a variety of wetland types in marsh units throughout the year. These generally include combinations of *moist soil unit*s and *hemi-marshes*.

Moist soil units are typically de-watered in the spring to provide shallow water conditions for waterfowl and shorebirds and plant growth. They are re-flooded in the fall to attract and provide food for fall migrants. Hemi-marshes are shallow water areas that contain water throughout the year. Figure 4 presents a depiction of the existing (July 1999) habitat conditions on the Ottawa Unit, the largest land unit of the Ottawa Refuge Complex. Figure 5 shows the Navarre and Darby units as well as Cedar Point National Wildlife Refuge.

Within these marsh complexes, invertebrates including insects, *gastropods* and other organisms living among the *vegetation* provide an important food source for fish and mammals. Waterbirds and other wetland wildlife rely on marsh plants for subsistence, nest sites and cover, while other wetland wildlife utilize fish and invertebrates that inhabit the vegetation. Each habitat component within the marsh attracts its own species of plant, bird,

Figure 4: Existing Habitat, Ottawa National Wildlife Refuge

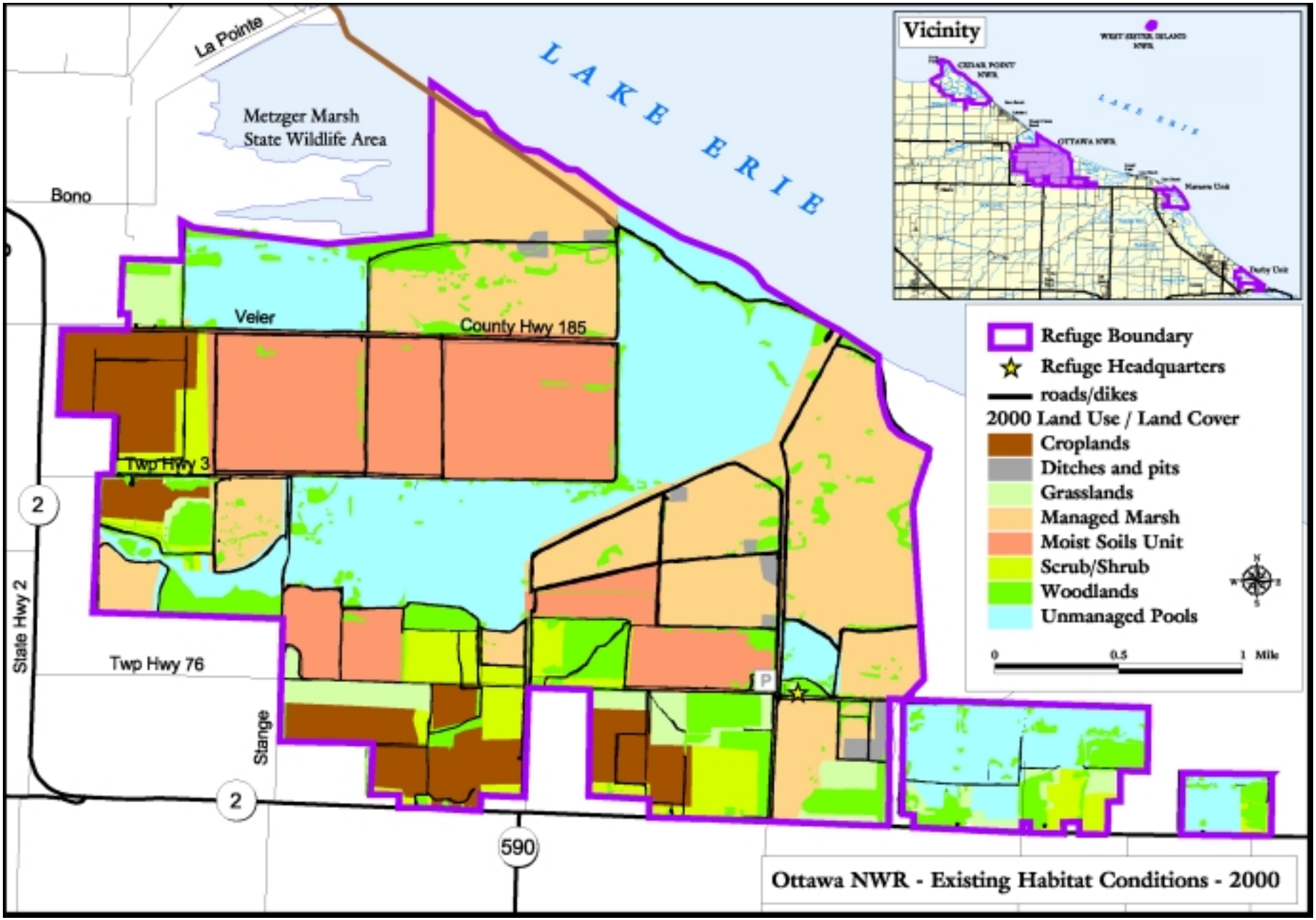
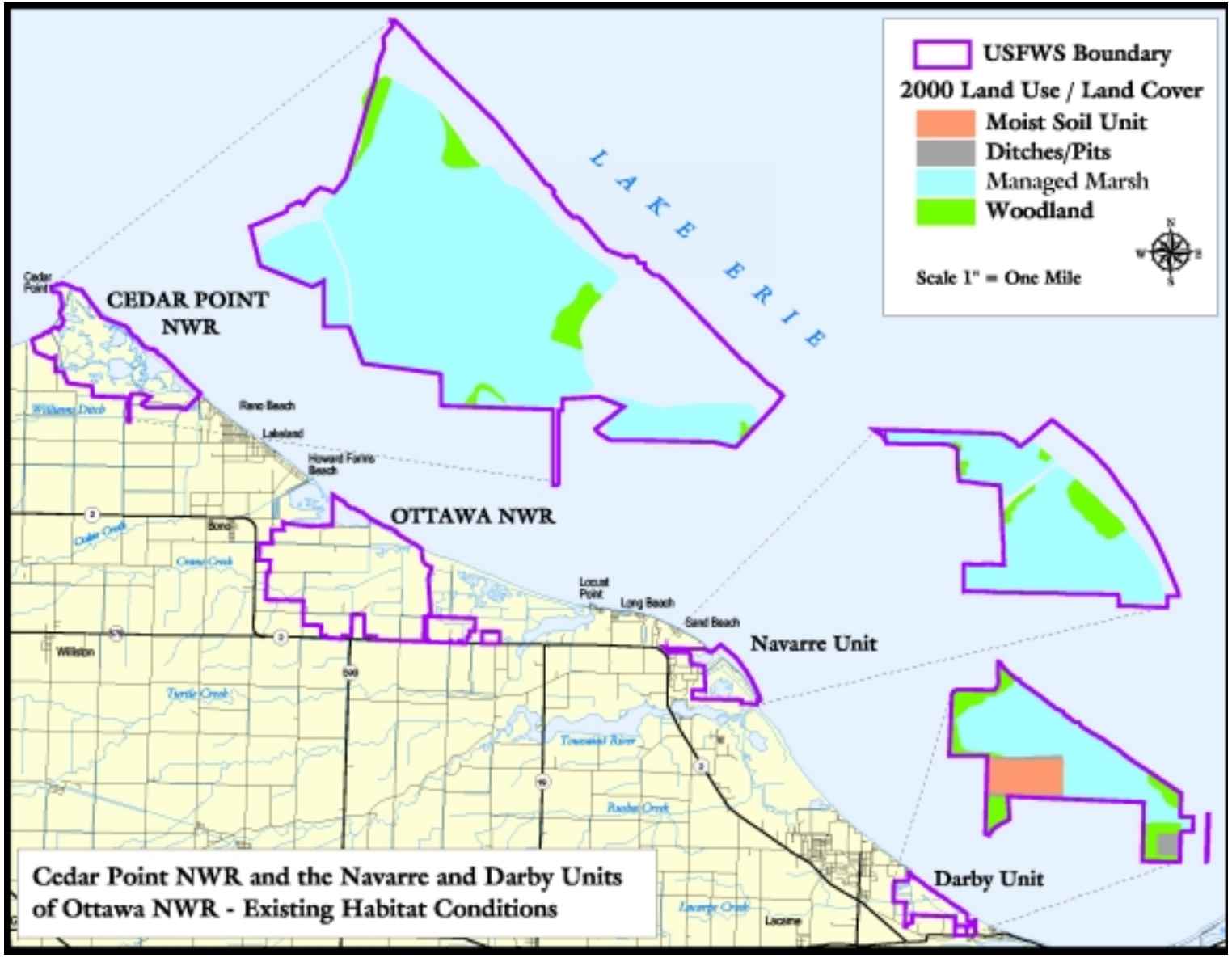


Figure 5: Existing Habitat, Navarre and Darby Units, Cedar Point National Wildlife Refuge



mammal, reptile, amphibian and fish. Within the marshes, *zonation* and *succession* in response to environmental conditions are among the important community processes. Water level fluctuation, whether natural or human-induced, and the resultant plant and animal response are often the most significant driving forces in the wetland community.

