Old Woman Creek National Estuarine Sanctuary

Management Plan

ARTMENT OF COMMERCE
Oceanic and Atmospheric Administration
Ocean and Coastal Resource Management
y Programs Division
on, D.C. 20235

OHIO DEPARTMENT OF NATURAL RESOURCES
Division of Natural Areas and Preserves
Fountain Square
Columbus, Ohio 43224

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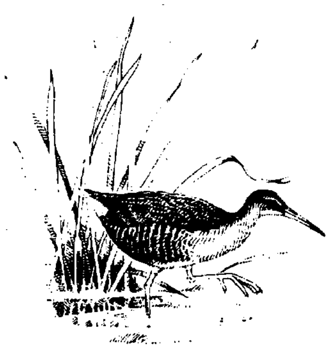
MARCH 1983



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Sanctuary Programs Division
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OLD WOMAN CREEK

NATIONAL ESTUARINE SANCTUARY

MANAGEMENT PLAN

Prepared by the

DIVISION OF NATURAL AREAS AND PRESERVES

OHIO DEPARTMENT OF NATURAL RESOURCES

FOUNTAIN SQUARE

COLUMBUS, OHIO 43224

Submitted to

OFFICE OF OCEAN AND COASTAL RESOURCE MANAGEMENT

NATIONAL OCEAN SERVICE

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

U.S. DEPARTMENT OF COMMERCE

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FOREWORD

This document is intended to serve three purposes. First and foremost, it is a comprehensive management plan for the sanctuary staff and agency administrators. It provides direction and guidance for the operation of the sanctuary. It is not a static document, but will be amended through deliberate and careful evaluation of proposed changes by the staff of the Division of Natural Areas and Preserves.

This document also fulfills contractual obligations between the Division of Natural Areas and Preserves of the Ohio Department of Natural Resources and the Office of Ocean and Coastal Resource Management, National Ocean Service, National Oceanic and Atmospheric Administration of the United States Department of Commerce. Grant number NA-80-AA-D-CZ122 from NOAA to the Department of Natural Resources requires that a management plan, research plan, education plan, and recreation plan all be submitted by April 1, 1981. This document, referred to as the management plan by the Division of Natural Areas and Preserves, includes the research, education, and recreational aspects of the overall sanctuary management program. Management actions completed prior to this 2nd Revision are referenced in the original document on file at the Sanctuary headquarters.

The third use of this document is for public review purposes. It will be used by the Old Woman Creek Sanctuary Advisory Council in its review of the sanctuary operations. It will also be of interest to a variety of individuals and organizations concerned about sanctuary management.

Since the Old Woman Creek is the first National Estuarine Sanctuary to have a final management plan developed, this document should be useful to the managers and administrators of other such sanctuaries in the development of their management plans.

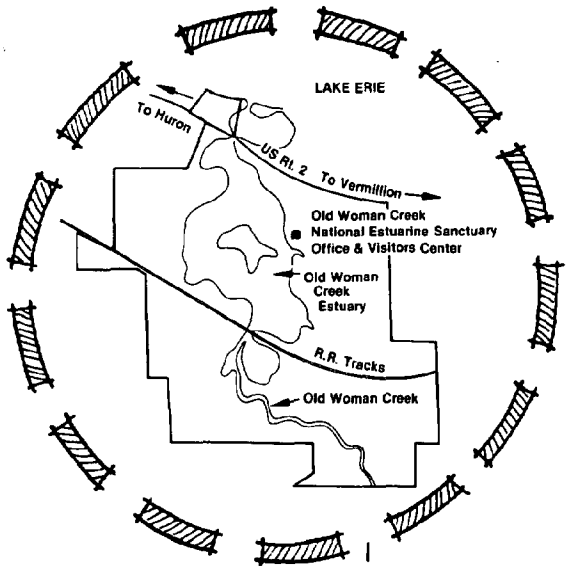
EXECUTIVE SUMMARY

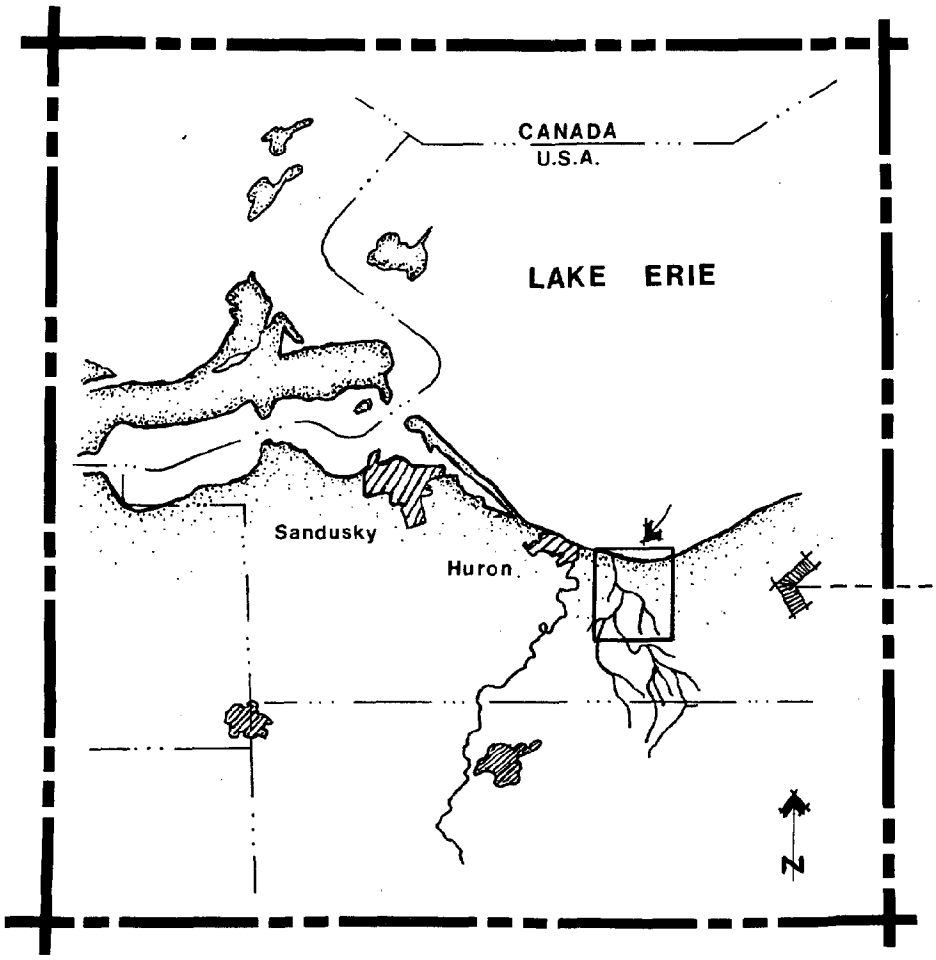
Although much of Ohio's Lake Erie Shoreline is highly developed, many areas with significant natural attributes remain. One of these is a relatively undisturbed representative of the freshwater estuaries found around the Great Lakes. It is located on the south central shore of Lake Erie at the mouth of Old Woman Creek, approximately two miles east of Huron, Ohio, in Erie County (Figure 1). Early in 1975, the Ohio Department of Natural Resources (ODNR) applied to the Office of Ocean and Coastal Resource Management (OCRM), (formerly the Office of Coastal Zone Management), NOAA, U.S. Department of Commerce for an estuarine sanctuary acquisition financial assistance award.

Under Section 315 of the Coastal Zone Management Act of 1972 (Public Law 92-583) as amended, the Secretary of Commerce is authorized to make financial assistance awards to coastal states for up to 50% of the cost of acquisition of wetlands and uplands surrounding the estuary and for the development of associated research and educational programs. Sanctuaries are to be representative of the nation's various ecosystem types.

In 1977 a Final Environmental Impact Statement was completed and OCRM approved the grant application. Dedication of Old Woman Creek as a national estuarine sanctuary and state nature preserve occurred on September 5, 1980 at a ceremony held in Huron, Ohio. Land acquisition was completed on March 31, 1981.

The establishment of the National Estuarine Sanctuary Program was a direct result of studies undertaken during the 1960s when the value of salt-water estuaries was beginning to be appreciated by scientists and government





LOCATION MAP
FIGURE 1

officials. Some scientists recognized that many areas of the land-water interface in the Great Lakes functioned in a similar manner.[1] In these areas where creeks and rivers drain into the lakes and where lake levels affect stream levels, physical mixing occurs upstream and gradients of chemicals and ions are observed.

The purpose of the Old Woman Creek National Estuarine Sanctuary is to ensure the long-term protection of a freshwater estuary. ODNR and OCRM have identified four objectives to guide development of the sanctuary management policies:

1. Provide an educational focus to increase public understanding of the Great Lakes coastal resources.
2. Analyze ecological relationships within a freshwater estuarine environment.
3. Document existing environmental conditions within the sanctuary and monitor changes as they occur.
4. Compare a relatively unmanipulated system to similar areas which have been extensively affected by human activities.

To ensure the protection of the Old Woman Creek estuary, the sanctuary is managed by ODNR's Division of Natural Areas and Preserves. In 1970, the Ohio legislature enacted the Natural Areas Act which authorizes ODNR to acquire and accept dedication of public and privately owned lands as nature preserves. It gives the Department authority to manage and protect such lands for educational and scientific use and visitation.

[1] Brant, R.S. and C.E. Herdendorf. 1972. Delineation of Great Lakes Estuaries, Proc. 15th Conf. Great Lakes Res., International Association of Great Lakes Resources, pp. 710-718.

INTRODUCTION

Planning, acquisition and protection of the Old Woman Creek Estuary as a National Estuarine Sanctuary and State Nature Preserve has been a seven year effort by a multitude of individuals, organizations and agencies at local, state, and national levels.

Funding and direction for these efforts were made possible by the Coastal Zone Management Act of 1972 (P.L. 92-583) and its 1976 amendments (P.L. 94-370). The Coastal Zone Management Improvement Act of 1980 (P.L. 96-464) provided additional changes to the federal program.

Section 315 of the Coastal Zone Management Act (CZMA) created a national estuarine sanctuary program for "...acquiring, developing, or operating estuarine sanctuaries, to serve as natural field laboratories in which to study and gather data on the natural and human processes occurring within the estuaries of the coastal zone...".

In order to ensure the sanctuary program adquately represents regional and ecological differences, the guidelines for the estuarine sanctuary program establish a biogeographic classification scheme which reflects geographic, hydrographic, and biological characteristics. This system presently recognizes eleven biogeographic categories that are defined in the guidelines; subcategories of this basic system will be utilized as appropriate to distinguish major sub-classes of the system.

At the state level, the Coastal Zone Management Unit of the Ohio Department of Natural Resources was instrumental in initiating the process

of nominating Old Woman Creek as a National Estuarine Sanctuary in 1974. Between 1974 and 1977, there were numerous changes to the sanctuary proposal. The Division of Natural Areas and Preserves is operating the sanctuary as a national estuarine sanctuary and a dedicated state nature preserve.

At the local and regional levels, numerous individuals and organizations have contributed their time, energy, and expertise to the development and implementation of the sanctuary proposal.

In January 1975, the sanctuary grant application was formally submitted to the National Oceanic and Atmospheric Administration (NOAA) by the Ohio Department of Natural Resources. During 1975, public meetings and hearings were held and the application was substantially revised. In April 1977, the final environmental impact statement was released by the U.S. Council of Environmental Quality. This document reflected changes in the project brought about by new federal policies on estuarine sanctuaries, by public comment on the draft environmental impact statement, and by revised sanctuary boundaries. On July 18, 1977, the Office of Coastal Zone Management in NOAA approved the sanctuary grant application at a ceremony in Huron, Ohio. Dedication of Old Woman Creek as a national estuarine sanctuary and state nature preserve occurred on September 5, 1980. Land acquisition for the sanctuary, which now totals 562 acres, was completed on March 3, 1981 (see Table 1).

Old Woman Creek is the smallest of the national estuarine sanctuaries, and is presently the only such sanctuary on the Great Lakes. The very concept of an area as a freshwater estuary is relatively new. An estuarine

Appendix C

Old Woman Creek National Estuarine Sanctuary

LAND ACQUISITION SCHEDULE

Date Acquired	Tract	Acreage	Cost
11/30/77	Murray	10.652	$ 145,000.00
10/5/78	Hoffman	13.420	23,100.00
11/20/78	Kaiser	11.243	23,050.00
11/20/78	Willgrube	37.751	77,390.00
1/1/78	Williams	137.230	273,100.00
1/31/79	Stocker	18.790	9,200.00
1/31/79	Jenkins	50.206	45,000.00
3/6/79	Anderson Acres	191.009	310,360.00
8/3/78	Phillips	17.384	15,340.00
9/9/79	Long	4.949	6,500.00
12/5/79	Oberlin Beach Association	38.351	76,700.00
3/6/80	Schuh	17.684	97,000.00
1/26/81	Hartley	12.940	14,250.00
1/26/81	Hartley (Conservation easement)	2.910	25,749.00
2/10/81	Fix	0.104	1,750.00
	Totals:	564.623	$ 1,143,489.00

Relocation Assistance

Schuh	15,500.00
Hart Advertising Co.	2,500.00
Ohio Outdoor Advertising Co.	16,400.00
Total:	$ 34,400.00

Other Costs

Appraisal Fees	17,275.00
Title Fees	1,503.00
Relocation Services	12,948.00
Survey Costs	13,357.31
Total:	$ 45,263.31

TOTAL ALL COSTS: $ 1,223,152.31

sanctuary is defined in Section 304 of the CZMA as "...a research area which may include any part or all of an estuary and any island, transitional area, and upland in, adjoining, or adjacent to such estuary, and which constitutes to the extent feasible a natural unit, set aside to provide scientists and students the opportunity to examine over a period of time the ecological relationships within the area".

The basic goal is to preserve as much of the Old Woman Creek Estuary and its watershed as possible so that information can be gained which will aid in future management decisions concerning the coastal zone, and natural learning centers will be provided for students, researchers and members of the general public. Secondary benefits include: the preservation of habitats for estuarine-dependent flora and fauna, including endangered species; and low intensity recreation, as long as that activity does not detract from the major purposes outlined above (MacFarland, 1979). In order to accomplish these potentially conflicting goals, a management program must be designed to maintain and protect the natural functions and values of the sanctuary for long-term scientific and educational uses. This management plan is intended to give direction and guidance to the management of the sanctuary by the Division of Natural Areas and Preserves.

GENERAL DESCRIPTION OF

RESOURCES AND USES

A. History of Old Woman Creek

Archaeological evidence suggests that following the last phase of Wisconsinan glaciation, early Indians entered north-central Ohio and lived in the Old Woman Creek region. These people, called Paleoindians, were probably nomadic hunters exploiting the last great herds of now extinct Pleistocene animals. Successive time periods found various Prehistoric Indian cultures undergoing a constant change in social and survival strategies. Information concerning these early peoples and later Indians is somewhat lacking prior to European chroniclers circa 1600 A.D.

The southern shores of Lake Erie were the domain of the Erie Indians early in the seventeenth century. An incident in which the Erie Indians captured a great Iroquois leader led to a war of revenge between the two nations. The Iroquois defeated their enemy and by 1656 the entire Erie nation was destroyed. Huron Indians migrated into the western Lake Erie region in the late 1600's and became the dominant tribe for a time. The Hurons remained here until circa 1700 when the New York Iroquois once again invaded Ohio and defeated them. It was at this time that the surviving Hurons journeyed to the Sandusky Bay region and became known as the Wyandotte, a word derived from their language meaning "in the islands". Remnants of the Wyandotte tribe were probably living in the vicinity when the first settlers arrived at Old Woman Creek.

In 1795, the Greenville Treaty was signed between the United States and the Ohio Indian tribes, including the Wyandotte. This act began an era that would see the Indians lose all their Ohio lands to the early American government. In 1805, Almon Ruggles came to the Old Woman Creek area to survey the land for the state of Connecticut. This territory was originally part of lands claimed by England as a result of the French and Indian War. The King of England routinely granted charters to various persons for these lands. Under one of these charters, Connecticut laid claim to the territory that included all of present-day Erie County, which includes the Old Woman Creek watershed. Following the American Revolution, colonies were requested to cede their holdings of western land to the newly formed government. Connecticut agreed to turn over their colonial holdings except for one western tract reserved for the state. During the American Revolution many residents of Connecticut had lost their property. In return for damages suffered (mainly by fire), the state agreed to give land to these citizens in lieu of monetary payment. In 1792 the westernmost 500,000 acres of the "Connecticut Western Reserve" was set aside to be divided among 1870 claimants. Mr. Ruggles' survey determined the boundaries of "The Firelands" to be those of present-day Erie County. Most of the original sufferers never came to Ohio because they had sold their claims to land speculators who in turn sold them to the first settlers who arrived in 1808-1809.

Early Firelands pioneers found the land surrounding Old Woman Creek covered by dense forests of oak, chestnut, hickory, ash, walnut, sycamore, and whitewood (Tuliptree). The generally rich, sandy soils in Berlin and Huron Townships were found to be well suited for agriculture, and the climate, moderate by the proximity to Lake Erie, appeared favorable for fruit farming. Fruit trees were first brought to the Old Woman Creek area from Canada in 1812, and became an important crop in the years to follow.

In 1810, J. K. Thompson constructed the first grist mill on Old Woman Creek near the Village of Berlin Heights. The erection of this mill established Old Woman Creek as a commercial waterway. During the 18th century, historical records indicate that six saw mills, five sandstone quarries, two additional grist mills and at least one salt well were situated within the Old Woman Creek watershed. Small fruits such as strawberries, raspberries, and grapes were also commercially imported to this region throughout the next hundred years. Hardwood timber, particularly white oak, was sought by the ship building industry in nearby Huron. This community was the largest ship building site in Ohio in the middle 1800's.

By 1879, most of the land surrounding Old Woman Creek had been cleared, harvestable timber removed, and ditches opened to drain agricultural lands. These factors contributed to annual flooding of the creek, rendering its flood plain worthless to farmers.

The last commercial ventures on Old Woman Creek began about 1880 on Star Island in the middle of the creek. At this time, the island was accessible from the mainland in dry weather via a road through the cat-tail marsh. Charles Hardy bought the 10-acre island from James Anderson and during the winters of the next five years, proceeded to remove the virgin hardwood timber. Then, in 1899, Martin Daniels purchased the island, built a house and barn, and raised his family there. The island was cultivated in strawberries, raspberries, and red currants. The Daniels' family business venture met quick success and their operation was soon expanded to include grapes and tree fruits. Their fruits were transported by boat to the mouth of Old Woman Creek where they were transferred to the Lake Shore Electric train for shipment to the Cleveland market. At about this time, summer cottages were constructed along the lake near the creek mouth and the stream became a popular recreation area. The Daniels' once again expanded their business to include a retail outlet on the island where tourists could buy grapes, berries, and honey. With the approach of the "Great Depression" years, fruit prices dropped and the family was forced out of business and left their island farm. The island has remained uninhabited for the past 50 years.

The immediate vicinity surrounding Old Woman Creek National Estuarine Sanctuary has remained relatively undisturbed since the island occupation in 1920 for several reasons. Perhaps the most important factor has been the attitude of landowners controlling the critically located properties near the creek mouth. Three groups of people have resisted the pressures from developers who would have altered the natural character of Old Woman Creek in pursuit of recreational activities and urban expansion.

The Anderson family has owned the land along the estuary's western bank from 1839 until the Ohio Department of Natural Resources purchased a portion of it for the sanctuary. The upland portion of this property has been farmed throughout their ownership. The family was also interested in conservation, and in the late 1940's planted large numbers of pine trees as part of a nationwide reforestation program. In years to come, fires originating on the nearby railroad right-of-way destroyed most of the trees. There are still remnants of the pine plantation visible along the perimeter of the estuary.

The northernmost property on the west bank of Old Woman Creek Estuary is the Hartley homestead. This property has been in the family since the middle 1800's. Fruit and vegetable farming was the primary family vocation for two generations, and today a third generation Hartley resides on the shores of the estuary. Hartley's strong feeling of tradition has been his incentive for maintaining the land as it is.

The third property owner instrumental in keeping Old Woman Creek in a relatively undisturbed condition was Oberlin College Beach Association. About 1813, Oberlin College trustees purchased several acres along the eastern banks of the creek. Cottages were built on the lakeshore portion of their property, but the southern portion along the estuary was preserved in its natural condition and has been managed as a private nature preserve throughout their ownership.

The concern for the area's natural features by these landowners was a key in attracting ODNR to Old Woman Creek. It was through the efforts of local civic organizations, environmental groups, and interested citizens that Old Woman Creek National Estuarine Sanctuary became a reality.

B. Regional Perspective

The Great Lakes and contiguous coastal areas have historically provided economic, ecological, recreational and aesthetic benefits to the nation. Located near the heartland of the nation, these lakes form almost 1,000 miles of international boundary between the United States and Canada. The total shoreline is approximately 10,000 miles and the Great Lakes contain 20 percent of the world's fresh surface water.

The Great Lakes are characterized by a variety of coastal features, including: bedrock cliffs, clay bluffs, sand beaches, marsh wetlands, and stream mouths. Tributaries enter the Great Lakes in three ways: (1) as free-flowing, single-channel streams at their mouths, (2) through deltaic distributary systems, or (3) at estuaries formed in the downed mouths of the streams. To some degree estuaries are present on all of the Great Lakes but they are best developed in Lake Erie where crustal movements have extended them as far as 10 miles upstream from the lake at the lower reaches of major rivers.

The Great Lakes owe their origin to physiographic changes induced by Pleistocene glaciation. As the ice sheets paused in advances or retreats, ridges or moraines of glacial till were built up at their margins damming the natural drainage and forming glacial lakes. Lake Erie is the remnant of such a lake, which at its highest stage extended as far south as Fort Wayne, Indiana, with its outlet to the southwest via the Wabash River.

In the selection of an area for nomination to estuarine sanctuary status it was important to consider how well that area represented all the natural freshwater estuaries on the Great Lakes. Because Lake Erie possesses all of the major shoreline types found in the Great Lakes and is characterized by the preponderance of estuary-type stream mouths, major attention in

searching for a representative estuarine sanctuary site was focused on this lake. Most tributaries flowing into Lake Erie have been greatly altered by man's activities. Major ports, pleasure craft marinas, industrial complexes, residential developments and recreational facilities have been attracted to these sensitive areas.