Wildlife

Birds

The Ottawa National Wildlife Refuge Complex has recorded more than 325 species of birds in or around units of the Complex. This diversity of species attests to the attractiveness of existing wetlands in the area, and to the location along a major bird migration route. Birds are further concentrated due to the physical barrier presented by Lake Erie and the tendency for migrant birds to follow well-defined landscape "highways," such as shorelines. This natural pathway funnels millions of birds through a relatively small area.

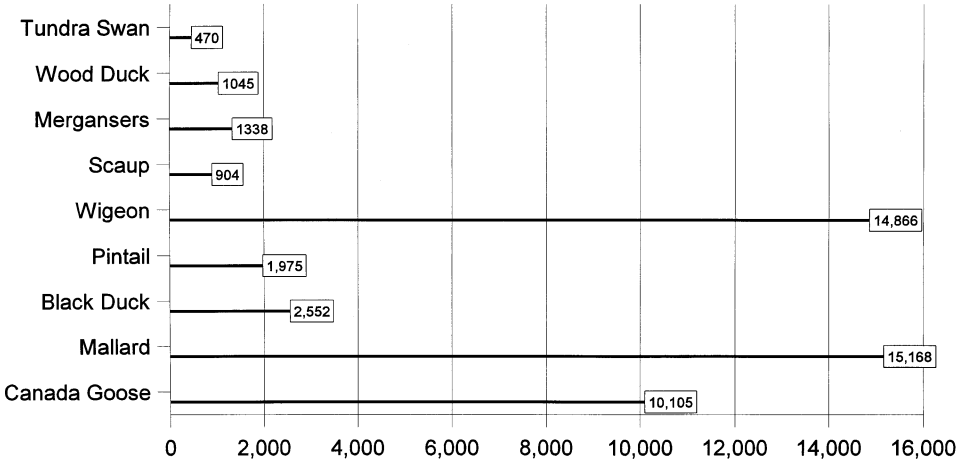
The Refuge complex and surrounding wetland areas are especially important to certain groups of birds including waterfowl, neotropical migrant songbirds (such as warblers and thrushes that nest in North America and winter in Mexico, the Caribbean and Central and South America), raptors, bald eagles, shorebirds and colonial-nesting wading birds such as herons.

The region is an important staging area for migrant songbirds as they rest up for the passage around or over Lake Erie in the spring. Lake Erie represents the largest barrier to many of these species after they cross the Gulf of Mexico. The abundance and variety of insect prey available in the marshes and adjacent habitats permit these birds to refuel for their continued migration. It is currently believed that the western Lake Erie shoreline has one of the most dramatic buildups of neotropical migrants in North America during spring migration. For many years the Black Swamp Bird Observatory, a non-profit group, has captured and banded songbirds on the Ottawa Refuge Complex. The top 10 most common songbird species banded during 1999 were the blackpoll warbler (1,368), Swainson thrush (1,301) magnolia warbler (1,203), common yellowthroat (857), white-throated sparrow (789), ruby-crowned kinglet (759), gray catbird (754), yellow warbler (708), American redstart (673), and Myrtle warbler (608). A combined total of 19,129 individuals representing 113 species were banded that year. The number of birds captured at mist net sites is considered a small proportion of birds that pass through the Refuge units.

A small colony of black terns, a regional conservation priority species for the Service, recently began to nest again in natural habitat on Cedar Point National Wildlife Refuge. The number of adults and their nesting success is unknown at this time.

The Lake Erie marshes are at the crossroads of the Mississippi and Atlantic flyways, and they annually attract hundreds of thousands of migrating waterfowl. During a normal migration, waterfowl use of the Ottawa Refuge Complex averages 3 million duck-use days and 800,000 goose-use days. Mallards, black ducks, American wigeon, pintail, lesser scaup, redhead, and canvasback are the predominant duck species during migration. The Lake

Figure 6: Peak 1998 Waterfowl Numbers on Ottawa and Cedar Point National Wildlife Refuges.



Erie marshes are the most important migration staging area for black ducks on the continent. Surveys indicate that approximately 70 percent of the black ducks in the Mississippi flyway are concentrated in these wetlands during fall migration. This high concentration represents nearly 17 percent of all black ducks tallied nationwide. Waterfowl species that nest in the area are mainly mallard, blue-winged teal, wood duck and Canada goose. Figure 6 presents a selection of migratory waterfowl and the highest number observed on the Refuge Complex during 1998.

A colony of great blue herons, great egrets, double-crested cormorants and black-crowned night herons on West Sister Island National Wildlife Refuge averages 3,500 nesting pairs. Many of these birds feed in coastal wetland habitats on Ottawa and Cedar Point refuges. The island supports the largest night-heron rookery in the U.S. waters of the Great Lakes.

The Ottawa Refuge Complex and nearby Lake Erie shoreline also serves as an important spring and fall migration stopover for a variety of shorebirds. According to Black Swamp Bird Observatory records, the peak time for spring shorebird migration arrivals is April 11-20. Common snipe, greater yellowlegs, killdeer and pectoral sandpipers are among the species commonly seen during this time period. Peak arrival times for dunlin, semi-palmated plover and black-bellied plover are May 11-31. Fall migrations begin in mid-July and continue through early November. It is not uncommon to see a great variety of shorebirds well into October if the weather is mild and winds shift directions frequently. Shifting wind patterns typically dry out the western basin of Lake Erie, creating mudflats that are ideal for shorebird feeding.

Migratory Bird Conservation Initiatives:
North American Waterfowl Management Plan (NAWMP): This continent-wide plan was ratified in 1986 and outlines a broad framework for waterfowl management strategies and conservation efforts in the United States, Canada and Mexico. The Ottawa Refuge Complex is located within two joint ventures, or conservation partnerships, identified in the plan. A large portion of the State of Ohio, including the Refuge Complex, is located

within the Upper Mississippi River and Great Lakes Region Joint Venture. The Ottawa Refuge Complex is within the Lake Erie Marshes Focus Area of this Joint Venture. The Ottawa Refuge also contributes significant migration habitat for black ducks, the focus of the species-based Black Duck Joint Venture. The NAWMP provides a conduit for enhanced State, Federal and private wetland conservation efforts.

Partners in Flight: Nationally and internationally, several non-game bird initiatives are in the planning stage. Partners in Flight is developing Bird Conservation Plans, primarily for landbirds, throughout the United States. The plans include priority species lists, associated habitats and management strategies. The same elements will be the focus of ongoing planning efforts for shorebirds (U.S. Shorebird Conservation Plan) and colonial waterbirds (North American Colonial Waterbird Conservation Plan). These future plans will be supported through the management goals outlined in this CCP.

Mammals

About 30 species of mammals are found on the Ottawa Refuge Complex. Common species include muskrat, mink, raccoon, eastern cottontail, woodchuck, opossum, striped skunk, white-tailed deer, fox squirrel, and several mole and mice species. Mammals are most abundant in and around wetland habitat due to the abundant food and cover available.

A few resident mammal species, including muskrats, woodchucks and white-tailed deer, have periodically become overabundant on the Refuge. An elevated deer population can hinder the natural succession of woodlands through over browsing, damage neighboring croplands and constitute a hazard to motorists. Muskrats can greatly affect the emergent vegetative cover on marshes. Woodchucks can damage dikes through excessive burrowing. Resident populations of these species are being controlled, with varying success, through Refuge hunting and trapping programs.

Photo by Sharon Cummings

Reptiles and Amphibians

Amphibians and reptiles, while often mentioned together, are two natural and distinct classes of vertebrate animals. Many species of salamanders, newts, toads, and frogs are common to the Refuge and depend on wetland habitat for their survival. Sixteen species of turtles and snakes are also found in the area. Some, like the garter snake, are abundant. Others, like the soft-shelled turtle, are rare. The five-lined skink is the only lizard species in the area.