Since the beginning of industrial development along the Ohio shoreline, estuaries have been consumed in man's continuous progress toward increased economic growth. Today, the shoreline is characterized by industrial, residential, and commercial development. Only a few remnants of the once extensive estuarine areas remain, and of these Old Woman Creek is the best.

The Old Woman Creek estuary belongs to biogeographic category 21 for the Great Lakes of North America. Located on the south shore of central lake Erie, it possesses a variety of characteristics that make it well suited as a natural field laboratory site. In the immediate area are: a barrier beach, a glacial till and lacustrine-sediment bluff, a drowned stream-mouth estuary, marsh wetlands, an upland hardwood forest, an island within the estuary, and old fields in various stages of natural succession.

Old Woman Creek National Estuarine Sanctuary is located in Erie County, two miles east of Huron, Ohio, on Ohio Route 2 and United States Route 6. The sanctuary is situated in the heart of the northern Ohio urban-industrial region. Within the immediate vicinity of the sanctuary, residential and agricultural land use is prominent.

Within a 50-mile radius of the sanctuary are the cities of Fremont, Sandusky, Tiffin, Bucyrus, Mansfield, Norwalk, Ashland, Wooster, Medina, Lorain, Elyria and Cleveland. An excellent transportation network connects the sanctuary with these population centers.

Within Erie and adjacent counties, outdoor recreation opportunities abound. State parks in the area include Findley State Park in Lorain County; Catawba Island, Crane Creek, East Harbor, and South Bass Island State Parks in Ottawa County; and Kelley's Island State Park in Erie County. Numerous public hunting and fishing opportunities are provided in the surrounding counties. Sheldon's Marsh and DuPont Marsh state nature preserves are also located in Erie County.

The economy of the Old Woman Creek watershed is predominately agricultural. The fertile silt and sand loam soils of the area, complemented by the prolonged growing season due to the "lake effect" are currently producing high yields of corn, soybeans, wheat, and truck produce. The economy of the area, however, is entering a transitional stage, as the agricultural lands are being threatened by encroachment from the outward growth of the city of Huron.

C. Climate

Climatological data specific to the Old Woman Creek estuary does not exist. However, the climate may be inferred from data recorded at the United States Department of Commerce, Environmental Services Administration weather station in the city of Sandusky.

Old Woman Creek enters Lake Erie in north central Ohio. The climate of this region is marked by large fluctuations in temperature and precipitation. Because of the proximity to the lake, winds from the north tend to lower daily high temperatures in the summer, while raising the daily low temperatures in the winter. The growing season at Old Woman Creek averages 198 days, the average of the period between the last freezing temperature of spring and the first freezing temperature of autumn. The warming or tempering effect of the lake is evident when one considers the growing season at the Erie-Huron County line, seven miles south of the lake. At that point, the growing season averages only 165 days.

Summers in the area are moderately warm and humid with approximately 16 days when temperatures exceed 89 degrees. Winters are generally cold and cloudy. However, the tempering effect of the lake allows for only three of five winters in which subzero temperatures occur. This area experiences weather changes every few days because of passing fronts and their associated centers of high and low pressure.

As is common for continental climates, precipitation is highly variable on a yearly basis. However, precipitation is generally abundant and well distributed, with autumn being the driest season. Average annual precipitation for the area is approximately 89 centimeters (35 inches). Annual prevailing winds are southwesterly and average 7 knots in the summer and 10 knots in the winter. The area has a history of severe storms which have caused extensive damage to shoreline.

D. Geology

The upper course of Old Woman Creek at Berlin Heights cuts through the Berea Sandstone escarpment forming a narrow, steep-walled valley ranging from 60 to 80 feet deep. The lower course of Old Woman Creek occupies a depression in glacial till that fills a preglacial valley in the shale bedrock. A water well on the property adjacent to Old Woman Creek in Oberlin Beach penetrates the entire valley fill. The surface elevation at the well is 592 feet; bedrock (Huron Shale) is encountered at 445 feet, indicating that there are 147 feet of glacial till and lacustrine deposits. Exposures on the lake bluff near the sanctuary show that lake deposits constitute only the upper 20 feet of the sediment. At two elevations in the till, 5-foot thick lenses of sand are encountered, but they yield only small amounts of water. This valley has been traced southwestward, where wells drilled east of Shinrock have penetrated 126 feet of glacial drift without reaching bedrock. These wells generally stop in sand and gravel lenses that are good producers of groundwater. The buried valley has not been traced beyond the western limit of Berlin Township, but from its lineation it appears that it may have been the preglacial course of the northward-flowing Huron River.

Most of the glacial deposits in the area between Huron and Vermilion are late Cary (Hiram) in age, and consist principally of ground moraines. These deposits occupy the basal portion of the exposed lake bluffs between Vermilion and Old Woman Creek, and show signs of reworking by wave action at their upper surface where they are covered by varved lake deposits. At Oberlin Beach, just east of the creek mouth, there are excellent exposures of interlaminations of silt and clay. The silt laminae appears as light bands and the clay as thinner dark zones, indicating cyclic sedimentation in a glacial lake that was considerably larger than present-day Lake Erie.

At the mouth of Old Woman Creek, the barrier beach is composed of medium to course-grained sand. Quartz dominates, but patches of red garnet and black magnetite are common. A gravel and pebble zone occurs at the waterline. The beach sand has a maximum thickness of 24 feet and overlies glacial till that is exposed at the waterline east of the barrier beach.

E. Soils

The dominant soil association found in the sanctuary is the Kibbie-Tuscola-Colwood association. This association is characterized by deep, level to gently sloping, moderately well-drained to very poor drained soils. The subsoil is comprised of silt loam to silt clay loam which formed under the glacial lake. The southeastern portion of the sanctuary is marked by the Del Rey-Lenawee association. The characteristics of this association are essentially the same as the above association except that the Del Rey-Lenawee association has poorer drainage characteristics.

The major soil type found in the inundated portion of the Kibbie-Tuscola-Colwood association is the marsh soil. This soil is characterized by a high percentage of organic matter throughout a large portion of the profile. The inundated portions of the Del Rey-Lenawee association are composed of the Lenawee silt loam, which is made up of dark soil in the upper profile progressing to higher percentages of sand as the depth increases.

The lands surrounding the estuary are primarily composed of the Sission silt loam soil. This soil type is on slopes varying from 2 to 25 percent. It is a well-drained soil formed by water-laid silt and sand covered by hardwood forest throughout the area.

F. Hydrology

Old Woman Creek is 829 feet above sea level at its source. The creek meanders 10 miles and falls 257 feet to an elevation of 573 feet at its mouth. This difference yields an average gradient of 25.6 feet per mile. The stream drains an area of 30.37 square miles in Erie and Huron counties. The mouth of Old Woman Creek is submerged, while the upstream portions are degrading. The stream is generally turbid throughout most of the year.

Because of high water levels in Lake Erie in recent years, the former marshlands occupying the lower flood plain are inundated. This condition has resulted in a flooded area of approximately 75 acres, affecting water

levels in the stream as far as 1.3 miles from the mouth. Lake Erie, historically, has exhibited major periods of high and low water levels, which cause related effects to the lower flood plain of Old Woman Creek. Upon a lowering of water level in Lake Erie, the inundated flood plain of Old Woman Creek can be expected to develop into an extensive emergent marsh. Figure 2 illustrates the historic fluctuations of Lake Erie water levels.

The low-lying flood plain at the mouth of Old Woman Creek, defined by its steep banks is referred to as a freshwater estuary. The use of the term estuary in a totally freshwater environment may seem inappropriate. However, upon examining the physical parameters defining an estuary, it becomes apparent that each is applicable to the freshwater lake-stream environment with the exception of saline mixing. Coastal estuaries exist owing to the force of the rising tide reversing river currents, while the vertical oscillation or seiche of the freshwater lake is responsible for the reversing of stream currents in the freshwater estuary.

Lake Erie is the thirteenth largest freshwater lake in the world and one of the shallowest. Because of its shallow average depth, Lake Erie exhibits changes in water level that seldom occur in other lakes of North America. In observing these verticle oscillations for the first time, one might note the similarity between lake seiches and the tides of the Atlantic Ocean and the Gulf of Mexico. In spite of the similarity, changes in the water level of Lake Erie result from different causes. Several explanations for these frequent verticle oscillations have been proposed. Krecker[2] explains,

> "The possible causes of the seiche movement have been discussed by Forel[3]. He was of the opinion that the oscillations are set up by an area of exalted atmospheric pressure bearing down upon a particular region of a lake and pushing the water out to regions of low pressure. When exalted pressure passes, the water surges back, and, in the process of gaining equilibrium, exhibits oscillatory movement of a seiche."

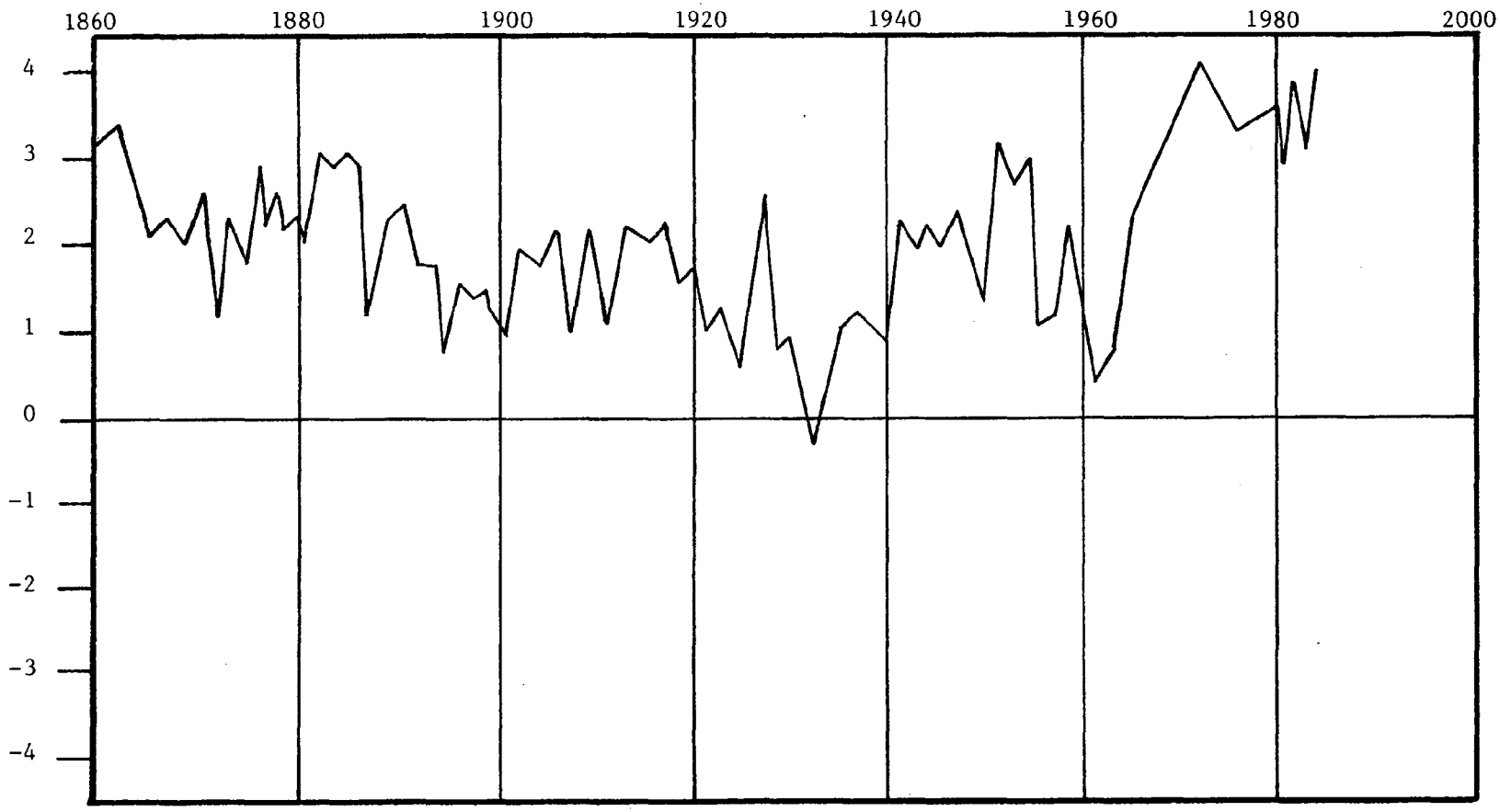
This explanation may be true in part for Lake Erie seiches, however, Krecker further explains,

> "Forel's view undoubtedly explains some seiches, perhaps all seiches that occur on lakes protected from winds, but there is evidence (Krecker '29) that in wind-swept lakes, winds are an important agency in developing the seiche movement."

[2] Krecker, F.H. 1931. Vertical Oscillations of Seiches as a Factor in the Aquatic Environment. Ecology 12: 156-163.

[3] Forel, F.A. 1895. LeLeman: monographie limnologique. Tome 2, Mecanique, Chimie, Thermique, Optique, Acoustique. Lausanne, F.R., 651 pp.

HISTORIC FLUCTUATIONS OF LAKE ERIE WATER LEVELS



Levels shown in feet above or below the
low water datum plane for Lake Erie (568.6 ft)

FIGURE 2

Certainly this latter alternative explains many of the extreme changes in the water level of Lake Erie. An example of this phenomenon occurred on January 14, 1950 when 35 to 40 knot southwesterly winds in a 20 hour period, caused a drop in the water level at Put-in-Bay of over 1.5 yards. A similar situation occurred on October 21, 1976 when strong southwesterly winds resulted in a dramatic lowering of water levels in Lake Erie's western basin. The drop in water level of western Lake Erie caused a related drop in the water level of the Old Woman Creek Estuary, which left a large portion of the previously inundated flood plain exposed. The subsequent back-surge of water resulted in an increase in the water level of the lake and estuary greater than levels previous to the onset of the winds.

Lake seiche is an important factor in short period oscillations of the Lake and estuary water levels. The effect of wind blown seiche on the Old Woman Creek Estuary is readily observable, yet this type of seiche occurs less frequently than the seiche produced by barometric differences. As weather fronts pass through the area every few days with their associated areas of high and low pressure, a consistent seiche is maintained. While many calculations have been made on the predominant seiche period, it is generally agreed that this period of oscillation is approximately of 14 hours duration. As Old Woman Creek Estuary lies on the south shore of the central lake basin, these short period oscillations are less pronounced than in areas lying in the southwestern or eastern basins. This situation is exemplified by a report of an average seiche height of 6 inches at Sandusky, Ohio, while at Fairport, Ohio, 78 miles east of Sandusky, the average seiche height is only 1 to 2 inches.

In contrast to the short period oscillations are long period oscillations related to volumetric changes of Lake Erie owing principally to precipitation, evaporation and runoff over the entire Great Lakes drainage area. These long period oscillations are extremely important in the establishment, loss and maintenance of the aquatic vegetation of the Old Woman Creek Estuary. Currently Lake Erie is exhibiting a prolonged high water level period, causing the inundation of the entire flood plain of the estuary. This inundation results in a reduction in the available marsh habitat and has left only a few remnant embayment marshes. These small sites provide a limited area for the persistence of the marsh vegetation, which during periods of low water levels thrived on the extensive flood plain. As no complete records exist on the composition of the flora during low water periods, it is impossible to state accurately the extent to which species composition in the estuary has been affected.

G. Flora

The diversity of habitats present within the sanctuary contributes to a wide variety of plant communities, each comprised of a distinctive flora. The following information is provided as a brief characterization of the major plant communities present.

Aquatic and wetland habitats include open water areas, mud flats, remnant embayment marshes, shoreline and forested flood plain. Owing to current

high lake levels, open water areas predominate in the northern portion of the sanctuary. Within this habitat, vegetation is sparse, consisting largely of American lotus, white waterlily, spatterdock and arrow arum. Plants characteristic of mudflats include cattail, marsh mallow, burreed, and water smartweed. As available marsh habitat is severely restricted by current high water levels, species characteristic of this habitat now thrive in isolated remnant embayment marshes. Physical differences in these marshes are reflected in their floral composition. Wetland species occurring in shoreline areas include buttonbush, dogwood, blue flag, river bulrush, cattail, and arrowhead. Forested flood plain predominates in the southern portion of the sanctuary. Here, swamp forest species comprise the major component of the vegetation, with a minor component of marsh species, as associates.

Terrestrial habitats within the sanctuary are represented largely by former agricultural fields in various stages of succession. On the steep banks surrounding the estuary and on Star Island, Oak-Hickory forest predominates. Additional terrestrial habitat is provided by the dry portion of the barrier beach, and the prairie area. Old field plant communities are composed predominately of successional species such as ragweed, asters, goldenrod, sumac, wild carrot, and various grasses. Upland forest areas are dominated by white oak and shagbark hickory, with sassafras as a major associate. Herbaceous associates of the forest communities include large-flowered trillium, mayapple, violets, troutlilies, and other woodland spring species. Few species thrive on the barrier beach, owing to its xeric nature. Among species characteristic of this habitat are Russian thistle, cocklebur, witchgrass, crabgrass, and velvetleaf. Plants characteristic of the prairie area include big bluestem, Indian grass, whorled rosinweed, butterfly-weed, ladies'-tresses and bush clover.

A compendium of plant species currently known to occur in the sanctuary is presented in Appendix A.

H. Fauna

While a comprehensive survey of the animal populations occurring within the sanctuary has not been performed to date, various observations and test nettings offer a characterization of the fauna of the area.

Mammals observed at the sanctuary include house mouse, deer mouse, short-tail shrew, eastern chipmunk, little brown bat, fox squirrel, cottontail rabbit, eastern woodchuck, raccoon, opossum, muskrat, and whitetail deer. Undoubtedly, future study will reveal the presence of additional mammalian species.

Old Woman Creek lies within a major route for avian migrations. As such, sanctuary personnel have recorded an impressive list of birds. A total of 197 species have been sighted in the sanctuary.

While little is currently known of the populations of reptiles and amphibians occurring in the sanctuary, a brief survey conducted during July 1980 revealed the presence of twelve species including slimy salamander, American toad, Fowler's toad, American bullfrog, snapping turtle, midland painted turtle, Blanding's turtle, map turtle, fox snake, northern water snake, Dekay's snake, and the eastern garter snake (including the melanistic form).

In past years, several test nettings for fish species have been conducted in the sanctuary. During the 1950's, test nettings indicated significant numbers of adult northern pike, largemouth bass, brown and black bullhead, longnose gar, goldfish, carp, common shimer, black and white crappie, bluegill and sunfish. Stream surveys conducted in the southern portion of the estuary near Darrow Road from 1967 to 1970 indicated good populations of largemouth bass, bluegill, green sunfish, common shiner, johnny darter, white sucker, creek chub, flathead minnow, stone roller, and bluntnose minnow.

Commencing in 1982, fish samples were collected at 5 permanent stations on a regular basis by Old Woman Creek Sanctuary staff. Nearly 40 species have been identified to date.

A compendium of animal species, including insects and other invertebrates, known to occur in the sanctuary is presented in Appendix A.

MANAGEMENT STRATEGY

I. Administration

The Old Woman Creek National Estuarine Sanctuary is administered by ODNR - Division of Natural Areas and Preserves (Figure 3). The State Nature Preserve System was established when the Ohio Natural Areas Act became law on August 31, 1970. This act authorized the Department of Natural Resources to protect and manage for present and future generations a statewide system of nature preserves which are representative examples of the significant natural features of the state. Old Woman Creek National Estuarine Sanctuary and State Nature Preserve is one of sixty-one (61) areas that are managed by the Division throughout the State of Ohio.

The Division Chief has employed a sanctuary staff to facilitate the operations, development and protection of Old Woman Creek National Estuarine Sanctuary. The following full-time and part-time positions are currently assigned to the sanctuary (see Appendix B for complete job descriptions):

A. Sanctuary Staff

Sanctuary Manager - The manager's role is multi-functional in scope. He is responsible for the overall administration of the sanctuary operations. The manager's responsibilities include: public relations, environmental education, ecological research, maintenance and construction, and law enforcement.

Sanctuary Ecologist (Biologist) - The ecologist is primarily responsible for the baseline monitoring program, but also coordinates research projects by visiting researchers, analyzes research data, and provides technical assistance to various governmental, public and private organizations.

Conservation Aide - The conservation aide's responsibilities include day-to-day maintenance of the sanctuary grounds, facilities and equipment. This person also assists the sanctuary manager with routine visitor contact and law enforcement work. When needed, the aide assists sanctuary staff with habitat management and estuarine biota surveys.

Laboratory Technician - This person assists the sanctuary ecologist with surveying and monitoring estuary biota, collects samples in field and conducts water chemistry analysis in lab, maintains data records, assists with special workshops, and with operation of the visitor center. This position is currently funded by a one-year contract and will expire in June 1983.