Threatened and Endangered Species

Bald eagles, a federally listed threatened species, are commonly seen near coastal areas during migration and five active nests are located on the Ottawa Refuge Complex[1]. Kirtland's warblers have been sighted on the Ottawa and Navarre units during migration seasons. Peregrine falcons, a species removed from the endangered species list in 1999, are occasionally

[1] Bald eagle populations are recovering nationwide and the Service has announced a delisting program.

seen during migration. Other federally listed threatened or endangered species that may be found locally in suitable habitat include the Indiana bat (endangered), lakeside daisy (threatened), eastern prairie bush clover (threatened), and eastern prairie fringed orchid (threatened). None of these additional species have been documented on the Ottawa Refuge Complex.

Thirty-three of the State of Ohio's 60 *terrestrial* endangered or threatened wildlife species are dependent on wetlands, and some of these species nest in Lake Erie marshes. Migratory bird species on the State list include American and least bittern, king rail, northern harrier, hermit thrush, common tern and sedge wren and several others. In addition to these terrestrial species, the State-listed endangered Great Lakes muskellunge also use coastal wetlands for spawning, nursery and rearing habitat.

Fish

Coastal wetlands are a vital link in Lake Erie's fisheries ecosystem. They provide spawning, nursery and rearing habitat for some 43 wetland-dependent fish species, 26 of which have significant recreational, commercial, or prey value. Two categories of fish associated with the coastal marshes of this region include: (1) species directly dependent on coastal marshes as adult habitats, and (2) species making opportunistic use of coastal marshes. The first category includes species such as northern pike, longnose gar, bullheads, and crappies, whose dependence on aquatic vegetation has been well established. The second category includes near-shore and bay species such as gizzard shad, common carp, white perch, channel catfish, and yellow perch, which have been shown by qualitative surveys to be seasonally common in coastal marshes as young or adults. The well-developed system of drainage ditches in much of the area allows seasonal movement of some species far into the mainland.

Photo by Sharon Cummings

Carp have become a serious problem in many wetlands due to their sheer numbers, aquatic plant diet, and markedly increasing water *turbidity* during bottom feeding. Increases in turbidity decrease sunlight penetration in the water, which in turn reduces the plant and *zooplankton* production necessary to many wetland food chains.

Fish, Wildlife and Plant Species of Management Concern

Table 1 presents information on the status and current habitat use of a number of fish, wildlife and plant species found on the Ottawa Refuge Complex. The table also lists which of the proposed CCP habitat objectives to be introduced in Chapter 4 will benefit each species. Individual species, or species groups, were chosen because they are listed as Regional Resource Conservation Priorities or State-listed threatened/endangered species. In addition, some species are of management concern due to their importance as economic/recreational sources and/or status as nuisance or invasive species.

Table 1: Resource Conservation Priority Matrix

Species	Refuge Status	Monitored?	Unit	CCP Habitat Objective Benefit								
				1	2	3	4	5	6	7	8	9
* Wading Birds	Common/increasing	Yes Goal=Stable	WSINWR ONWR CPNWR	F, M	F	F	F		F	B		X
*Marsh Birds (General)	Uncommon	Yes Goal=Stable	ONWR CPNWR	F, Br, M	F, B, Br	F, B, Br	F					X
Black-crowned night heron	Common-decreasing	Yes Goal=Increase	WSINWR ONWR	F, M	F	F	F		F	B		X
Double-crested cormorant	Common-increasing	Yes Goal=Stable	WSINWR	F, M					F	B		X
*Shorebirds (General)	Common seasonally	Yes Goal=Stable	ONWR CPNWR			M, F	F					
American bittern	Uncommon	Yes Goal=Stable or Increase	ONWR CPNWR		F, Br	F, B, Br						X
Least bittern	Uncommon	Yes Goal=Stable or Increase	ONWR CPNWR	F, M	F, B, Br	F, Br						
American woodcock	Common seasonally	Yes Goal=Increase								F, M	F, M, B, Br	
Common tern	Uncommon	Yes Goal=Increase	ONWR	F		F			F, B, Br			
Black tern	Rare	Yes Goal=Increase	CPNWR	F, B Br		F, B Br	F, Br					
*Waterfowl (general)	Recreational/economic Common	Yes Goal=Stable	ONWR CPNWR	F, M		F	F	F	P			
Canada goose	Recreational/economic Common	Yes Goal=Stable	ONWR CPNWR	F, M		F, M	F	F	P			F, B Br
Trumpeter swan	Uncommon	Yes Goal=Increase	ONWR CPNWR	F, M		F, M		F	P			
Wood duck	Recreational/economic Common	Yes Goal=Increase	ONWR CPNWR	F, M	F	F	F	F		F, B Br		