Naturalist/Education Specialist - This person assists the sanctuary manager with interpretive and educational programming including conducting public tours, school and college group tours, public workshops, and other special activities at the sanctuary. This person also is involved in development of educational materials, programs, and activities and is responsible for the sanctuary library and coordination of volunteers of the sanctuary. This position is presently

OHIO DEPARTMENT OF NATURAL RESOURCES

DIVISION OF NATURAL AREAS AND PRESERVES

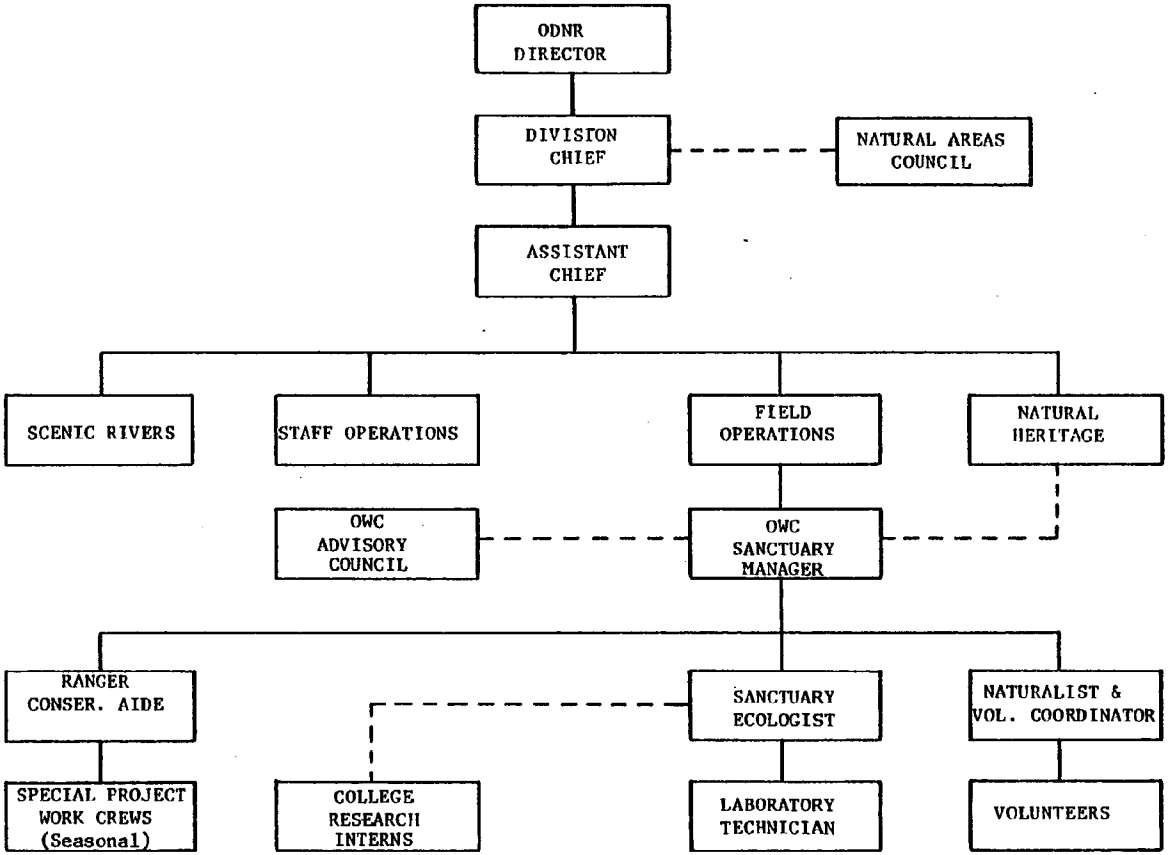


FIGURE 3

being filled by an intermittent conservation worker who is paid from Divisional funds approximately half of each calendar year. The educational specialist has volunteered her time for the balance of year for each of the past two years.

B. Future Staff Needs

In order to accomplish the short-term goals and objectives of the Old Woman Creek National Estuarine Sanctuary, it will be necessary to retain, at an absolute minimum, the present 1983 staffing level. Of course it is speculative to anticipate our long-term needs, but after four years of operation, trends are becoming apparent. In response to these trends the following plan is offered to fulfill our probable needs.

Permanent Staff - Sanctuary manager, sanctuary biologist, preserve officer, laboratory technician, education specialist/naturalist, and conservation worker.

The preserve officer is an addition to present sanctuary staff. This person will be required to complete Ohio's Peace Officer Training Course and hold a State of Ohio Commission. The much greater attendance that is being experienced since the visitor center opened has caused an alarming increase in visitor violations.

The job description for the preserve officer will include daily enforcement and patrol, weekend and evening security for the center and its equipment inventory, visitor contact and interaction, interpretive programming, and light maintenance.

Seasonal Staff - Routine building and facility maintenance requires a significant time allotment from our permanent staff throughout the year. However, during the summer, such seasonal chores as mowing, painting, fence construction, rennovation of support facilities, and trail maintenance, place an extra burden that can be most easily met by securing a temporary work force.

During the 1980-82 summer seasons, in addition to our permanent staff, a conservation crew of 3-6 persons have been utilized at the sanctuary to perform many routine maintenance tasks and special projects. These crews were provided at no cost to the sanctuary by the Community Action Commission's summer youth employment program. The crew reported to one of the sanctuary staff, who outlined work to be completed.

If such "public works" programs cease, the sanctuary staff will have to take over these tasks. Such tasks will be impossible to achieve if this happens. Sanctuary priorities will have to be re-evaluated with regard to future goals and objectives of the sanctuary's research, public education, and maintenance programs.

It remains the responsibility of the sanctuary manager to continually seek out innovative sources of labor, and to implement the necessary adjustments. Some possible sources of labor include use of volunteers, conservation groups, and college interns. Volunteers would be utilized

to carry out the programs and activities of the sanctuary where feasible should state or federal funds be reduced due to budget cuts or poor economic conditions.

C. Volunteer Program

The ODNR Division of Natural Areas and Preserves has utilized volunteers in its program for several years. Using their "Community Volunteer Program" as a model, we will design and implement a "Volunteers in the Estuary Program" to assist in the daily operation of the visitor center, maintenance of hiking trails and facilities, and other projects as the need arises. Our plan is summarized as follows:

1. A volunteer program will be implemented in March 1983. The sanctuary manager will be responsible for training and evaluation of volunteers.

2. A volunteer coordinator will be appointed by the sanctuary manager. The coordinator will be responsible for planning and scheduling of volunteers for daily visitor center duty. The coordinator will also work with the sanctuary manager to organize a work force for special projects. Targer date: March 31, 1983.

3. Volunteer program materials will be developed in early 1983 for use in the training sessions. The packet will include a volunteer application form (Appendix C), scope and limitations of volunteer responsibility, Old Woman Creek background data and a questionnaire concerning the volunteer's interests, skills, and availability. Target date for implementation: March 6, 1983.

D. Sanctuary Advisory Council

Creation of a Sanctuary Advisory Council (SAC) was identified in the final environmental impact statement for the sanctuary. This EIS stated that "The Division of Natural Areas and Preserves of ODNR will have the final decision in all matters relating to the management of the sanctuary. An advisory council, the Old Woman Creek Advisory Council, will be appointed by the director of ODNR to advise the Division of Natural Areas and Preserves in the preparation and implementation of specific plans concerning this sanctuary. The SAC will be composed of one member each from a local government agency, the Natural Areas Council, a local or statewide public interest group, one local member of an agricultural institution, two members from Ohio educational institutions, and one member from a Great Lakes research institution." The Old Woman Creek Advisory Council was officially created by the Director of ODNR on April 1, 1981 when the nine members of the council were appointed. To give the SAC a broader base and to obtain additional input from the local community, two additional council members were appointed beyond those recommended. One of the additional council members represents a local public interest group, and the other is a local landowner, bringing the total membership of the council to nine.

The SAC members are appointed to staggered three year terms, and may be reappointed to consecutive terms. No remuneration for service on the council is authorized. The council chooses a chairperson and vice-chairperson and may form and disband such committees as the majority may desire. The council has adopted bylaws for the conduct of its business. The council meets quarterly and a majority quorum is required to conduct its business. The council is to meet at the sanctuary with appropriate members of the Division of Natural Areas and Preserves staff at regular intervals. Meetings are scheduled to provide maximum opportunity to view seasonal variations at the sanctuary.

The staff of the Division is to make available to the council the appropriate reports and data relating to preserve management, education and research plans for the period between each meeting. The council is to advise the Chief of the Division of Natural Areas and Preserves in writing of any recommendatins resulting from each meeting. Special meetings may be called as necessary.

Appendix D contains names and composition of the Sanctuary Advisory Council, including sub-committees of the council.

E. Plan Review and Modification

The resource management, education, and research plans shall be reviewed on an annual basis. The review shall be carried out by staff as assigned by the Chief of the Division with the advice and recommendations of the Sanctuary Advisory Council and OCRM. Prior to completion of an annual report, the administrative staff shall meet with the council and sanctuary staff at the sanctuary and shall evaluate the condition of the area. The annual report shall include a review of management tasks achieved, problems encountered, recommendations, proposed alterations of the plans, and a commentary on scheduled management goals and tasks for the upcoming year. The annual report shall be submitted to the Chief of the Division and OCRM by February 1 for review.

Upon acceptance by the Chief of the Division and OCRM, the reports shall be provided to interested parties upon request.

F. Visitor-Research Center Facility

The Old Woman Creek National Estuarine Sanctuary's base of operations is located at 2514 Cleveland Road, East near the eastern edge of the estuary. This multi-purpose building was completed in September 1982 and sanctuary staff completed the transition from temporary offices into the new center in October 1982.

Public education and research play an important role in the estuarine sanctuary operations at Old Woman Creek. The sanctuary's main focus will serve both the needs of scientific research and provide an opportunity for increased public awareness of the importance of freshwater estuarine ecosystems. Scientific research at Old Woman Creek will identify the

environmental and biological parameters which affect freshwater estuaries, while education will stimulate public interest and awareness. A facility to house both research and education serves to unify these activities and provide a means of disseminating this information to the public (Figure 4).

The facility functions on the following levels:

1. As a freshwater estuarine ecology research complex, the center provides facilities for the research coordinator to conduct ongoing monitoring of the estuary for baseline data collection. It also serves to attract guest investigators to conduct scientific research on the estuary.

2. As an environmental interpretive facility and visitor center, it orients visitors to the sanctuary and acquaints them with freshwater estuarine ecology through various displays and interpretive exhibits. An observation deck and trail system are an integral part of this facility.

3. As an educational facility, workshops and programs pertaining to the sanctuary and other related topics are presented at the center by the staff and guest lecturers.

II. Management Policies

A. Management Goals & Objectives

Although public visitation and scientific research are encouraged at Old Woman Creek, protection of the entire freshwater estuarine ecosystem is the primary goal of the program. Specific objectives are to:

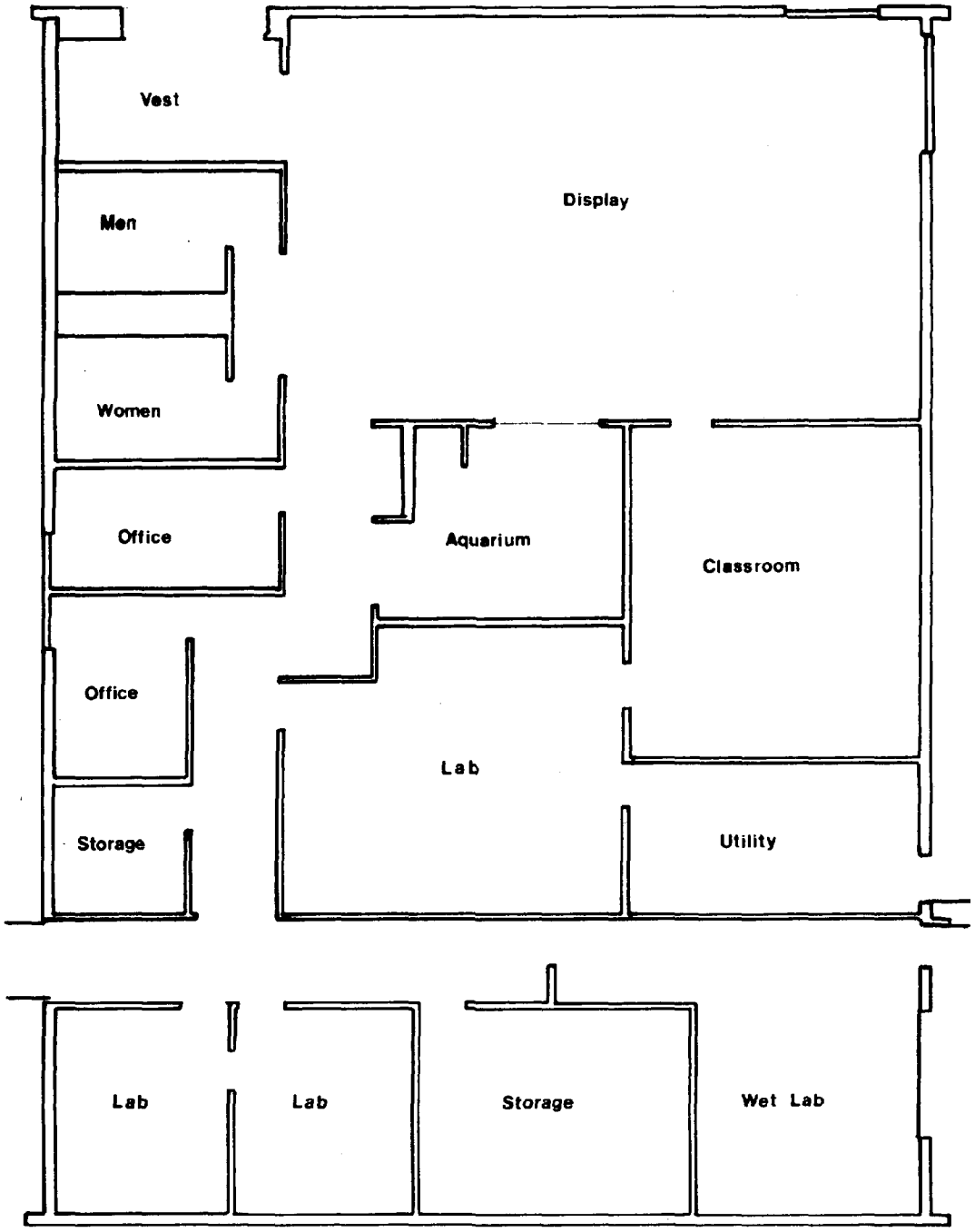
...provide an educational focus to increase public understanding of Great Lakes coastal resources;

...analyze ecological relationships within the freshwater estuarine environment;

...document existing conditions within the sanctuary and monitor changes as they occur; and

...compare a relatively unmanipulated ecosystem to similar areas which have been more extensively affected by human activity.

Excessive use can destroy or alter the plant and animal communities within the estuary, therefore, activities are restricted to those which minimize environmental disturbance. Mass recreational activities such as camping, fishing, hunting, swimming, or organized sports are not permitted in any portion of the sanctuary. However, some low intensity recreation is compatible with sanctuary goals. Provisions have been made for these activities, as long as the activity does not detract from the major purposes



FLOOR PLAN

OHIO CENTER FOR COASTAL WETLANDS STUDIES

FIGURE 4

outlined above. Photography, art, walking, bird watching, and canoeing are examples of recreation permitted in areas of the sanctuary where appropriate facilities have been developed.

Unsupervised public access is permitted on designated walkways, observation decks, and beach access. Visitors desiring to gain access to other portions of the sanctuary must obtain written permission from the sanctuary manager. An example of an access permit is presented in Appendix E.

B. Access/Use Zones

ODNR, Division of Natural Areas and Preserves has established a classification system for state nature preserves which reflects their uniqueness, fragility, and extent of use. Old Woman Creek National Estuarine Sanctuary use-zones have been set up accordingly. Areas within the sanctuary are classified as either scientific or interpretive zones, with scientific zones being the most restricted in use (Figure 5).

According to the criteria, scientific zones encompass natural features of the highest quality. They are established for preservation of unique or rare biological communities, plant species, animal species, or geological features. Only scientific research is allowed in these areas. Improvements are not permitted unless necessary for the area's continued preservation. Access is by written permit only, because of the fragile nature of the area or the danger of disturbing research in progress.

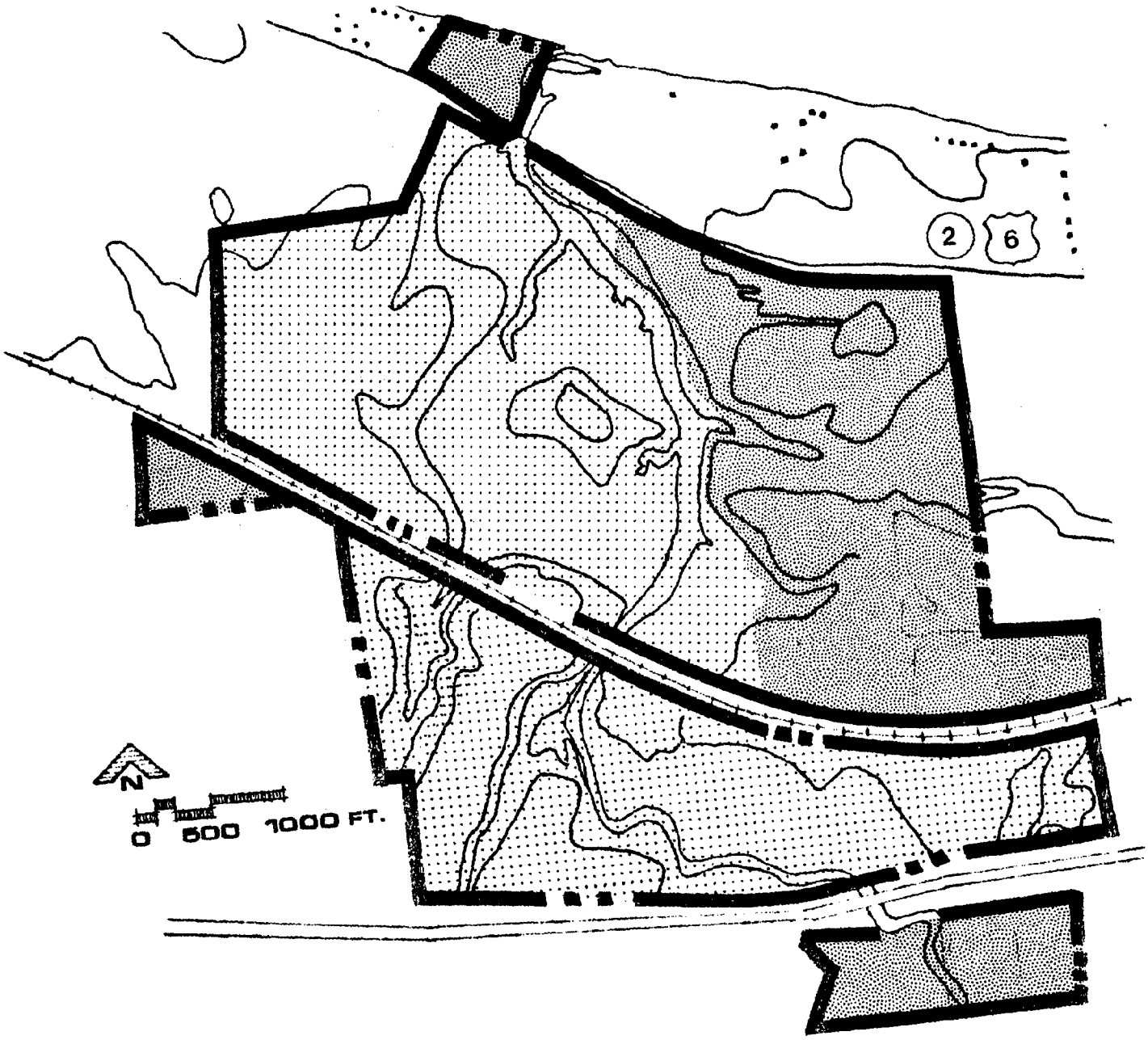
Interpretive zones are comparatively undisturbed or are in the process of returning to their natural or original condition. These areas can withstand moderate use for educational and research purposes. Hiking trails, observation platforms, walkways, and interpretive devices may be permitted on a limited basis, but other improvements and facilities are restricted to outlying buffer areas only.

C. Resource Protection

1. Law Enforcement Policy

Rules for use of Old Woman Creek National Estuarine Sanctuary and State Nature Preserves are promulgated under the Ohio Revised Code Chapter 119. The Revised Code sections rule amplifies 1517.02, which contains the authority for ODNR to create the Division of Natural Areas and Preserves. Subsequent sections of this document define the intent and extent of nature preserve uses and purposes (Appendix F). Preserve resource protection and policy and other perinent information is contained in the ODNR - Division of Natural Areas and Preserves Manager Handbook.

The sanctuary manager is a professionally trained commissioned law enforcement officer charged with the responsibility for protecting the natural resources base at Old Woman Creek. Although a preserve (sanctuary) manager and/or officer has full police powers on lands administered by the Division of Natural Areas and Preserves, these police powers were bestowed



OLD WOMAN CREEK NATIONAL ESTUARINE SANCTUARY
ACCESS/USE ZONES
FIGURE 5

upon the officer primarily to enable him/her to enforce rules and regulations as promulgated by the Chief of the Division of Natural Areas and Preserves.

No personnel of the Division of Natural Areas and Preserves are authorized to wear or use firearms on duty. However, a nightstick, PR-24 baton, chemical mace, and handcuffs may be worn when encountering a situation in which another individual may have to be subdued. Said equipment shall not be worn when giving programs away from the area, or while engaged in routine work in the visitor center.

2. Basic Areas of Law Enforcement Responsibility

a. Protect Resource from People

Protecting the resource from the people is a very important and critical area. Most of the time, damage to the resource occurs because of ignorance. This could include the careless act of dropping a match in dry leaves. The result, of course, is a forest fire. It can also include the act of littering.

b. Protect People from People

To protect people from people is easily understood. This means you must ensure that people do not harm, harass, abuse, or disturb one another.

c. Protect People from Themselves

There are many obvious dangers found on a preserve that do not always seem obvious to our visitors who are enjoying themselves. An often witnessed event in preserves is to see someone placing himself in danger by a careless or unthoughtful act. This could include disregard for water safety or carelessly handling a wild animal.

III. Resource Management Plan

This section of the management plan deals with the On-site Management Units and the Off-site Management Considerations. The On-site Management Units were developed as a result of the current land uses and existing facilities at the sanctuary. The Off-site Management Considerations include a discussion of regional zoning and potential land use changes which may affect the sanctuary.

A. On-Site Management Units

Old Field 1

Description: Old Field I (Figure 6) is about 35 acres in size. It is part of the 138 acre Walper property and is located on the eastern portion of the sanctuary. Much of this land had been farmed prior to acquisition by the state in 1978.

Old Field 1 is bounded on the south and west by the upland forest, on the east by private property (currently being farmed), and on the north by Cleveland Road East.

Old Field 1 was chosen as the site of the research center for three major reasons: good vehicular access, close proximity to the estuary and proposed trail system, and available land base. Other sites were eliminated because of poor hazardous road conditions, lack of adequate land area and public access. A site analysis and archaeological survey were completed in 1981 and a report is filed at the Division of Natural Areas and Preserves in Columbus.

The building site is located approximately 1,000 feet south of Cleveland Road and 500 feet east of the estuary. The upland forest provides a buffer between the estuary and the center.

Goals: To provide a site for the Ohio Center for Coastal Wetlands Studies; to provide a site for an area maintenance center; to provide successional plots for educational and research purposes; and to permit some areas to revert to a natural condition.

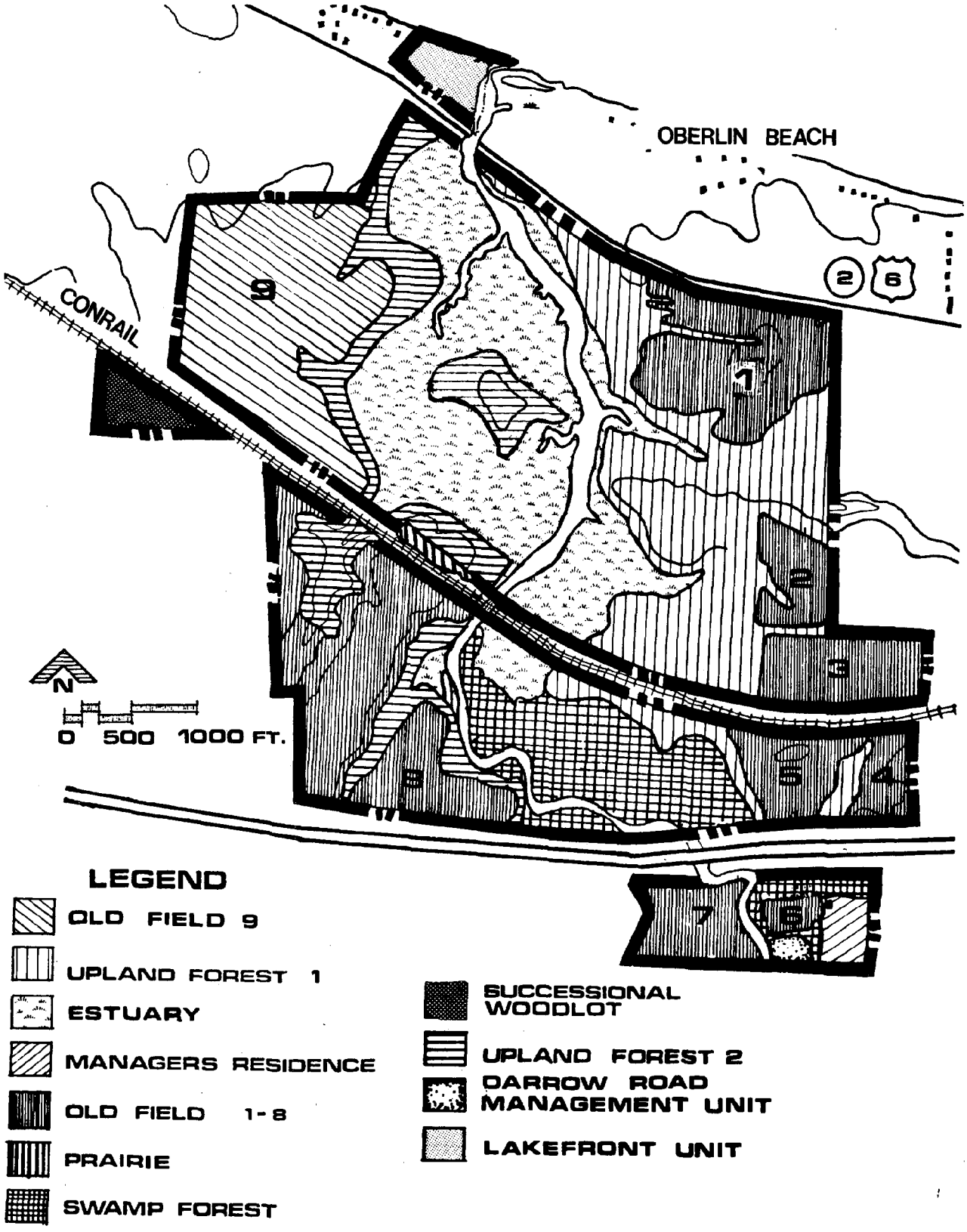
Management Actions:

1. Construct the research center and related facilities.

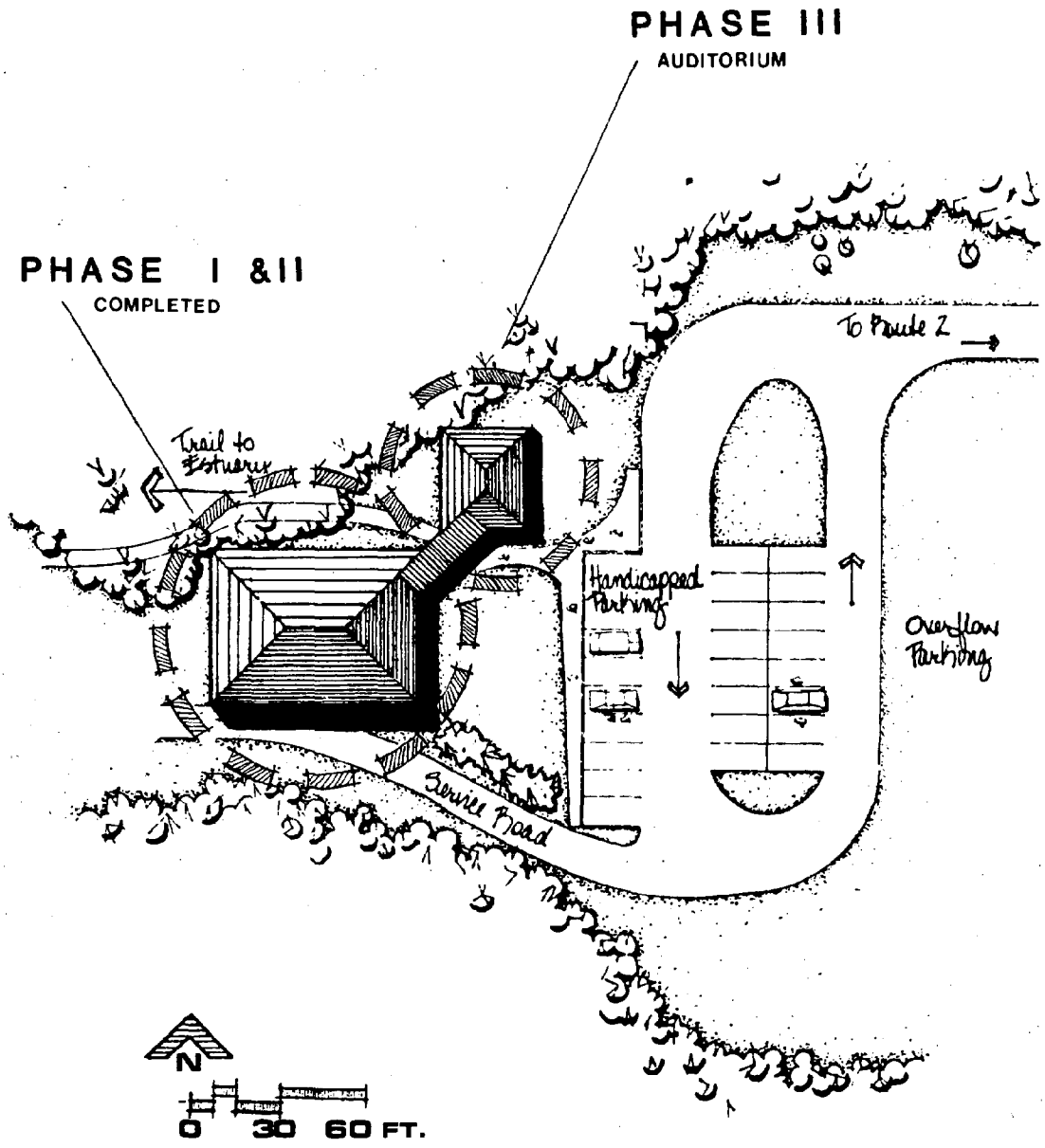
   A. A facility encompassing approximately 5,300 square feet will ultimately be required to meet both the educational and scientific needs at Old Woman Creek (Figure 7). Preliminary ODNR engineering estimates in 1981 indicated that the building would cost $520,000. This included construction of access roads, parking lot and utilities. Due to limited funding, construction will be phased. Phase I and II contain 3,300 sq. feet of floor space, including laboratory space, office and exhibit space. The exhibit area is a multi-purpose room with moveable furniture and exhibits.

      Construction bids were advertised on September 1, 1981. Contracts were signed and ground broken on December 1, 1981 for Phase I and II construction. Scheduled for completion by July 1, 1982, due to several problems, actual completion date was October 1982.

      Funding for Phase I and II were provided through state capital improvements appropriations and a matching award from the U.S. Department of Commerce, Office of Ocean and Coastal Resource Management.



RESOURCE MANAGEMENT UNIT MAP
FIGURE 6



OHIO CENTER FOR COASTAL WETLANDS STUDIES
CONSTRUCTION PHASING
FIGURE 7

B. Trail system and overlook deck completed 1982 at a cost of $16,460.34.

C. Trail extension planned for 1984-85.

D. The 1,200 sq. ft. third phase will include a multi-purpose auditorium, additional office space and a library-conference room. This addition would provide seating for 100 persons to serve as a meeting room for interpretive programming, workshops, lectures, and other estuarine-sponsored special events. Phase III construction is scheduled for completion during 1984, pending availability of funding.

2. Remodel barn and convert into an equipment storage facility.

   Time frame: 1983-84

   Estimated Cost: $5,000.00

3. Develop and maintain 5-10 acre early old field succession plots adjacent to the research center for educational use and to encourage ecological diversity. Mowing schedule: Every three years, on a rotational basis.

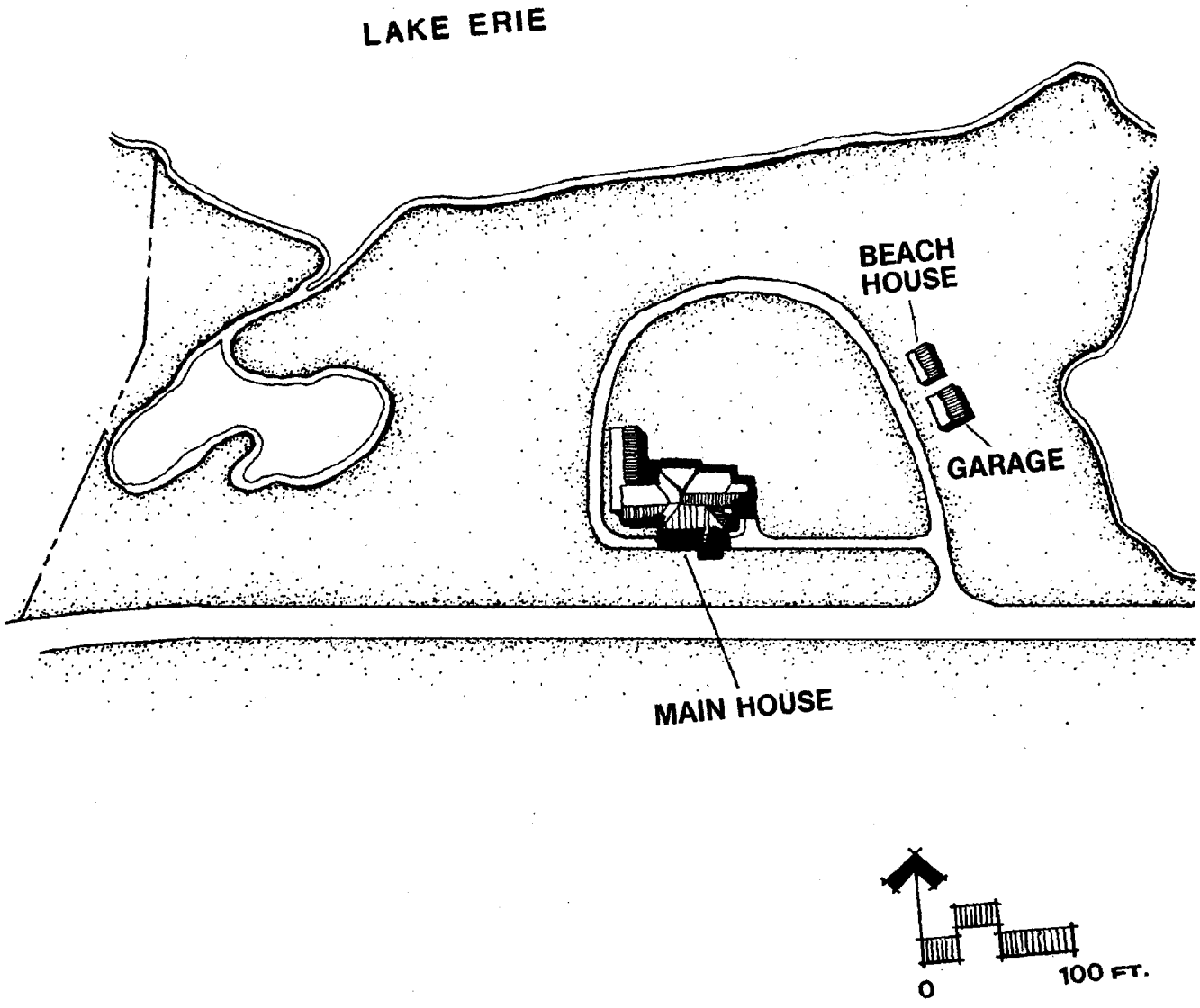
4. Allow the old fields along Cleveland Road East and along the eastern property boundary to revert to act as a buffer.

Lake Front Unit

Description: The Lake Front Unit is an eleven acre tract of land adjacent to Lake Erie and to the mouth of Old Woman Creek. It is the former Murray property and is well known to area residents. This area forms the northernmost boundary of the sanctuary.

This unit consists of three land sections: the lawn area encompassing 2.7 acres, a 900 linear foot beach along the Lake Erie shoreline, and a one-acre marsh. In addition, this unit contains three buildings, a gravel driveway and highway right-of-way (Fig. 8).

The three structures are the main house, beach house and garage. The three story main house, built between 1900 and 1910, includes a basement, attached two-car garage, laundry room, screened porch and carport. The structure provides 5,100 square feet of available space. The house appears to have had numerous additions and alterations over the years. A 1979 inspection by the Chief Engineer of the Ohio Department of Natural Resources stated that while the building was structurally sound, there were a number of problems with the electric wiring system, heating system, plumbing system and general maintenance of the property. In 1980, necessary repairs were estimated to be in the $30,000 - $40,000 range.



LAKE FRONT PROPERTY MANAGEMENT UNIT
FIGURE 8

The main house currently serves as a dormitory facility for visiting researchers during the spring, summer, and autumn months. A small first floor laboratory space is provided for use by Old Woman Creek staff for fish survey work and houses the reference fish collection.

The second floor has been converted into two separate apartments which are available for on-site researchers. These apartments share a first-floor kitchen. The third floor is unfinished and is suitable for storage.

In its present physical condition, the main house is extremely expensive to operate and maintain. Numerous repairs and alterations were made to the main house in 1979 and 1980. These include a new septic system, construction of temporary laboratory and office facilities, development of the new apartments on the second floor, and many minor but time consuming repairs and modifications.

A beach house is located nearby the main house at the mouth of the creek. This wood frame, two bedroom structure was remodeled around 1950. With the exception of occasional basement flooding, problems with this building have been minimal. The house appears structurally sound despite its location. It is currently utilized as housing for researchers.

The third structure is a two car, concrete block and wood frame garage south of, and immediately adjacent to, the beach house. During the summer of 1981 the building was rewired, a new roof put on, the exterior of blocks sealed and painted, and an overhead door installed. The garage contains a gauging station; equipment which was installed by the U.S. Geological Survey. It is also used to store boating equipment, tractor, mowing equipment, trailers, etc.

Access to the Lake Front property is provided by a gravel drive approximately 100 feet west of the Old Woman Creek bridge. Parking space was expanded in 1981 to accommodate six to eight vehicles.

The lawn area is comprised of the landscaped property surrounding the main house. Efforts have been made over the last three years to reduce the land area maintenance. A certain amount of landscape maintenance will always be required because of the site location and historical significance of the house.

The beach area at the sanctuary, while very small, is one of the few publicly owned beach locations in the area. It is a scenic attraction which brings numerous casual visitors to the lake front property. Problems have been encountered with public confusion over access rights, recreational opportunities and a general misunderstanding of the sanctuary concept.

The beach and creek mouth area is used as an interpretive area for public programs and other educational activities. Recreational uses are not considered appropriate, thus public swimming, picnicking and sun bathing are not allowed.

A small marsh area is located on the west edge of this unit. This area is suitable for interpretive use as well as small scale research demonstration projects.

Goals: To upgrade the Lake Front property structures to provide adequate living accommodations for staff and guest researchers; to reduce the level of maintenance required on the structures and grounds, and to reduce energy consumption in the main house.

Management Actions:

1. Decrease grounds maintenance by reducing areas mowed - Time Frame: 1983.

2. A preliminary engineering study has recommended that over $40,000 would be needed to remodel the old Murray house into a safe and somewhat efficient structure, comprising several small living units. Local state and local housing codes would dictate requirements to insure the safety of future occupants.

   The following estimates are based on competitive bids from several local construction firms:

   Roofing - $9,500
   Electricity - $6,900
   Plumbing - $2,500
   Heating - $8,300
   Structural - $4,100
   Rental Units - $5,700
   External Fire Escapes - $2,900

3. Place adequate signs along the beach to delineate public property and inform visitors of the beach regulations. Time Frame: Summer, 1983.

Old Field Units 2-9

Description: Old Fields 2 through 9 are currently in various stages of succession. In 1978, at the time of acquisition, farming of Old Fields 2, 3, 4, 5, and 6 was discontinued. As a result of the suspension of agriculture on these management units, a weedy flora has become well established. Currently invasion of these units by woody species is commencing. Old Field 7, at the time of acquisition, was well advanced successionally. Currently Old Field 7 is characterized by well established weedy herbaceous flora with interspersions of shrubs and small trees. Old Field 8, the largest of the old field units, exhibits various successional development, with the eastern portion appearing similar to Old Field 7. The center western section Old Field 7 is similar to Old Fields 2 through 6. The northern section is just beginning the successional process as farming was suspended in 1980. Old Field 9 is a 63 acre unit that was used as an agricultural field for the production of corn, soy beans and wheat.

Goal: To permit succession to occur in Old Field Units 2 through 9.

Management Actions:

1. Remove all existing man-made debris from all the old field units.

2. Allow natural succession to occur and monitor successional growth to determine future management actions.

3. Allow naturally occurring fires to burn within the management units. Fire suppression will be permitted when danger to structures or adjacent cropland is apparent.

Upland Forest Unit 1

Description: The Upland Forest Unit 1 occupies the steep banks and bluffs between water's edge and the old fields on the sanctuary's eastern boundary. The forest community is composed of mature oak, hickory, and numerous associates. The area has an abundant and diverse spring herbaceous flora.

Goal: To maintain Upland Forest Unit 1 as a natural forest community with an interpretive trail in it.

Management Actions:

1. All man-made debris will be removed. Completed 1982.

2. Construct trail system which will originate at the research center, pass through the forest, parallel to Old Field 1, and return to parking lot.

   a. Initial construction of trail, 1/2 mile in length, completed in October 1982; 800 ft. of trail is paved, the balance is wood chipped.

   b. Trail extension through upland forest and old fields scheduled for completion in 1983-84.

3. An observation platform, overlooking the estuary, will be constructed. Completed 1982.

4. Timber will not be removed except when it obstructs trail. Only the obstruction portion of the tree will be removed.

Upland Forest Unit 2

Description: The 55-acre Upland Forest Management Unit includes approximately 40 acres of steep banks at the southwestern portion of the estuary generally extending from water's edge to the crest of the bank, plus the 15-acre Star Island. The mainland forest communities are composed of relatively mature timber of oak and hickory. However, a stand of white pine trees planted circa 1950 occupies an area adjacent to the railroad.

Star Island still shows signs of human inhabitation as evidenced by the overgrown house foundation and late successional vegetation species. The largest and most mature trees are found on its south and east shores.

Goals: To permit the Upland Forest Management Unit 2 including Star Island to remain as a natural forest community, free to evolve via natural processes.

Management Actions:

1. Remove existing man-made debris. Scheduled for 1984.

2. Allow natural succession to occur.

3. Mark and secure a hand dug cistern located on the easternmost projection of Star Island by summer of 1983.

Successional Woodlot Unit

Description: The Successional Woodlot Unit consists of small trees and brush left following a selective timber harvest in 1978.

Goal: To allow natural succession to occur.

Management Actions:

1. Remove existing man-made debris.

Prairie Unit

Description: Located along the Conrail tracks on the western uplands of the sanctuary, this management unit supports the growth of a dry prairie flora. Codominant species at the site are big bluestem and Indian grass, with principal associates including whorled rosin-weed, butterfly-weed, bush clover, asters, and switch grass. The area has been the site of periodic fires, which may aid in the maintenance of the herbaceous flora. Currently the site is being invaded by woody species such as shagbark hickory, sassafras, oaks and sumac.

Goal: To maintain the existing prairie flora.

Management Actions:

1. Remove woody species occurring within the prairie by hand.

2. The site will be periodically burned to assist in maintenance of the herbaceous prairie flora. The first prairie burn was completed March 31, 1981. A second burn was accomplished April 15, 1982. A third fire is planned for 1983, with subsequent burning done on a two year basis or as data suggests a need.

Darrow Road Unit

Description: The Darrow Road Unit is located on the north side of Darrow Road, adjacent to Old Woman Creek. The site is low-lying and consequently is often quite wet. Prior to acquisition, the site was maintained as a grassy access point to the creek. A barrier has been installed to prevent unauthorized access.

This unit also contains a 24 acre swamp forest along the stream channel. Interspersed within the swamp forest are small open water embayments. Upon construction of the proposed Ohio Route 2, the Darrow Road Unit will consist of two distinct components lying to the north and south of the highway.

Goal: To maintain existing natural conditions.

Management Actions:

1. Existing structures and man-made debris will be removed.

2. Long-term management will be restricted to the opening of the stream channel only when log jams present a danger to upstream flooding.