* See Species List in Appendix

B – Breeding Habitat
Br – Young/Brood Rearing
M – Migration
F – Foraging Habitat
P – Predator Avoidance, etc.
X – Present

Table 1: Resource Conservation Priority Matrix

Species	Refuge Status	Monitored?	Unit	CCP Habitat Objective Benefit								
				1	2	3	4	5	6	7	8	9
American black duck	Recreational/economic Common	Yes Goal=Increase	ONWR CPNWR	F, M Br	F, M	F, M	F	F	P			
Mallard	Recreational/economic Common	Yes Goal=Stable	ONWR CPNWR	F, M, B, Br	F	F, M, B, Br	F	F	P	F		
Blue-winged teal	Recreational/economic Common	Yes Goal=Stable	ONWR CPNWR	M		F	F	F				
Canvasback	Recreational/economic Uncommon	Yes Goal=Stable	ONWR CPNWR	M		F, M		F	F			
*Raptors	Common	Yes Goal=Stable	ONWR CPNWR							B	F	F
Bald eagle	Threatened/recovering	Yes Goal=Stable	ONWR CPNWR	F		F			F	F, B Br		X
*Owls (general)	Common	Yes Goal=Stable	ONWR CPNWR								F	F
*Songbirds (general)	Abundant seasonally	Yes Goal=Stable	ONWR							F, M, B, Br	F, M, B, Br	F
Sedge wren	Rare	Yes Goal=Increase	ONWR CPNWR									F
Wood thrush	Uncommon	Yes Goal=Stable	ONWR							F, M, B, Br	F, M, B, Br	
*Furbearers	Recreational/economic Common	Yes Goal=Stable or Decrease	ONWR CPNWR	F, B, Br	F, B Br	F, B Br				B, Br	F, B, Br	F
White-tailed deer	Common	Yes Goal=Decrease	ONWR	F, P	F, P	F, P	F	F		F, X	F, B Br	X
Lake sturgeon	Rare (not found)	No Goal=Monitor	ONWR?						Br			
Walleye	Recreational/economic	Yes Goal=Increase	ONWR CPNWR						B, Br			
Sea lamprey	Nuisance	Yes Goal=Eradicate	ONWR						X			

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Species	Refuge Status	Monitored?	Unit	CCP Habitat Objective Benefit								
				1	2	3	4	5	6	7	8	9
Lake whitefish	Recreational/economic	Yes Goal=Stable	ONWR CPNWR						Br			
Muskellunge	Recreational/economic	Yes Goal=Stable	ONWR?						B, Br			
Round goby	Nuisance	Yes Goal=Eradicate	ONWR CPNWR						B, Br			
Yellow perch	Recreational/economic	Yes Goal=Increase	ONWR CPNWR						F			
*Reptiles (general)	Common	Yes Goal=Stable	WSINWR ONWR CPNWR									X
Copperbelly water snake	Threatened (not found)	No Goal=Monitor	ONWR?									
Lake Erie water snake	Proposed threatened (not found)	No Goal=Monitor	WSINWR?									
*Amphibians (general)	Common	Yes Goal=Monitor	ONWR CPNWR	F, B, Br	F, B, Br	F, B Br	F, B, Br	F, B, Br		B, Br		X
Mapleleaf mussel	Recreational/economic	Yes Goal=Stable	ONWR									
Pimpleback mussel	Recreational/economic	Yes Goal=Stable	ONWR						F, B, Br			
Round pigtoe mussel	Rare	Yes Goal=Stable	ONWR						F, B, Br			
Threeridge mussel	Recreational/economic	Yes Goal=Stable	ONWR						F, B, Br			
*Lepidopteran (general)	Recreational/economic	Yes Goal=Complete Inventory	ONWR CPNWR				F, B, Br	F		F,B, Br	F, B, Br	F, B Br
Purple loosestrife	Increasing	Yes Goal=Eradicate	ONWR CPNWR	X	X	X	X	X				X

* See Species List in Appendix

B – Breeding Habitat F – Foraging Habitat

Br – Young/Brood Rearing P – Predator Avoidance, etc.