3. Natural materials removed from the stream channel will be deposited in the adjacent flood plain.

4. Monitor natural components to observe effects of highway construction.

Manager's Residence

Description: The area manager's residence is located on Darrow Road, east of the creek at the southern boundary of the preserve. This 2-acre residence is part of the 17-acre tract, formerly known as the Schuh property, and was acquired in August, 1980.

Three structures exist on approximately 4.7 acres of land. The remaining land consists of flood plain forest and old field. The four bedroom residence provides 1296 square feet of living space. A 25' x 48' pole barn has an attached 20' x 20' workshop.

The residence is occupied by the sanctuary manager and his family. The building was built in the early 1970's and is in good condition. Utilities include electric (with baseboard heating), water well and septic system.

Goal: The residence should continue to serve as the sanctuary manager's residence. The pole barn and workshop should serve as a work area and equipment storage for the sanctuary. Unused land should be allowed to revert to the original vegetation.

Management Actions:

1. Manager's residence will be maintained in good condition.

2. The residence will be better insulated for energy conservation.

3. Necessary improvements and security measures will be made to the pole barn and workshop.

   a. Exterior painted 1981.

4. A wooded buffer will be maintained between the structures and relocated Route 2.

Estuary Unit

Description: The Estuary Unit consists of that area bounded by steep wooded banks beginning at the mouth of the stream on Lake Erie and extending south of the railroad to a point at which the stream channel becomes readily identifiable, exclusive of Star Island. Currently, the stream channel and the stream's flood plain are not identifiable because of the high lake levels. During lower lake levels, the area will change, re-establishing a stream and associated flood plain marsh. Currently, this unit consists largely of open water with occasional occurrences of American lotus, white waterlily, other emergent and floating-leaved vegetation.

Goal: To maintain the management unit free from development, and subject to the periodic environmental change which is characteristic of freshwater estuarine environments.

Management Actions:

1. Existing structures and man-made debris will be removed.

2. Continue to monitor the estuary water quality for research and education purposes.

3. Limit the amount of public access to prevent interference with research projects and to insure minimum disruption of naturally occurring flora and fauna.

Boundary Management Unit

Description: The sanctuary currently has approximately 26,000 feet of boundary. These areas border on cultivated fields, forested areas, U.S. Route 6, Conrail Right-of-Way, Darrow Road and Lake Erie. These boundaries are largely unsecured and offer points of unrestricted access.

Construction of boundary fencing along these property lines is strongly recommended and in two cases mandated by severance deed requirements.

Goals: To clearly and conspicuously identify all boundaries. To secure all points of access. To prevent encroachment and trespass. To construct severance line fences.

Management Actions:

1. Inventory all boundaries and determine the appropriate types of boundary markers and security devices.

2. Secure all access points.

3. Post all boundaries with the appropriate nature preserve boundary sign as per division policy.

4. All corner survey points will be permanently marked with standard ODNR concrete monuments,

5. 46" woven wire galvanized fence will be erected where necessary or as required in the purchase agreement(s). Target date 1983-85, pending financial appropriations.

6. Boundaries adjacent to wooded areas within the sanctuary shall be clearly marked with white florescent paint to aid identification at night, as outlined by division policy.

7. Where possible, all boundaries along the eastern and western sides will be mowed 10 feet inside the property line to aid in fire control, law enforcement, and maintenance functions.

B. Off-Site Management Considerations

1. Land Capability, Current Use and Zoning

Land capability is an expression of soil, geologic, terrain, climate, and other characteristics in relation to sustained use. In the area surrounding the estuary, land capability is limited primarily by soil drainage characteristics and associated seasonal wetness (Fig. 9). Land suitable for agricultural use is primarily so used. The second most prevalent land use is single family residential, with the majority of this use congregated near Lake Erie. Berlin Heights, the only municipality in the watershed, is expected to experience only nominal growth during the next twenty years.

Zoning enacted in the proximity of the estuary provides for single family residential and agricultural uses (Fig. 10). There is also provision for development of commercial activity to the west of Berlin Road. A double track standard gauge railroad, currently operated by Conrail, bisects the preserve. No appreciable effects upon the preserve are caused by operation of this line, and no changes in operation are anticipated.

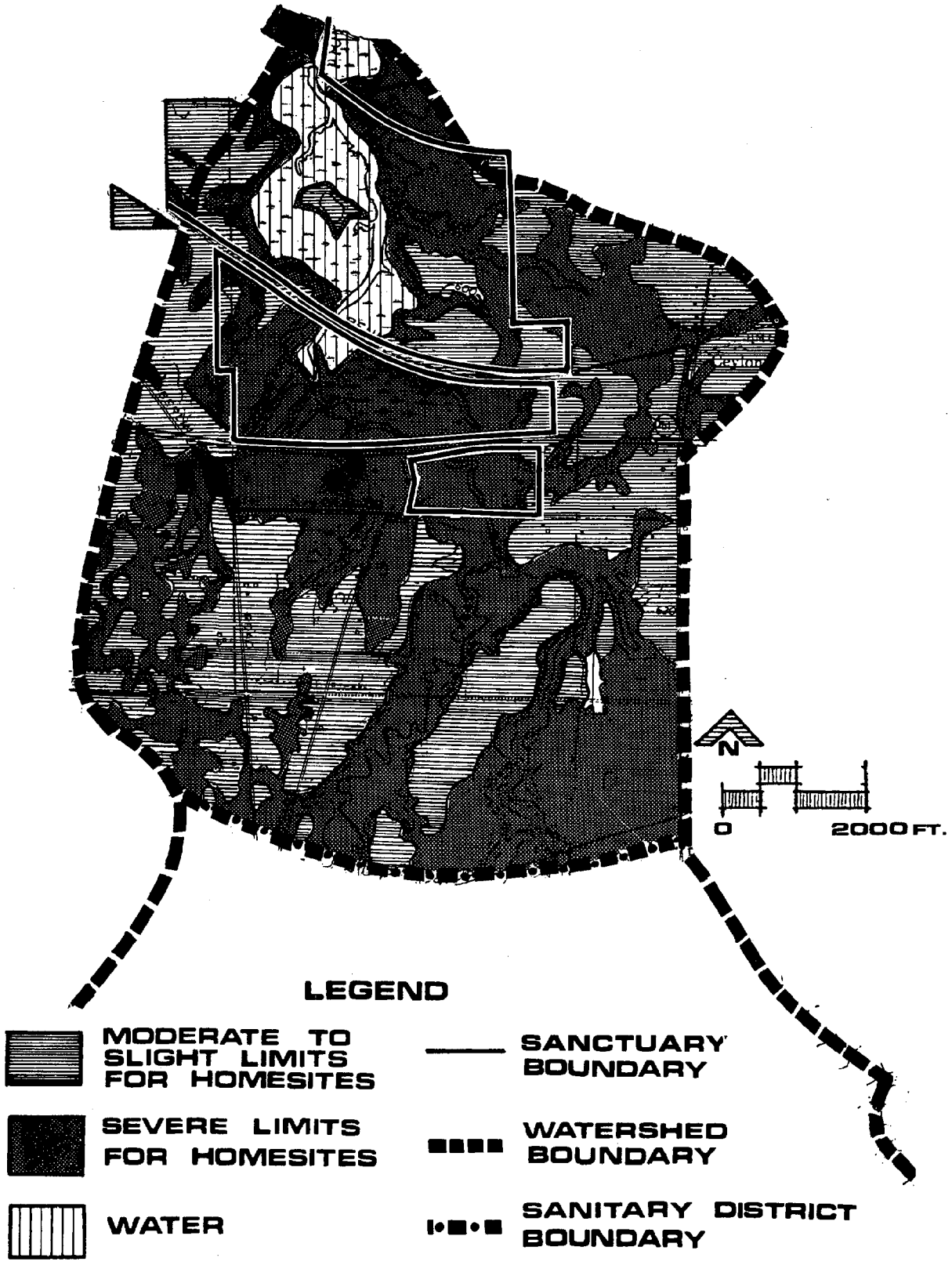
Growth in the area can be expected along the land closest to Lake Erie and in proximity to the alignment of two interchanges to U.S. Route 2 which is planned along the southern portion of the existing preserve property. The major threat expected from development is associated with construction of Route 2.

Two approaches should be utilized to mitigate such development.

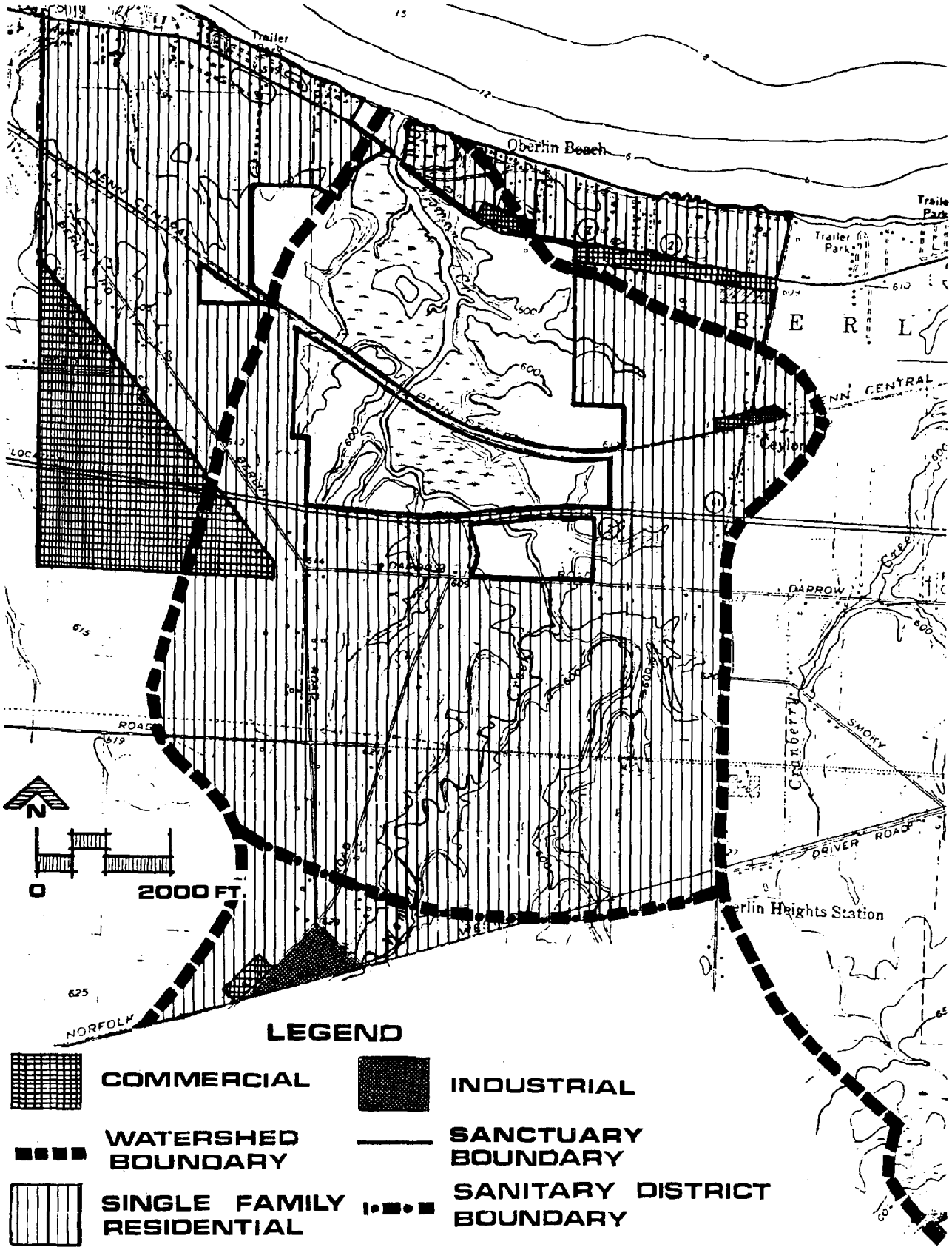
Residential and other wastewater producers should be required to tap in to interceptor sewers planned for the area. One such line is already planned for service to Berlin Heights and the area to the west of the preserve.

Wooded land, especially on slopes, should be maintained to the greatest degree possible, either by dedication as part of a subdivision or through individual deed restrictions. All construction activities should meet current sediment control aspects of existing local regulations and the developers be encouraged to take special precautions where runoff is an immediate threat to the estuary. Close coordination with local authorities has been established and will be the most effective means of dealing with these relatively short-term threats.

Finally, agricultural non-point source sediment and nutrient loading of the waters feeding the estuary can be expected to continue as the major man induced effect upon the water chemistry of the estuary. Cooperation with local authorities should be maintained so that best available agricultural practices to mitigate these effects are put into practice wherever possible. Use of minimum till farming, maintenance of wind breaks, use of grass swales, and maintenance of trees along watercourses are some of the many approaches to keep sediment and associated nutrients in place on cultivated land.



GENERALIZED SOILS CAPABILITY MAP
FIGURE 9



CURRENT ZONING MAP
FIGURE 10

2. Area Land Use Changes

Completion of the new State Route 2 alignment along and through the southern portion of the sanctuary will create a permanent, artificial land form barrier except where the Old Woman Creek channel is bridged. The effect of changes to local drainage patterns will be monitored as will effects of construction activity. Route 2 access plans provide for interchanges on both the west and east barriers of the watershed. Accelerated rates of surrounding development are to be expected upon completion of the project.

The entire project site within the watershed also lies within the special sanitary district which extends out one mile from the sanctuary boundary. Due to the special authority obtained from creation of the sanitary district, and currently enforced local regulations, the effects from development are not expected to pose a threat to the integrity of the sanctuary. Development of the area will be monitored for effect upon the sanctuary.

The current Wastewater Treatment Plan for the region provides for the conveyance of effluent from Berlin Heights to Huron by an interceptor sewer. Conversion from septic tank treatment will improve water quality in the estuary. New development will be serviced by planned interceptor sewers which will remove the effluent from the Old Woman Creek Watershed.

RESEARCH PLAN

OLD WOMAN CREEK RESEARCH PLAN

A. Research Philosophy

The establishment of the Old Woman Creek National Estuarine Sanctuary presents an unprecedented opportunity to develop a comprehensive body of knowledge regarding the physical and biological characteristics and interrelationships of a freshwater estuary, its watershed, and nearshore Lake Erie. The long range goal of the research program at this sanctuary is to develop a comprehensive understanding of the freshwater estuarine ecosystem. In general, the research program will follow the recommendations of the U.S. Man and the Biosphere Program (1979) and the long-term ecological goals of the National Science Foundation (Institute of Ecology 1979, 1979).

Research on brackish water estuaries and other coastal zones has demonstrated the importance of undeveloped wetlands in providing both natural (food production, water purification) and cultural (commercial and sport fisheries) benefits. A major objective of studies undertaken at Old Woman Creek is to determine the relative significance of freshwater estuaries in performing functions similar to those performed by brackish water estuaries and coastal zones. The information derived from the research program at Old Woman Creek will be available for coastal zone management decisions.

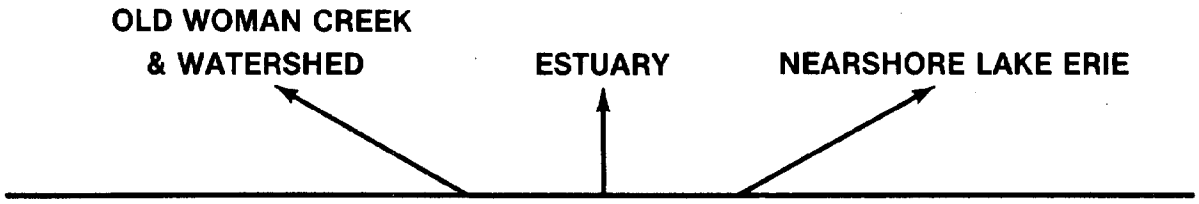
The basic approach to research at the sanctuary is to provide fundamental data, opportunity, direction, and facilities to the scientific community, thereby permitting the cumulative results of widely divergent projects to form the body of information necessary to gain a comprehensive understanding of the freshwater estuarine system. In soliciting research from groups and individuals other than sanctuary staff, flexibility in project design is critical and will be determined by the specific interests of the researcher. Therefore, the research program for the sanctuary has not been designed to accomplish specific projects on an established schedule, nor does the program specify individual project design. The plan does provide opportunity and direction within a framework of pragmatic flexibility.

Many ecological theories, particularly in the fields of population biology and community ecology, require long term studies before they can be critically evaluated. The security from encroaching development coupled with the availability of a data base would be valuable in the testing of these theories, and may prove to be some of the most important scientific work that will emerge from the program.

B. Research Framework

A research outline has been developed to provide direction for the research program at Old Woman Creek National Estuarine Sanctuary (Table 2). This outline is presented not as a restrictive list of acceptable research areas, but rather as a general framework of research opportunities to spark the creative talents and interests of the research community.

RESEARCH COMPONENTS FOR OLD WOMAN CREEK NATIONAL ESTUARINE SANCTUARY



Descriptive Research

(1) Geology
- a. Geomorphic Characteristics
- b. Bedrock Characteristics
- c. Sediment Characteristics

(2) Water Quality
- a. Chemical Properties
- b. Physical Properties

(3) Meteorology

(4) Biology
- a. Aquatic Organisms
- b. Terrestrial Organisms
- c. Aerial Organisms

(5) Geography
- a. Physical Characteristics
- b. Cultural Characteristics

Functional Research

(1) Geologic System

(2) Hydologic System
- a. Hydraulics
- b. Sediment Transport
- c. Mixing Processes

(3) Chemical System
- a. Nutrient Cycles
- b. Major Ion Cycles
- c. Toxic Substances Cycles

(4) Energy System (Organic)
- a. Production (Autochthonous)
- b. Allochthonous Processes
- c. Consumption
- d. Decomposition

(5) Flux Processes/Loading
- a. To/From Lake Erie
- b. To/From Upstream
- c. To/From Estuary Margins

(6) Life History/Ecology

(7) Cultural Processes
- a. Land Use
- b. Water Use

REGIONAL RESEARCH
(Lower Great Lakes Biogeographic Area)

Natural Systems Research

As Specified

Cultural Systems Research

As Specified

INFORMATION MANAGEMENT/ COMMUNICATIONS

(1) Data Storage and Management
(2) Scientific Literature
(3) Library Services
(4) Public Information
(5) Education
(6) Publications

TABLE 2

Many of the studies undertaken by the academic community will mirror the interests and expertise of those involved as well as the availability of research monies. Despite the apparent randomness of resulting work, all well-planned research will be encouraged because all such research aids in the understanding of the estuary and its watershed.

C. Monitoring Program

The sanctuary staff is responsible for the development and implementation of a comprehensive baseline monitoring program. This program will provide the basis of a data bank which will provide future researchers with information regarding the biotic and abiotic components of the estuary, creek proper, and nearshore lake areas.

Permanent ground-level photographic monitoring stations were established in 1982 within the sanctuary. These stations will provide documentation of floristic changes related to fluctuating water levels, changing environmental conditions and natural succession, as well as changes associated with alterations in management practices. In addition to these ground-level monitoring stations, an aerial photographic survey of the entire watershed will be conducted every 5 years.

A program to monitor chemical components of the estuary and upstream waters has been underway since late 1980. Chemical and physical parameters currently being monitored include silicate, orthophosphate, ammonia, nitrite, nitrate, alkalinity, sulfate, chloride, pH, conductivity, dissolved oxygen, water temperature, and turbidity. Seven sites within the sanctuary boundaries, six sites in the creek proper, and one in nearshore Lake Erie are sampled on a fortnightly basis. The seven sites within the sanctuary include a site directly above, below, and at the proposed construction site of the State Route 2 bypass. Surface and bottom water samples are collected at five sites to determine chemical differences, if any, between the top and bottom waters. An expanded program of monitoring vertical profiles will be implemented if significant differences are found. With the completion of the Center for Estuarine Sanctuary Research in late 1982, the monitoring program was expanded to include analysis of selected metals. The analysis of waterborne metals will be of special importance in assessing the impacts of State Route 2.

The attached and planktonic algal communities of Old Woman Creek are sampled in conjunction with the chemical program outlined above. Epilithic algal samples are collected at 5 of the 6 creek sites and epiphytic samples are taken from 4 sites within the estuary. Phytoplankton samples are collected at every chemical site. This portion of the biological monitoring program will provide information on species composition and seasonal patterns of the attached and planktonic algae in the creek, estuary, and nearshore lake.

The chemical and algal monitoring programs will continue through 1983, but in 1984 the sampling schedule will be altered to correspond with major storm events. The sites will be monitored immediately before, during, and

at selected intervals after each major storm to permit an estimation of the role of storms in regulating chemical concentrations and algal populations In Old Woman Creek. After a three year sampling period, the results from this portion of the monitoring program will be analysed to determine the suitability of continuing a storm related sampling schedule.

Three water level gauges were installed during the summer of 1980 to monitor water level fluctuations in Lake Erie near Old Woman Creek, at the mouth of the creek, and in the estuary opposite the site of the new research facility. They are currently maintained by the U.S. Geological Survey. Information provided by these gauges will be of great value to researchers concerned with water mass movements through the estuary and the role of these movements in determining the biology and chemistry of the estuary.

The sanctuary staff began a fortnightly seine netting program to monitor fish populations in the estuary, creek, and nearshore Lake Erie during the summer of 1981. This program is augmented with data provided by the Ohio Division of Wildlife's annual test netting and with data from field trips to Old Woman Creek which incorporate shoreline seining. The sanctuary staff is also conducting a gut analysis study on selected fish species of the estuary, creek, and nearshore lake to determine feeding habits of the fish utilizing the estuary.

These portions of the monitoring program will continue to be examined indefinitely, but on a more abbreviated schedule than is currently undertaken. The monitoring program will be expanded in the future to address ecological and physiological parameters not currently under investigation. This continuous collection of data will result in an ever expanding data base which will be useful in identifying temporal changes in the environmental quality of the watershed.

D. Facilities and Equipment

The success of the research program will be dependent upon both the interest of prospective researchers and availability of the equipment and facilities required to undertake such a program. The increasing complexity of research requires specialized facilities and sophisticated equipment. The new research facility was built to incorporate the most common specialized facilities required in today's ecological research while providing the flexibility necessary to accommodate future research requirements. An analytical chemistry laboratory within the facility reflects the importance of chemistry in ecological research. A laboratory designed for the use of radioisotopes has also been incorporated in the facility. The general laboratory along with two smaller rooms provide areas with the flexibility to handle future and currently unknown research needs. Support facilities currently include a utility room, offices, and storage areas. With the completion of Phase III, the support facilities will be increased with the addition of a library and more office space.

A definitive equipment inventory of the laboratory complex is difficult to predict because research objectives and methodology are constantly evolving and changing. The equipment needs of today may differ from those

of the future. Despite this uncertainty, there is a broad spectrum of equipment that will remain important in the foreseeable future. This equipment could be termed "basic laboratory" equipment, because it is considered essential in virtually any laboratory situation and it is used in such a wide range of research projects. Such equipment would include balances, water distillation system, centrifuge, chart recorders, magnetic stirrers, hot plates, water baths, ovens, air and vacuum pumps, autoclave, and microscopes.

The chemical analysis of waters, biological tissue, and sediments is highly equipment dependent. In addition to the laboratory equipment necessary for the preparation of standards and reagents, there is a wide range of sophisticated equipment needed to conduct chemical analysis tests. Several of the chemical and physical tests are determined electrometrically with the appropriate meters and accessories. An automatic titration system increases the sensitivity and reliability of titrametrical determinations. Many of the chemical tests are determined colormetrially, requiring a UV/Vis spectrophotometer. Metals are determined using an atomic absorption spectrophotometer and accessories. The detection of herbicide or pesticide levels as well as other organic compounds requires the use of a high performance liquid chromatograph and/or a gas chromatograph.

The use of radioisotopes requires instruments both to insure the safety of the researcher as well as to quantify the level of isotopes in the experiments.

Aquatic research requires boats and specialized sampling equipment. Both lake going work boats as well as shallow draft boats are necessary to sample both the estuary and the nearshore lake as well as other coastal wetlands. The various nets, sampling bottles, and grabs are all required for ecological work in an aquatic ecosystem.

Meteorological equipment will permit the collection of on site climatical conditions.

Controlled environmental equipment are required for many of the studies of interactions or organisms and their environment. Such facilities would also permit small scale manipulative studies, which could be undertaken in the laboratory rather than in the estuary.

Future equipment demands are unknown as future research projects and methodology remain undefined. The same flexibility that has been designed into the laboratory facility must also be included in equipment requisition.

E. Research Prospectus

The success of the research program at Old Woman Creek National Estuarine Sanctuary will depend upon the ability of the sanctuary staff to encourage the research community to utilize the site for their studies. The staff expect to encourage the active participation of the research community in sanctuary research by offering access to an ever expanding data bank, assistance in both project design and implementation, and availability of on-site laboratory facilities and low cost housing.

The initial phase in this role of encouraging research at the sanctuary is to acquaint the academic community with the area and available facilities. To fulfill this function, the staff have visited universities in Ohio and have presented papers at two conferences of Great Lakes area researchers. An open house for academic researchers in the lower Great Lakes region is planned for September 1983 to acquaint them with the site and the new facilities.

The data bank provides the background data (e.g., species lists, population numbers, etc.) necessary to undertake an ecological research project. The data may suggest a future study to the researcher. This data will provide the long-term temporal data for the development of ecological theories or for remodeling studies.

The sanctuary staff will assist the potential researcher in preparing the research proposal. The staff will be able to alert the researcher to conditions unique in the estuary that will present problems in the proposed sampling techniques as well as providing background data on the site and the importance of the proposed study. The staff can suggest potential funding sources that may not be readily apparent to the researcher. After the study has commenced the staff will assist with data collection, as the need and time permit.

Research overhead at Old Woman Creek will be significantly diminished by the availability of on-site housing and research facilities. Living accommodations along the Lake Erie shoreline, if available, are quite expensive, particularly during the summer months when most academics are able to conduct research. Housing, at a nominal cost, is available for the researcher either on-site at the Old Woman Creek National Estuarine Sanctuary, or nearby at other state nature preserves. This housing will significantly cut living expenses and, coupled with the laboratory facilities, decrease the need for transportation expenses. The close proximity to the research area will also permit more frequent sampling.

On-site laboratory facilities are currently available. This complex is equipped with the more common laboratory and limnological equipment which is available for use by researchers, cutting research expenses even further. The cost of specific chemicals and equipment unavailable at the facility, however, must still be borne by the researcher.

Appendix G contains the research guidelines and application forms required by Division of Natural Areas and Preserves policy.

F. Funding

Grants and contracts for research on the estuary and other coastal wetlands will be sought when available and appropriate. These may be sought for use by regular or temporary employees, or for the use of outside researchers. Grants and contracts may also be solicited in conjunction with universities or other research organizations. Solicited grants and contracts will not be restricted to research projects considered by the

staff and Sanctuary Advisory Council to be of highest priority, but the projects may be relevant to the goals of the sanctuary research program.

The sanctuary staff may approach the academic community with specific research proposals in an attempt to fill obvious voids in the data bank. Stipends, when available, will be offered to encourage these studies.

G. Information Management

The expanding data base dictates that increased attention must be given to an organized system of data and specimen storage and retrieval. All modern manual, photographic, and electronic systems will be considered.

publications. Pepper et. al. (1954) outlined the lithologies and paleogeography of the underlying rock formations in northern Ohio. Herdendorf (1963) conducted a study of the geology of the Vermilion Quadrangle, which encompasses a major portion of the Old Woman Creek watershed. This work characterized the specific properties of the major bedrock types of the watershed. This

publication also contained a detailed bedrock map of the area. Campbell (1955) summarized the surficial geological history of Erie and Huron Counties from the Illinoian period until the present. This paper includes a map of the major moraines in the area.

I. History of Research Activities After Sanctuary Designation

Reports of research studies undertaken at Old Woman Creek National Estuarine Sanctuary or undertaken under the auspices of the sanctuary are housed in the sanctuary library.

J. Priority Research

The impending construction of the State Route 2 bypass through the southern portion of the estuary deems that studies on the proposed impact area and stations lakeward are ranked as priority projects. The

more data that is collected prior to construction, the more comprehensive of an impact study can be undertaken. Currently a monitoring program on the chemistry of the water and on the planktonic algae in the affected area is in progress.

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EDUCATION PLAN

OLD WOMAN CREEK EDUCATION PLAN

A. Introduction

Education of the general public, specialized groups and the local community will play a prominent role in the successful operation of the Old Woman Creek National Estuarine Sanctuary. The objective of these educational efforts will be to provide the appropriate level of information about the estuary, sanctuary, and the state, federal, and local organizations that have roles in the management of the area.

This education plan is divided into on-site and off-site activities. These activities will be implemented by the sanctuary manager, with assistance from his/her staff and coordinated with ODNR. The physical boundaries of the sanctuary have been used to categorize these activities.

B. Off-site Educational Activities

1. Mobile Displays - The Sanctuary will acquire or construct mobile displays for use throughout the state at conferences, workshops, schools, etc.

2. Lectures - The Sanctuary will respond to, and encourage, speaking engagements by the sanctuary manager, sanctuary staff, and other knowledgeable persons. Audiences may include service organizations, youth groups, school groups, conservation clubs, radio and television programs, etc.

3. News Media - The Sanctuary will actively encourage media coverage of the sanctuary. Such coverage could include special newspaper articles and editorials, magazine articles, and electronic media coverage.

4. Special Activities - The sanctuary staff will be encouraged to participate in special activities such as serving on various boards, advisory groups, public programs, etc.

C. On-Site Educational Activities

1. Publications - The Sanctuary will develop publications as necessary to promote the goals and objectives of the sanctuary. A sanctuary brochure is essential to the public education program and will be developed as soon as possible. Other publications, such as one promoting and describing research opportunities at the sanctuary, will also be developed. All publications will be carefully screened to assure that they serve the state and national objectives of the sanctuary program.

2. Organized Activities - Well-planned public programs at the sanctuary should stimulate public educational involvement in the objectives of the sanctuary. The sanctuary manager will coordinate all such programs to assure that they serve the objectives of the sanctuary.

a. Statewide events - The Sanctuary will sponsor specific meetings, tours, workshops, etc. on topics relating to the estuary and sanctuary. These events will be publicized statewide and will be directed at the interested general public. These events will use the expertise of sanctuary and division staff as well as volunteer experts.

b. Specialized Group Workshops - The sanctuary staff will provide workshops and other organized educational activities for specialized groups and organizations, such as youth group leaders, school science teachers, and college classes. These activities will concentrate on topics directly related to the sanctuary and its management.

c. Lectures - Sanctuary staff will operate a lecture series at the research center. Guest speakers, sanctuary and other division staff will present evening or weekend programs. These presentations will be on an irregular schedule, with programs held both indoors and outdoors as conditions and subject matter warrant. The lectures should promote public education and yet entertain and stimulate interest by people with a low-level concern about the estuary.

d. Interpretive Programs - The sanctuary manager will coordinate and provide a variety of interpretive programs for the public and special groups. A guided "nature walk" is an effective means of stimulating two-way communication with an audience while providing close contact with the physical setting of the sanctuary. Old Woman Creek National Estuarine Sanctuary provides a variety of habitats which can be used for interpretive programs. The purpose of these programs should be education, not recreation. For example, a canoe tour is an excellent means of interpreting the estuary, but it should not be the primary reason for organizing or attending the program. Interpretive tours may be led by sanctuary staff or by skilled volunteers with prior approval from the sanctuary manager.

e. Research Facility Tours - Tours of the research facilities at the sanctuary will be made available to interested groups and the public at regular intervals. Care will be taken to avoid upsetting the schedules of staff and guest researchers. A "hands-on" learning experience should be provided wherever possible.

f. Volunteer Program - The sanctuary staff will encourage and coordinate a volunteer program at the sanctuary. A volunteer program will be developed and volunteers will be recruited and trained to fulfill specific tasks. The volunteer

program will be managed in accordance with accepted ODNR volunteer management procedures, and will be an active rather than reactive program.

g. Area Tours - Special "good neighbor" tours of the sanctuary will be offered to the adjacent landowners and local community. Sanctuary staff will encourage a full understanding of the estuary and sanctuary objectives within the local community.

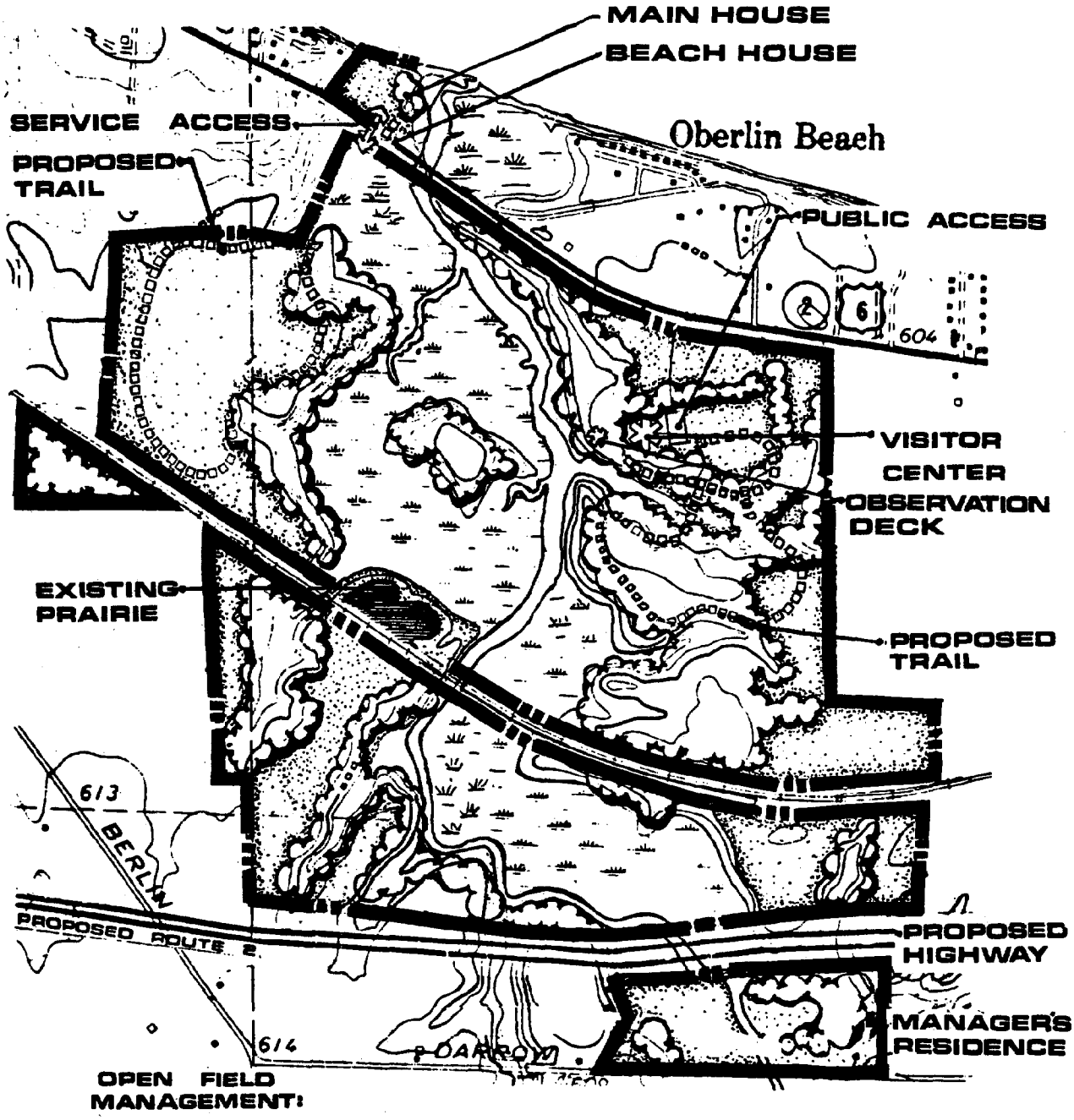
3. Visitor Orientation - Many, if not most, of the public visiting the sanctuary will be casual visitors with little or no knowledge of the purpose of the sanctuary. Since it is not feasible for sanctuary staff to greet each visitor and explain the history, purpose, and activities of the sanctuary, a visitor orientation system is essential to the operation of the sanctuary. This system will include the following:

a. Trails - The sanctuary master plan identifies existing and planned facilities including the trail system (Figure 11). Trail development, from conception to completion, will comply with the Division's standard trail development policy. The trail system is intended to provide a variety of experiences for both the casual and serious sanctuary visitor.

b. Visitor Center - The visitor center will serve as the focal point for most sanctuary visitors. Permanent and temporary exhibits are designed to "explain" the sanctuary to the casual visitor. These exhibits and other interpretive devices will be designed by professionals to fulfill the objectives of this aspect of the educational program.

"Hands-on" displays will be developed for individuals interested in more detailed educational information. Microscopes, water chemistry equipment, and similar devices will be used to provide greater opportunities to special groups and individuals.

c. Trail-side Devices - Various devices, including signs, bulletin boards, observation platforms, benches, maps, brochures, etc. will be used to convey information to the public and to make their visit a pleasant one. Attempts will be made to anticipate visitor needs and questions, and to respond to them in advance. A self-guided tour of the portion of the sanctuary which is open to the public will provide an enjoyable and educational experience through the use of these trail-side devices.



- "Striped areas" to be managed by Sanctuary personnel to create or maintain prairie conditions.
- Immediate areas around the Visitor's Center, and Residences to be mowed on a routine basis.
- Remaining fields to revert back to woodlands — this will create a greater edge effect, will help buffer the roads and railroads and will help create visual and vegetative diversity.

N

0 500 FT.

OLD WOMAN CREEK NATIONAL ESTUARINE SANCTUARY
MASTER PLAN
FIGURE 11

4. Reference Library - The library contains many reference volumes including field guides, identification manuals, scientific journals, and abstracts of Great Lakes regional research projects. A bibliography of wetlands education and resource materials will be developed for on-site use by teachers, students, and group leaders.

5. Recreational Considerations - Facility design to meet education and research goals will also provide visitors to the sanctuary with opportunities for passive recreation experiences as part of an overall educational experience. Viewing flora and fauna along trails, at the estuary overlook and in the center sets a tone for relaxed enjoyment of nature while learning about the estuary. Effective environmental education programming utilizes many principles inherent to recreation and provides for active involvement while preserving the resource base. Whether individually or in groups, recreation will be a part of the visitors' overall experience at the sanctuary.

   Active or intensive recreation opportunities will not be provided at the sanctuary. Numerous outdoor recreation opportunities are provided at nearby state parks and wildlife areas within easy driving distance of the sanctuary.

APPENDIX A

Vascular Plants Recorded at the Old Woman Creek
National Estuarine Sanctuary
Through 1982

EQUISETACEAE	
Equisetum arvense	Common Horsetail
OSMUNDACEAE	
Osmunda cinnamomea	Cinnamon Fern
POLYPODIACEA	
Adiantum pedatum	Maidenhead Fern
Athrium Felix-femina	Lady Fern
Dryopteris austriac var. spinulosa	Spinulose Wood Fern
Onoclea sensibilis	Sensitive Fern
Polystichum acrostichoides	Christmas Fern
OPHIOGLOSSACEAE	
Botrychium	Rattlesnake Fern
PINACEAE	
Picea pungens	Blue Spruce
Pinus rigida	Pitch Pine
P. strobus	Eastern White Pine
P. sylvestris	Scotch Pine
Tsuga canadensis	Eastern Hemlock
TAXODIACEAE	
Metasequoia sp.	Metasequoia
TYPHACEAE	
Sparganium eurycarpum	Bur-reed
Typha angustifolia	Narrow-leaved Cattail
T. atifolia	Broad-leaved Cattail
POTOMOGETONACEAE	
Potomogeton nodosus	Pondweed
P. pectinatus	Sago Pondweed
ALISMATACEAE	
Alisma trivale	Water Plantain
Sagittaria latifolia	Common Arrowhead
BUTOMACEAE	
Butomus umbellatus	Flowering Rush

GRAMINEAE

Aegilops cylindrica	Goat Grass
Andropogon gerardi	Big Bluestem
Andropogon scoparius	Little Bluestem
Bromus japonicus	Brome Grass
Calamagrostis canadensis	Blue-joint Grass
Cinna arundinacea	Wood Reed
Digitaria sanguinalis	Crab Grass
Echinochloa crusgalli	Barnyard Grass
E. pungens	Barnyard Grass
E. walteri	Walter's Millet
Elymus virginicus	Wild Rye
Eragrostis pectinacea	Love Grass
Glyceria striata	Manna Grass
Leersia oryzoides	Cut Grass
Panicum capillare	Witch Grass
P. virgatum	Panic Grass
Phalaris arundinacea	Reed Canary Grass
Phleum pratense	Timothy
Phragmites australis	Reed Grass
Poa pratense	Kentucky Blue Grass
Setaria glauca	Foxtail Grass
S. faberii	Foxtail Grass
Sorghastrum nutans	Indian Grass

CYPERACEAE

Carex frankii	Frank's Sedge
C. staminea	Sedge
C. vulpinoidea	Sedge
Cyperus engelmanni	Umbrella-sedge
C. esculentus	Umbrella-sedge
C. ferruginescens	Umbrella-sedge
C. rivularis	Umbrella-sedge
C. strigosus	Umbrella-sedge
Scirpus americanus	Bulrush
S. atrovirens	Dark Green Bulrush
S. fluviatilis	River Bulrush
S. validus	Great Bulrush

ARACEAE

Acorus calamus	Sweet Flag
Arisaema atrorubens	Jack-in-the-pulpit
Peltandra virginica	Arrow Arum

LEMNACEAE

Lemna minor	Duckweed
Spirodela polyrhiza	Duckweed

COMMELINACEAE

Tradescantia virginiana	Spiderwort

PONTEDERIACEAE

Pontederia cordata	Pickerelweed

JUNCACEAE

Juncus effusus	Rush
J. tenuis	Path Rush

LILIACEAE

Allium sativum	Garlic
Asparagus officinalis	Asparagus
Erythronium albidum	White Trout-lily
E. americanum	Yellow Trout-lily
Hemerocallis fulva	Day Lily
Lilium canadense	Canada Lily
Polygonatum biflorum	Solomon's Seal
Smilacina racemosa	False Solomon's Seal
Smilax sp.	Greenbrier
Trillium grandiflorum	Large-flowered Trillium

AMARYLLIDACEAE

Hypoxis hirsuta	Star Grass

IRIDACEAE

Iris versicolor	Blue Flag
Sisyrinchium sp.	Blue-eyed Grass

ORCHIDACEAE

Epipactis latifolia	Helleborine
Spiranthes gracilis	Ladies' Tresses

SAURURACEAE

Saururus cernuus	Lizard's-tail

SALICACEAE

Populus deltoides	Cottonwood
P. grandidentata	Big-tooth Aspen
Salix spp.	Willow

JUGLANDACEAE

Carya cordiformis	Bitternut Hickory
C. ovata	Shagbark Hickory
Juglans nigra	Black Walnut

BETULACEAE

Alnus serrulata	Smooth Alder
Corylus americana	Hazel
Ostrya virginiana	Hop Hornbeam

FAGACEAE

Castanea dentata	American Chestnut
Fagus grandifolia	American Beech
Quercus alba	White Oak
Q. bicolor	Swamp White Oak
Q. borealis	Red Oak
Q. macrocarpa	Bur Oak
Q. palustris	Pin Oak

MORACEAE

Morus alba	White Mulberry

ULMACEAE

Celtis occidentalis	Hackberry
Ulmus americana	American Elm
U. rubra	Slippery Elm

URTICACEAE

Boehmeria cylindrica	False Nettle
Laportea canadensis	Wood Nettle
Pilea pumila	Clear Weed
Urtica dioica	Stinging Nettle
U. gracilis	Slender Nettle

SANTALACEAE

Comandra umbellata	Bastard-toadflax

POLYGONACEAE

Polygonum coccineum	Water Smartweed
P. convolvulus	Black Bindweed
P. hydropiperpoides	Mild Water Pepper
P. lapathifolium	Nodding Smartweed
P. pensylvanicum	Pinkweed
P. pensylvanicum var. eglandulosum	Lake Erie Pinkweed
P. persicaria	Lady's-thumb
P. punctatum	Smartweed
P. sagittatum	Arrow-vine
P. virginianum	Jumpseed
Rumex crispus	Sour Dock
R. orbiculatus	Great Water Dock
R. verticillatus	Water Dock