M – Migration X – Present

Social and Economic Context

Even though more than 8 million people live within a 2-hour drive, the Refuge complex is located within a predominantly rural region. However, Toledo and Cleveland are close enough to influence housing and recreational development. Nearby smaller communities range from agriculture-oriented towns (Oak Harbor) to recreation-oriented towns (Port Clinton). The economic base of the region is a mix of light industry, service industries, power generation, agriculture, government and recreation. Land use is roughly 75 percent agriculture, 8 percent conservation/parks, 6 percent residential, 6 percent business, 3 percent transportation and 2 percent miscellaneous.

Photo by Sharon Cummings

Major farm commodities produced are soybeans, wheat, corn, vegetables and fruits, with some cattle, hogs and poultry. Industries include food processing, light manufacturing and the production of concrete, limestone, lime, gypsum, rubber and plastic products. The Davis-Besse Nuclear Power Plant west of Port Clinton is a major employer in the area and has 1,100 employees.

Tourism has become an increasingly important component of the area's economy with the renewal of water quality in Lake Erie and the corresponding resurgence of the lake as a premiere regional and national fishery. Port Clinton, for example, has a permanent population of 12,500 people. During the summer months, however, the average weekday population is 120,000 and on weekends 250,000. The estimated annual expenditures by tourists in Ottawa County are estimated at between $550 and $600 million.

In the 1920s and '30s, the Lake Erie Marshes gained fame for their tremendous waterfowl hunting opportunities. This tradition is still strong today even though the amount of habitat, the number of birds, and the number of hunters have all dropped considerably. Several waterfowl hunting clubs still operate large wetland complexes along the Lake Erie coastline while State and Federal wildlife areas draw thousands of waterfowl hunters yearly.

Archaeological and Cultural Resources

As part of the CCP process, the Service contracted for a cultural resources overview study of the Ottawa National Wildlife Refuge Complex. The study resulted in the report, "*Cultural Resource Overview, Ottawa, Cedar Point, and West Sister Island National Wildlife Refuges, Lucas and Ottawa Counties, Ohio,*" by William E. Rutter and Andrew M. Schneider of Midwest Environmental Consultants, Inc., dated June 11, 1998. The report concluded that the Ottawa Refuge Complex has 53 reported sites on Refuge land and one site on adjacent Coast Guard land. Most of these sites date to the historic period. The authors identified an additional 149 known archeological sites within 5 miles of the three refuges. The single standing structure on the refuges is the West Sister Island Lighthouse.

Using Government Land Survey maps from 1820 and 1834, and other old maps, the archeologists were able to determine the extent of Lake Erie shoreline erosion since that time. Erosion has implications for destroyed archeological sites and for Refuge land management.

As of June 10, 1999, Lucas and Ottawa counties contain 106 properties on the National Register of Historic Places. Most of these properties are located in towns and cities, but the West Sister Island Lighthouse is on the Refuge. Historic properties on the National Register are generally not indicative of the kinds of properties that could be found on the refuges. Sites on the refuges could include prehistoric archeological sites, historic archeological sites (Indian and Western), farmsteads, and sites associated with commercial trapping and recreational hunting.

The overview study identified Indian tribes, historical societies and museums, and other potentially interested parties that should be consulted in the search for and evaluation of cultural properties on the refuges. However, it is often difficult to determine an association between prehistoric cultures that created the archeological sites and modern Indian tribes. No evidence exists for the removal of Native American human remains from any of the refuges, but reported prehistoric mounds in the area indicate the potential for finding human remains and cultural materials.

Indian Tribal Interests

During the late prehistoric period, two cultural groups occupied northern Ohio – the Algonquian-speaking Sandusky and the Iroquoian-speaking Western Basin Traditions. Approximately 700 years ago the people of the Western Basin Tradition moved to Ontario. Then, 350 years ago, the Neutral Iroquois defeated the people of the Sundusky Tradition, who fled and were absorbed into other Algonquian-speaking populations. By the late 17th century, northwest Ohio appears to have been abandoned. Tribes later in the area were the Miami, Shawnee, Delaware, Wyandot, Ottawa, Chippewa, and Potawatomi.