CHENOPIDIACEAE	
Chenopodium album	Lamb's Quarters
Cycloloma atriplicifolium	Winged Pigweed
Salsola kali	Russian Thistle
AMARANTHACEAE	
Amaranthus albus	Tumbleweed
A. retroflexus	Pigweed
NYCTAGINACEAE	
Mirabilis nyctaginea	Four-O'clock
PHYTOLACCACEAE	
Phytolacca americana	Pokeweed
PORTULACACEAE	
Portulaca oleracea	Purslane
CARYOPHYLLACEAE	
Saponaria officinalis	Bouncing Bet
CERATOPHYLLACEAE	
Ceratophyllum demersum	Coontail
NYMPHAEACEAE	
Nelumbo lutea	American Lotus
Nuphar advena	Spatterdock
Nymphea tuberosa	White Water-lily
MAGNOLIACEAE	
Liriodendron tulipera	Tuliptree
RANUNCULACEAE	
Anemonella thallictroides	Rue Anemone
Anemone quinquefolia	Wood Anemone
A. virginiana	Thimbleweed
Caltha palustris	Marsh Marigold
Cimicifuga racemosa	Black Cohosh
Clematis virginiana	Virgin's Bower
Hepatica acutiloba	Sharp-lobed Hepatica
Ranunculus fascicularis	Buttercup
R. repens	Buttercup
R. sceleratus	Cursed Crowfoot
Thalictrum dioicum	Meadow Rue

BERBERIDACEAE

Berberis thunbergii	Japanese Barberry
B. vulgaris	Common Barberry
Podophyllum peltatum	May Apple

LAURACEAE

Sassafras albidum	Sassafras

CRUCIFERAE

Alliaria officinalis	Garlic Mustard
Barbarea vulgaris	Winter Cress
Brassica campestris	Field Mustard
B. hirta	White Mustard
B. kaber	Charlock
Cardamine bulbosa	Spring Cress
C. pensylvanica	Bittercress
Dentaria laciniata	Toothwort
Hesperis matronalis	Dame's Rocket
Rorippa islandica	Yellow Cress
R. palustris	Marsh Cress

CAPPARIDACEAE

Polanisia dodecandra	Clammy Weed

CRASSULACEAE

Penthorum sedoides	Ditch Stonecrop
Sedum telephium	Live-forever

SAXIFRAGACEAE

Heuchera americana	Alumroot
Hydrangea arborescens	Wild Hydrangea
Ribes sativum	Currant
Ribes sp.	Gooseberry

PLATANACEA

Platanus occidentalis	American Sycamore

ROSACEAE

Agrimonia gryposepala	Agrimony
Amelanchier sp.	Serviceberry
Crataegus spp.	Hawthorn
Fragaria virginiana	Strawberry
Geum canadense	Avens
G. laciniatum	Avens
Malus sp.	Apple

M. angustifolia	Crab Apple
Potentilla canadensis	Cinquefoil
P. recta	Rough-fruited Cinquefoil
P. simplex	Common Cinquefoil
Prunus americana	American Plum
P. pensylvanica	Pin Cherry
P. serotina	Wild Black Cherry
Rosa blanda	Smooth-stem Rose
R. carolina	Pasture Rose
R. multiflora	Multiflora Rose
R. palustris	Swamp Rose
R. setigera	Prairie Rose
Rubus occidentalis	Black Raspberry
Spirea alba	Meadow-sweet

CAESALPINIACEAE

Cercis canadensis	Eastern Redbud
Gymnocladus diocus	Kentucky Coffeetree

FABACEAE

Amphicarpa bracteata	Hog Peanut
Astragalus canadensis	Milk Vetch
Desmodium canadensis	Tick Trefoil
D. laevigatum	Tick Trefoil
D. paniculatum	Panicled Tick Trefoil
Lespedeza capitata	Bush Clover
L. virginica	Bush Clover
Melilotus alba	White Sweet Clover
M. officinalis	Yellow Sweet Clover
Robinia pseudoacacia	Black Locust
Strophostyles helvola	Wild Bean
Trifolium pratense	Red Clover
Vicia cracca	Cow Vetch

OXALIDACEAE

Oxalis europaea	Wood Sorrel

GERANIACEAE

Geranium maculatum	Wild Geranium

POLYGALACEAE

Polygala verticillata	Milkwort

EUPHORBIACEAE

Acalypha rhomboidea	Three-seed Mercury
Euphorbia corollata	Flowering Spurge
E. dentata	Spurge

ANACARDIACEAE	
Rhus glabra	Smooth Sumac
R. radicans	Poison Ivy
R. typhina	Staghorn Sumac
CELASTRACEAE	
Euonymus fortunei	Bigleaf Winter-Creeper
ACERACEAE	
Acer palmatum	Japanese Maple
A. platanoids	Norway Maple
A. rubrum	Red Maple
A. saccharinum	Silver Maple
A. saccharum	Sugar Maple
HIPPOCASTANANCEAE	
Aesculus glabra	Ohio Buckeye
BALSAMINACEAE	
Impatiens capensis	Spotted Touch-me-not
I. pallida	Pale Touch-me-not
RHAMNACEAE	
Ceanothus americanus	New Jersey Tea
VITACEAE	
Parthenocissus quinquefolia	Virginia Creeper
Vitis riparia	Riverbank Grape
TILIACEAE	
Tilia americana	American Basswood
MALVACEAE	
Abutilon theophrasti	Velvet-leaf
Hibiscus palustris	Marsh Mallow
H. trionum	Flower-of-the-hour
HYPERICACEAE	
Hypericum perforatum	St. John's Wort
H. punctatum	St. John's Wort

VIOLACEAE	
Viola cucullata	Blue Marsh Violet
V. pubescens	Downy Yellow Violet
V. striata	Pale Violet
LYTHRACEAE	
Decondon verticillatus	Swamp Loosestrife
Lythrum alatum	Wing-angled Loosestrife
ONAGRACEAE	
Circaea quadrisulcata	Enchanter's Nightshade
Epilobium glandulosum	Willow-herb
Gaura biennis	Gaura
Ludwigia palustris	Water Purslane
Oenothera biennis	Evening Primrose
UMBELLIFERAE	
Cicuta maculata	Water Hemlock
Daucus carota	Wild Carrot
CORNACEAE	
Cornus drummondii	Dogwood
C. florida	Flowering Dogwood
Nyssa sylvatica	Black Gum
PRIMULACEAE	
Lysimachia ciliata	Fringed Loosestrife
L. nummularia	Moneywort
L. quadrifolia	Loosestrife
OLEACEAE	
Fraxinus	White Ash
GENTIANACEAE	
Gentian andrewsii	Closed Gentian
Sabatia angularis	Rose-pink
APOCYNACEAE	
Apocynum cannabinum	Indian Hemp
A. sibiricum	Indian Hemp

ASCELPIDACEAE	
Asclepias incarnata	Swamp Milkweed
A. syriaca	Milkweed
A. tuberosa	Butterfly-weed
CONVOLVULACEAE	
Convolvulus sepium	Hedge Bindweed
Cuscuta gronovii	Dodder
POLEMONIACEAE	
Phlox divaricata	Phlox
HYDROPHYLLACEAE	
Hydrophyllum virginianum	Waterleaf
VERBENACEAE	
Verbena hastata	Blue Vervain
V. x illicita	Vervain
V. urticifolia	White Vervain
LABIATAE	
Collinsonia canadensis	Horse-balm
Lamium purpureum	Dead-nettle
Lycopus americanus	Water Horehound
L. europaeus	Water Horehound
L. virginicus	Bugleweed
L. uniflorus	Water Horehound
L. x sherardi	Water Horehound
Mentha arvensis	Mint
M. x cardiaca	Mint
Monarda fistulosa	Wild Bergamot
Nepeta cataria	Catnip
Prunella vulgaris	Self-heal
Pycnanthemum virginianum	Virginia Mountain Mint
Scutellaria epilobiifolia	Skullcap
S. lateriflora	Skullcap
Stachys tenuifolia	Hedge-nettle
Teucrium canadense	Germander
SOLANANCEAE	
Datura stramonium	Jimsonweed
Solanum dulcamara	Bittersweet Nightshade
S. nigrum	Black Nightshade

SCROPHULARIACEAE

Antirrhinum majus	Snapdragon
Chaenorrhimum minus	Lesser Toadflax
Chelone glabra	Turtlehead
Lindernia dubia	False Pimpernel
Linaria vulgaris	Butter-and-eggs
Mimulus ringens	Monkey-flower
Pedicularis lanceolata	Swamp Lousewort
Verbascum thapsus	Mullein
Veronicastrum virginicum	Culver's Root
Scrophularia lanceolata	Figwort

BIGNONIACEAE

Catalpa bignonioides	Catalpa

PHRYMACEAE

Phryma leptostachya	Lopseed

PLANTAGINACEAE

Plantago major	Plantain

RUBIACEAE

Cephalanthus occidentalis	Button Bush
Galium aparine	Cleavers
G. circaezans	White Wild Licorice
G. tinctorium	Bedstraw
G. triflorum	Fragrant Bedstraw

CAPRIFOLIACEAE

Lonicera japonica	Japanese Honeysuckle
Sambucus canadensis	Elderberry
Viburnum acerifolium	Arrow-wood
V. lentago	Nannyberry
V. prunifolium	Black Haw

VALERIANACEAE

Valerianella radiata	Corn Salad

DIPSACACEAE

Dipsacus sylvestris	Teasel

CUCURBITACEAE

Echinocystis lobata	Wild Cucumber

CAMPANULACEAE

Specularia perfoliata	Venus' Looking-glass

LOBELIACEAE

Lobelia siphilitica	Great Lobelia

COMPOSITAE

Achillea millefolium	Yarrow
Actinomeris alternifolia	Wingstem
Ambrosia artemisiifolia	Ragweed
A. trifida	Ragweed
Artennaria plantaginifolia	Pussy-toes
Arctium minus	Burdock
Aster azureus	Aster
A. ericoides	Heath Aster
A. laevis	Aster
A. lateriflorus	Calico Aster
A. novae-angliae	New England Aster
A. praealtus	Aster
A. sagittifolius	Aster
A. shortii	Aster
A. simplex	Panicled Aster
A. vimineus	Small White Aster
A. undulatus	Aster
Bidens cernua	Beggarticks
B. connata	Beggarticks
B. Frondosa	Beggarticks
Cacalia atriplicifolia	Indian Plantain
Chichorium intybus	Chicory
Cirsium arvense	Canada Thistle
C. vulgare	Bull Thistle
Coreopsis tripteris	Tall Coreopsis
Eclipta alba	Yerbe-de-tago
Erigeron philadelphicus	Daisy Fleabane
E. strigosus	Daisy Fleabane
Eupatorium maculatum	Spotted Joe-Pye Weed
E. perfoliatum	Boneset
E. pilosum	Hairy Thoroughwort
E. rugosum	White Snake-root
Galinsoga parviflora	Galinsoga
Helenium autumnale	Sneezeweed
Helianthes divaricatus	Woodland Sunflower
H. helianthoides	Ox-eye Daisy
H. hirsutus	Stiff-haired Sunflower
H. tuberosus	Jerusalem Artichoke
Lactuca canadensis	Lettuce
L. floridana var. floridana	Lettuce
Liatris spicata	Dense Blazing-star
Prenanthes serpentaria	Lion's Foot

COMPOSITAE

Rudbeckia fulgida	Coneflower
R. hirta	Black-eyed Susan
Senecio glabellus	Ragwort
Silphium trifoliatum	Rosinweed
Solidago canadensis	Goldenrod
S. juncea	Early Goldenrod
S. rugosa	Goldenrod
S. speciosa	Goldenrod
S. tenuifolia	Slender Fragrant Goldenrod
Taraxacum officinale	Dandelion
Tussilago farfara	Coltsfoot
Veronia altissima	Ironweed
Xanthium strummarium	Cocklebur

Algae Recorded at the Old Woman Creek
National Estuarine Sanctuary
Through 1982

DIVISION CYANOPHYTA

Anabaena circinalis Rabenhorst
A. sp.
Aphanizomenon flos-aquae (L.) Ralfs
Aphanocapsa delicatissima West & West
A. elachistra West & West
Calothrix sp.
Chroococcus dispersus (V. Keissler) Lemmermann
C. minor (Kutz) Naegeli
C. minutus (Kutz) Naegeli
Gloeocapsa sp.
Lyngbya sp.
Merismopedia minima Beek
M. tenuissima Lemmermann
Oscillatoria Agardhii Gomony
O. limosa (Roth) C.A. Agardh
O. subbrevis Schmidle
O. tenuis C.A. Agardh
Phormidium tenue (Menegh.) Gomont

DIVISION CHLOROPHYTA

Actinastrum Hantzschii Lagerheim
Ankistrodesmus convolutus Corda
A. falcatus (Corda) Ralfs
A. falcatus var. *mirabilis* (West & West) West
Carteria Klebsii (Dang) Dill
Characium curvatum G.M. Smith
C. sp.
Chlamydomonas globosa Snow
C. sp.
Cladophora glomerata (L.) Kuetzing
Closterium aciculare T. West
Cosmarium granatum de Brebisson
C. sp.
Closterium brebissonii
Crucigenia fenestrata Schmidle
C. quadrata Morren
C. rectangularis (A. Braun) Gay
C. tetrapedia (Kirch) West & West
Dictyosphaerium pulchellum Wood
Franceia Droescheri (Lemm.) G.M. Smith
Glococystis gigas (Kutz) Lagerheim
G. vesiculosa Naegeli
Golenkinia radiata (Chod.) Wille
Kirchneriella lunaris (Kirch.) Moebius
K. sp.

Lagerheimia citriformis (Snow) G.M. Smith
L. ciliata (Lag.) Chodat
L. genevensis var. *subglobosa* (Lemm.) Chodat
L. quadriseta (Lemm.) G.M. Smith
Micractinium pusillum Fresenius
Microspora stagnorum (Kutz) Lagerheim
Mougeotia sp.
Oedogonium sp.
Oocystis lacustris Chodat
O. parva West & West
Pandorina sp.
Pediastrum Boryanum (Turp.) Meneghini
P. duplex Meyer
P. duplex var. *clathratum* (A.Braun) Lagerheim
P. duplex var. *reticulatum* Lagerheim
P. simplex Lemmermann
P. simplex var. *duodenarium* (Bailey) Rabenhorst
P. tetras (Ehr.) Ralfs
P. tetras var. *tetraodon* (Corda) Rabenhorst
Phacotus sp.
Protococcus viridus C.A. Agardh
Pteromonas angulosa Lemmermann
Quadrigula closteriodides (Bohlin) Printz
Quadrigula lacustris (Chod.) G.M. Smith
Scenedesmus abundans (Kirch) Chodat
S. acuminatus (Lag.) Chodat
S. acuminatus var. *minor* G.M.Smith
S. armatus (Chod.) G.M. Smith
S. bijuga (Turp.) Lagerheim
S. bijuga var. *alternans* (Reinsch) Hansgirg
S. denticulatus Lagerheim
S. dimorphus (Turp.) Kutzing
S. hystrix Lagerheim
S. longus var. *brevispina* G.M. Smith
S. opoliensis P. Richter
S. quadricauda (Turp.) de Brebisson
S. quadricauda var. *longispina* (Chod.) G.M. Smith
S. serratus
S. planctonicus (Kors.) Fott
Schroederia setigera (Schroder) Lemmermann
Selenastrum sp.
Sphaerellopsis sp.
Sphaerocystis Schroeteri Chodat
Spirogyra sp.
Staurastrum gracile Ralfs
Stigeoclonium sp.
Tetraedron candatum (Corda) Hansgirg
T. minimum (A.Braun) Hansgirg
T. regulare Kutzing
T. trigonum var. *gracile* (Reinsch) DeToni
Tetrastrum glabrum (Roll) Ahlstr & Tiff
T. heteracanthum (Nordstedt) Chodat *forma elegans*
T. punctatum (Schmidle) Ahlstr & Tiff

T. staurogeniaeforme (Schroeder) Lemmermann
Ulothrix tenerrima Kutz

DIVISION EUGLENOPHYTA

Ascoglena sp. (*vaginicola?*)
Astasia sp.
Euglena acus Ehr.
E. gracilis Klebs
E. oxyuris Schmarda
E. oxyaris var. *minor* Deflandre
E. sp.
Lepocinclis sp.
Phacus acuminatus Stokes
P. Arnoldi Swirenko
P. helikoides Pochmann
P. pseudonordstedii Pochmann
P. sp.
Strombomonas gibberosa (Playf.) Deflandre
Trachelomonas superba (Swir.) Deflandre
T. varians (Lemm.) Deflandre
T. volvocina Ehr.
T. sp.

DIVISION CHRYSOPHYTA

Sub-Division Xanthophyceae

Dinobryon divergens Imhof
Dinobryon sp. (*Tabelleriae?*)
Ophiocytium capitatum var. *longispinum* (Moebius) Lemmermann
Stipitococcus vasiformis Tiffany

Sub-Division Chrysophyceae

Mallomonas acaroides Perty
Synura uvella Ehr.

Sub-Division Bacillariophyceae

Achnanthes hungarica (Grun.) Grun.
A. lanceolata (Breb.) Grun.
A. lanceolata var. *dubia* Grun.
A. minutissima Kutz
A. lauenburgiana Hust.
Actinocyclus normanii var. *subsalsa* (Juhl. Dannf.) Hust.
Amphora ovalis var. *pediculus* (Kutz) V.H.
A. perpusilla (Grun.) Grun.
A. submontana
Asterionella formosa Hass.
Caloneis amphisbaena (Bory.) Cl.
C. bacillaris var. *thermalis* (Grun.) A. Cl.
C. bacillum (Grun.) Cl.

C. *clevei* (Lagerst.) Cl.
C. *lewisii* Patr.
Cocconeis placentula Ehr.
C. *placentula* var. *euglypta* (Ehr.) Cl
C. *placentula* var. *lineata* (Ehr.) V.H.
Cyclotella atomus Hust.
C. *comta* (Ehr.) Kutz
C. *meneghiniana* Kutz
C. *pseudostelligera* Hust.
C. *stelligera* (Cl. and Grun.) V.H.
Cymatopleura solea (Breb. and Godey) W.Sm.
Cymbella minuta Hilse
C. *minuta* var. *silesiaca* (Bleisch) Reim.
C. *naviculiformis* Auersw.
C. *tumida* (Breb.) V.H.
C. *turgidula* Grun.
C. *ventricosa* Ag.
Diatoma tenue var. *elongatum* Lyngb.
D. *vulgare* Bory.
Eunotia arcus var. *bidens* Grun.
E. *curvata* (Kutz) Lagerst.
E. *curvata* var. *subarcuta*
E. *pectinalis* var. *minor* (Kutz.) Rabh.
Fragilaria capucina Desm.
F. *crotonensis* Kitton
F. *vaucheriae* (Kutz) Peters
F. *virescens* Ralfs
Gomphonema acuminatum Ehr.
G. *affine* Kutz
G. *affine* var. *elongatum*
G. *affine* var. *insigne* (Greg.) Andrews
G. *angustatum* (Kutz) Rabh.
G. *angustatum* var. *sarcophogus* (Greg.) Grun.
G. *gracile* Ehr.
G. *intricatum* Kutz
G. *olivaceum* (Lyngb.) Kutz
G. *parvulum* (Kutz) Kutz
G. *subclavatum* (Grun.) Grun.
Gyrosigma scalproides (Rabh.) Cl.
Hantzschia amphioxys (Ehr.) Grun.
Melosira ambigua (Grun.) O. Mull
M. *binderana* Kutz
M. *distans* var. *alpigena* Grun.
M. *varians* Ag.
Meridon circulare (Grev.) Ag.
Microsiphona potamus Weber
Navicula agnita Hust.
N. *atomus* (Kutz) Grun.
N. *capitata* Ehr.
N. *confervacea* (Kutz) Grun.
N. *contenta* var. *biceps* (Arn.) Grun.
N. *cryptocephala* Kutz

N. cryptocephala var. *exilis*
N. elginensis (Greg.) Ralfs
N. gregaria Donk
N. Lalophila var. *tenurostris*
N. heufleri var. *leptocephala* (Breb.) Patr.
N. hungarica var. *capitata* (Ehr.) Cl.
N. lanceolata (Ag.) Kutz
N. menisculus var. *upsaliensis* Grun.
N. minima var. *pseudofossilis*
N. minusculoides Hust.
N. mutica Kutz
N. mutica var. *tropica* Hust.
N. paucivisitata Patr.
N. pelliculosa Hilse
N. pupula Kutz
N. pupula var. *rectangularis* (Greg.) Cl.
N. pygmaea Kutz
N. radiosa Kutz
N. radiosa var. *tenella* (Breb.) Cl. and Moll.
N. salinarum Grun.
N. salinarum var. *intermedia* (Grun.) Cl.
N. schroeteri var. *escambia* Patr.
N. seminulum Grun.
N. splendicula Van Landingham
N. symmetrica Patr.
N. tantula Hust.
N. terminata Hust.
N. tripunctata var. *schizonemoides* (V.H.) Patr.
N. tripunctata var.*tripunctata* (O.F. Mull) Bory
N. vaucheriae Peterson
N. viridula (Kutz) Ehr.
Nitzschia actinastroides (Lemm.) Van Goor
N. acuminata (W.Sm.) Grun.
N. agnita Hust
N. amphibia Grun.
N. angustata (W.Sm.) Grun.
N. capitellata Hust.
N. communis Rabh.
N. dissipata var. *media* Grun.
N. filiformis Schutt
N. fonticola Grun.
N. frustulum (Kutz) Grun.
N. frustulum var. *perminuta* Grun.
N. frustulum var. *perpusilla* (Rabh.) Grun.
N. hungarica Grun.
N. inconspicua Grun.
N. kuetzingiana Hilse
N. levidensis (W.Sm.) Grun.
N. linearis (Ag.) W.Sm.
N. palea (Kutz) W.Sm.
N. parvula var. *terricola* Lund
N. philippinarum Hust

N. recta Hantz.
N. romana Grun.
N. sigmoidea (Nitz.) W. Sm.
N. sinuata var. *tubellaria* (Grun.) Grun.
N. stricta Hust.
N. subrostrata Hust.
N. tarda Hust.
N. tryblionella Hantz.
N. valga Chot.
Pinnularia abanjensis var. *rostrata* (Patr.) Patr.
P. brebissonii (Kutz) Rabh.
P. brebissonii var. *diminuta* (Grun.) Cl.
P. microstauron (Ehr.) Cl
P. nodosa (Ehr.) W.Sm.
P. stomatophora (Grun.) Cl.
P. termitina (Ehr.) Patr.
Plagiotropis lepidoptera var. *proboscidea* (Cl.) Riem
Rhizosolenia eriensis H.L. Smith
Rhoicosphenia curvata (Kutz) Grun.
Stauroneis anceps Ehr.
S. Kriegeri Patr.
S. phoenicenteron var. *gracilis* (Ehr.) Hust.
Stephanodiscus astraea (Ehr.) Grun.
S. astraea var. *minutula* Grun.
S. hantzschii Grun.
S. subtilis (Van Goor) A. Cl.
S. tenuis Hust.
Surirella angusta Kutz
S. ovata Kutz
S. ovata var. *pinnata* (W.Sm.) Rabh.
Surirella turgida W.Sm.
Synedra acus Kutz
S. fasiculata (Ag.) Kutz
S. fasiculata var. *truncata* (Grev.) Patr.
S. pulchella Ralfs
S. pulchella var. *capitata*
S. rumpens var. *familiaris* (Kutz) Hust.
S. ulna (Nitz.) Ehr.
S. ulna var. *obtusa* (W.Sm.) Grun.
Tabellaria fenestrata (Lyngb.) Kutz
Thalassiosira fluviatilis Hust.
T. pseudonana Hasle and Heim

DIVISION CRYPTOPHYTA

Cryptomonas erosa Ehr.
C. erosa var. *reflexa* Marsson
Rhodomonas lacustris Pascher & Ruttner
R. sp.

DIVISION PYRRHOPHYTA

Ceratium hirundinella (O.F. Muell.) Dujardin
Glenodinium sp.
Gymnodinium acidotum Nygaard
G. helveticum Penard
G. sp.

Birds Recorded at the Old Woman Creek
National Estuarine Sanctuary
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GAVIIDAE	Loons
Gavia immer	Common Loon
PODICIPEDIDAE	Grebes
Podilymbus podiceps	Pied-billed Grebe
Podiceps auritus	Horned Grebe
PHALACROCORACIDAE	Cormorants
Phalacrocorax auritus	Double-crested Cormorant
ARDEIDAE	Herons and Bitterns
Casmerodius albus	Great Egret
Ardea herodias	Great Blue Heron
Florida caerulea	Little Blue Heron
Butorides striatus	Green-backed Heron
Nycticorax nycticorax	Black-crowned Night Heron
Botaurus lentiginosus	American Bittern
ANATIDAE	Waterfowl
Cygnus olor	Mute Swan
Olor columbianus	Tundra Swan
Branta canadensis	Canada Goose
B. bernicula	Brant
Anser albirons	Greater White-fronted Goose
Chen caerulescens	Snow Goose
Anas platyrhynchos	Mallard
A. rubripes	American Black Duck
A. acuta	Northern Pintail
A. strepera	Gadwall
A. americana	American Wigeon
A. clypeata	Northern Shoveler
A. discors	Blue-winged Teal
A. crecca	Green-winged Teal
Aix sponsa	Wood Duck
Aythya americana	Redhead
A. valisineria	Canvasback
A. collaris	Ring-necked Duck
A. marila	Greater Scaup
A. affinis	Lesser Scaup
Bucephala clangula	Common Goldeneye
B. albeola	Bufflehead
Clangula hyemalis	Oldsquaw
Oxyura jamaicensis	Ruddy Duck
Mergus merganser	Common Merganser

M. serrator	Red-breasted Merganser
Lophodytes cucullatus	Hooded Merganser
CATHARTIDAE	Vultures
Cathartes aura	Turkey Vulture
ACCIPITRIDAE	Hawks and Eagles
Pandion haliaetus	Osprey
Accipiter cooperii	Cooper's Hawk
A. striatus	Sharp-shinned Hawk
Circus cyaneus	Marsh Hawk
Buteo lagopus	Rough-legged Hawk
B. jamaicensis	Red-tailed Hawk
B. lineatus	Red-shouldered Hawk
Haliaeetus leucocephalus	Bald Eagle
FALCONIDAE	Falcons
Falca sparverius	American Kestrel
PHASIANIDAE	Pheasants
Phasianus colchinus	Ring-necked Pheasant
RALLIDAE	Rails, Gallinules, Coots
Rallus limicola	Virginia Rail
Gallinula chloropus	Common Moorhen
Fulica americana	American Coot
GRUIDAE	Cranes
Grus canadensis	Sandhill Crane
CHARADRIIDAE	Plovers
Pluvialis dominica	Lesser Golden Plover
Charadrius vociferus	Kildeer
SCOLOPACIDAE	Sandpipers
Actitus macularia	Spotted Sandpiper
Tringa melanoleuca	Greater Yellowlegs
T. flavipes	Lesser Yellowlegs
Limnodromus griseus	Short-billed Dowitcher
Arenaria interpres	Ruddy Turnstone
Calidris alba	Sanderling
C. alpina	Dunlin
C. minutilla	Least Sandpiper
C. pusillus	Semipalmated Sandpiper

Scolopax minor	American Woodcock
Gallinago minor	Common Snipe
LARIDAE	Gulls and Terns
Larus marinus	Great Black-backed Gull
L. argentatus	Herring Gull
L. delawarensis	Ring-billed Gull
L. philadelphia	Bonaparte's Gull
Sterna hirundo	Common Tern
S. forsteri	Forster's Tern
S. caspia	Caspian Tern
Childonias niger	Black Tern
COLUMBIDAE	Doves
Columba livia	Rock Dove
Zenaidura macroura	Mourning Dove
CUCULIDAE	Cuckoos
Coccyzus americanus	Yellow-billed Cuckoo
C. erythropthalmus	Black-billed Cuckoo
STRIGIDAE	Owls
Otus asio	Eastern Screech Owl
Bubo virginianus	Great Horned Owl
Asio flammeus	Short-eared Owl
Strix varia	Barred Owl
Aegolius acadicus	Northern Saw-whet Owl
CAPRIMULGIDAE	Goatsuckers
Caprimulgus vociferus	Whip-poor-will
Chordeiles minor	Common Nighthawk
APODIDAE	Swifts
Chaetura pelagica	Chimney Swift
TROCHILIDAE	Hummingbirds
Archilochus colubris	Ruby-throated Hummingbird
ALCEDINIDAE	Kingfishers
Ceryle alcyon	Belted Kingfisher
PICIDAE	Woodpeckers
Colapes auratus	Common Flicker
Melanerpes carolinus	Red-bellied Woodpecker

M. erythrocephalus	Red-headed Woodpecker
Sphyrapicus varius	Yellow-bellied Sapsucker
Picoides villosus	Hairy Woodpecker
P. pubescens	Downy Woodpecker
TYRANNIDAE	Tyrant Flycatchers
Tyrannus tyrannus	Eastern Kingbird
Myiarchus crinitus	Great Crested Flycatcher
Sayornis phoebe	Eastern Phoebe
Contupus virens	Eastern Pewee
C. borealis	Olive-sided Flycatcher
Empidonax virescens	Acadian Flycatcher
E. minimus	Least Flycatcher
E. trailli	Willow Flycatcher
E. alnorum	Alder Flycatcher
ALAUDIDAE	Larks
Eremophila alpestris	Horned Lark
HIRUNDINIDAE	Swallows
Hirundo rustica	Barn Swallow
Tachycineta	Tree Swallow
Riparia riparia	Bank Swallow
Stelgdiopteryx serripennis	Northern Rough-winged Swallow
Progne subis	Purple Martin
CORVIDAE	Jays and Crows
Cyanocitta cristata	Blue Jay
Corvus brachyrhynchos	American Crow
PARIDAE	Chickadees and Titmice
Parus atricapillus	Black-capped Chickadee
Parus bicolor	Tufted Titmouse
SITTIDAE	Nuthatches
Sitta carolinensis	White-breasted Nuthatch
S. canadensis	Red-breasted Nuthatch
CERTHIIDAE	Creepers
Certhia americana	Brown Creeper
TROGLODYTIDAE	Wrens
Troglodytes aedon	House Wren
T. troglodytes	Winter Wren
Cietothorus palustris	Marsh Wren

MUSCICAPIDAE	Kinglets, Gnatcatchers, Thrushes
Subfamily Sylviinae	
Polioptila caerula	Blue-gray Gnatcatcher
Regulus satrapa	Golden-crowned Kinglet
R. calendula	Ruby-crowned Kinglet
Subfamily Turdinae	
Sialia sialis	Eastern Bluebird
Catharus fuscescens	Veery
C. minimus	Gray-cheeked Thrush
C. ustulatus	Swainson's Thrush
C. guttatus	Hermit Thrush
Hylocichla mustelina	Wood Thrush
Turdus migratorius	American Robin
MIMIDAE	Mockingbirds and Thrashers
Dumetella carolinensis	Gray Catbird
Toxostoma rufum	Brown Thrasher
BOMBYCILLIDAE	Waxwings
Bombycilla cedrorum	Cedar Waxwing
STURNIDAE	Starlings
Sturnus vulgaris	European Starling
VIREONIDAE	Vireos
Vireo solitarius	Solitary Vireo
V. griseus	White-eyed Vireo
V. flavifrons	Yellow-throated Vireo
V. olivaceus	Red-eyed Vireo
V. gilvus	Warbling Vireo
EMBERIZIDAE	Wood Warblers
Subfamily Parulinae	
Mniotilta varia	Black and White Warbler
Protonotaria citrea	Prothonotary Warbler
Vermivora pinus	Blue-winged Warbler
V. peregrina	Tennessee Warbler
V. ruficapilla	Nashville Warbler
Parula americana	Northern Parula Warbler
Dendroica petechia	Yellow Warbler
D. magnolia	Magnolia Warbler
D. tigrina	Cape May Warbler

D. Coronata	Yellow-rumped Warbler
D. virens	Black-throated Green Warbler
D. caerulescens	Black-throated Blue Warbler
D. cerulea	Cerulean Warbler
D. dominica	Yellow-throated Warbler
D. fusca	Blackburnian Warbler
D. pensylvanica	Chestnut-sided Warbler
D. castanea	Bay-breasted Warbler
D. striata	Blackpoll Warbler
D. pinus	Pine Warbler
D. palmarum	Palm Warbler
Seiurus aurocapillus	Ovenbird
Geothlypis trichas	Common Yellowthroat
Oporonis formosus	Kentucky Warbler
Wilsonia pusilla	Wilson's Warbler
W. canadensis	Canada Warbler
Setophaga ruticilla	American Redstart
Subfamily Coerebinae	Tanagers
Piranga olivacea	Scarlet Tanager
Subfamily Cardinalinae	Cardinals, Grosbeaks, Buntings
Cardinalis cardinalis	Northern Cardinal
Pheucticus ludovicianus	Rose-breasted Grosbeak
Passerina cyanea	Indigo Bunting
Spiza americana	Dickcissel
Subfamily Emberizine	Sparrows, Longspurs
Pipilo erythrophthalmus	Rufous-sided Towhee
Spizella arborea	American Tree Sparrow
S. passerina	Chipping Sparrow
S. pusilla	Field Sparrow
Passerella iliaca	Fox Sparrow
Melospiza melodia	Song Sparrow
M. lincolnii	Lincoln's Sparrow
M. georgiana	Swamp Sparrow
Zonotrichia albicollis	White-throated Sparrow
Z. leucophrys	White-crowned Sparrow
Junco hyemalis	Dark-eyed Junco
Calcarius lapponicus	Lapland Longspur
Plectrophenax nivalis	Snow Bunting
Subfamily Icterinae	Blackbirds, Orioles
Dolichonyx oryzivorus	Bobolink
Agelaius phoeniceus	Red-winged Blackbird
Sturnella magna	Eastern Meadowlark
Euphagus carolinus	Rusty Blackbird

E. cyanocephalus	Brewer's Blackbird
Quiscalus quiscula	Common Grackle
Molothrus ater	Brown-headed Cowbird
Icterus galbula	Northern Oriole
Family Fringillidae	Finches
Carpodacus purpureus	Purple Finch
C. mexicanus	House Finch
Loxia leucoptera	White-winged Crossbill
Carduelis flammea	Common Redpoll
C. pinus	Pine Siskin
C. tristus	American Goldfinch
Coccothraustes vespertinus	Evening Grosbeak
Family Passeridae	Weaver Finches
Passer domesticus	House Sparrow

Mammals Recorded at the Old Woman Creek
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DIDELPHIDAE	
Didelphis marsupialis	Opossum
SORCIDAE	
Sorex cinereus	Masked Shrew
Blarina brevicauda	Short-tailed Shrew
TALPIDAE	
Scalopus aquaticus	Eastern Mole
VESPERTILIONIDAE	
Myotis lucifugus	Little Brown Myotis
LEPORIDAE	
Sylvilagus floridanus	Eastern Cottontail
SCIURIDAE	
Tamias striatus	Eastern Chipmunk
Marmota monax	Woodchuck
Sciurus niger	Fox Squirrel
Tamiasciurus hudsonicus	Red Squirrel
Glaucomys volans	Southern Flying Squirrel
CRICETIDAE	
Peromyscus maniculatus	Deer Mouse
P.leucopus	White-footed Mouse
Microtus pennsylvanicus	Meadow Vole
Ondatra zibethicus	Muskrat
MURIDAE	
Rattus norvegicus	Norway Rat
Mus musculus	House Mouse
CANIDAE	
Vulpes vulpes	Red Fox
PROCYONIDAE	
Procyon lotor	Raccoon

MUSTELIDAE

Mustela nivalis	Least Weasel
Mephitis mephitis	Striped Skunk

CERVIDAE

Odocoileus virginianus	White-tailed Deer

Fish Recorded at the Old Woman Creek
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CLUPEIDAE	Herring Family
Dorosoma cepedianum	Gizzard Shad
CYPRINIDAE	Minnow Family
Campostoma anomalum	Common Stoneroller
Carassius auratus	Goldfish
Cyprinus carpio	Carp
Etheostoma caeruleum	Rainbow Darter
Notemigonus crysoleucas	Golden Shiner
Notropis antherinoides	Emerald Shiner
N. hudsonius	Spottail Shiner
N. spilopterus	Spotfin Shiner
Pimphales notatus	Bluntnose Minnow
Rhinichthys atratulus	Blacknose Dace
Semotilus atromaculatus	Creek Chub
CATOSTOMIDAE	Sucker Family
Carpiodes cyprinus	Quillback Carpsucker
Catostomus commersoni	White Sucker
Minytrema melanops	Spotted Sucker
ICTALUIDAE	Freshwater Catfish Family
Ictalurus melas	Black Bullhead
I. nebulosa	Brown Bullhead
I. punctatus	Channel Catfish
ANTHERINIDAE	Silverside Family
Labidesthes sicculus	Brook Silverside
PERCICHTHYIDAE	Temperate Bass Family
Morone americana	White Perch
M. chrysops	White Bass
CENTRARCHIDAE	Sunfish Family
Lepomis cyanellus	Green Sunfish
L. gibbosus	Pumpkinseed
L. humilis	Orangespotted Sunfish
L. macrochirus	Bluegill
Micropterus salmoides	Largemouth Bass
Pomoxis annularis	White Crappie
P. nigromaculatus	Black Crappie

PERCIDAE	Perch Family
Etheostoma nigrum	Central Johnny Darter
Perca flavescens	Yellow Perch
Stizostedion vitreum	Walleye
SCIAENIDAE	Drum Family
Aplodinotus grunniens	Freshwater Drum

Reptiles Recorded at the Old Woman Creek
National Estuarine Sanctuary
Through 1982

CHELYDRIDAE	Snapping Turtles
Chelydra serpentina	Snapping Turtle
EMYDIDAE	Box and Water Turtles
Terrapene carolina carolina	Eastern Box Turtle
Graptemys geographica	Map Turtle
Chrysemys picta marginata	Midland Painted Turtle
Emydoidea blandingi	Blanding's Turtle
COLUMBRIDAE	Snakes
Natrix sipedon sipedon	Northern Water Snake
Natrix sipedon insularum	Lake Erie Water Snake
Storeria dekayi dekayi	Northern Brown Snake
Thamnophis sirtalis sirtalis	Eastern Garter Snake
melanistic *Thamnophis sirtalis*	
Thamnophis butleri	Butler's Garter Snake
Coluber constrictor constrictor	Northern Black Racer
Elaphe vulpina gloydi	Eastern Fox Snake

Amphibians Recorded at the Old Woman Creek
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BUFONIDAE	True Toads
Bufo americanus	American Toad
Bufo woodhousei fowleri	Fowler's Toad
RANIDAE	True Frogs
Rana catesbeiana	Bullfrog
Rana clamitans melanota	Green Frog
PLETHODONTIDAE	Lungless Salamanders
Plethodon glutinosus	Slimy Salamander

Invertebrates Recorded at the Old Woman Creek
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Through 1982

PHYLUM PROTOZOA

Coleps sp.

PHYLUM PLATYHELMINTHES

Dugesia tigrina (Girard)

PHYLUM ASCHELMINTHES

Class Rotifera

Philodina sp.
Brachionus caudatus Barrios
B. calyciflorus Pallas
B. ureelaris Muller
B. bidentatus Anderson
Keratella quadrata Muller
K. cochlearis Gosse
K. cochlearis var. *tecta* (Gosse)
Asplanchna priodonta Gosse

Class Gastrotricha

Chaetonotus sp.

PHYLUM BRYZOA

Pectinatella magnifica Leidy

PHYLUM ANNELIDA

Aeolosoma sp.
Branchiura sowerbyi Beddard

PHYLUM ARTHROPODA

Class Crustacea

Pleuroxus procurvus Birge
Simocephalus serrulatus Koch
Ceriodaphnia reticulata (Jurine)
Daphnia galeata Sars var. *mendotae* Birge
Leptodora kindtii (Focke)
Bosmina coregoni Baird
Alonella nana (Baird)
Sida crystallina (O.F. Muller)
Gammarus pseudolimnaeus Bonsfield
Camberus diogones Girard

Orconectes rusticus Girard
Condona sp.
Ascellus sp.
Crangonyx gracilis S.I. Smith

Class Insecta

Order Ephemoptera

Epeorus spp.
Ephemera simulans Walker
E. varia Eaton
Caenis hilaris Say
Cinygmula sp.

Order Odonata

Ischnura sp.
Enallagma sp.

Order Hemiptera

Gerris canaliculatus Say
Trichocorixa sp.

Order Coleoptera

Dytiscus sp.
Haliplus sp.
Bidessus sp.
Berosus striatus Say

Order Trichoptera

Agraylea sp.
Ceraclea cancellata Betten
C. resurgens Walker
C. tarsi-punctata Vorhies
C. transversa Hagen
Cernotina ohio Ross
Cheumatopsyche aphanta Ross
C. pasella Ross
C. speciosa Banks
C. sordita Hagen
Chimarra obscura Walker
Cyrnellus fraternus Banks
Hydropsyche betteni Ross
H. recurvata Banks
H. walkeri Betten & Mosely
Hydroptilia agax Ross
H. angusta Ross

H. consimilis Morton
H. grandiosa Ross
H. perdita Morton
H. spatulata Morton
H. waubesiana Betten
Leptocerus americanus Banks
Limnephilus submonilifer Walker
Mystacides spulchralis Walker
Nectopsyche diarina Ross
Neotrichia sp.
Neureclipsis crespicularis Walker
Nyctiophylax moestus Banks
Ochrotrichia tarsalis Hagen
Oecetus avara Banks
O. inconspicua Walker
O. persimilus Banks
Orthotrichia americana Banks
Phryganea sayi Milne
P. scinerea Walker
Phylocentropus sp.
Polycentropus aureolus Banks
P. cinerus Hagen
P. crassicornis Walker
Potamyia flava Hagen
Rhyacophila cardina
R. ledra Ross
R. vibox Milne
Triaenodes frontalis Banks

Order Diptera

Glyptotendipes sp.
Cricotopus trifasciatus Panzer
Chironomus tentanus Fabr.
Chaoborus puntipennis Say
Chironomus cristatus Fabr.
Limnochironomus tenuicaudatus Mall.

PHYLUM GASTROPODA

Lymnaea (Bulimnaea) megasoma Say
Physa sp.
Sphaerium securis Prime

APPENDIX B

POSITION DESCRIPTION

OHIO DEPARTMENT OF ADMINISTRATIVE SERVICES

PERSONNEL DIVISION

AGENCY: Ohio Dept. of Natural Resources
DIVISION OR INSTITUTION: Natural Areas & Preserves
UNIT OR OFFICE: Old Woman Creek

Do not write in shaded area

POSITION CONTROL NUMBER: 6490.0
CLASS TITLE: Preserve Manager 2
CLASS NUMBER: 22412

[x] State Agency [ ] County Agency [ ] New Position [ ] Change

COUNTY OF EMPLOYMENT: Erie

USUAL WORKING TITLE OF POSITION: Preserve Manager

POSITION NO. AND TITLE OF IMMEDIATE SUPERVISOR: 6030.0 - Administrator of Field Operations

NORMAL WORKING HOURS (Explain unusual or rotating shift)
FROM 8:00 a.m. TO 5:00 p.m. - Subject to 24 hour call & irregular hours

JOB DESCRIPTION AND WORKER CHARACTERISTICS

%	Job Duties in order of importance	Minimum Acceptable Characteristics
50	Responsible for the overall supervision & administration of Old Woman Creek National Estuarine Sanctuary and State Nature Preserve which includes the public education and research programs. Supervises staff consisting of sanctuary biologist, educational specialist, laboratory technician, college interns, rangers, conservation workers, Y.A.C.C. workers and C.E.T.A. employees. Assigns & directs daily management of the preserve, including routine maintenance, mowing, light construction, installation of signs, boundary markers, trails, etc. Prepares preserve budget, requisition and other records and reports.	1, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 18 (Field Biology & Ecology); 28 (light equipment); 30E, 31C, 32E, 33E, 34D, 35B.
30	Directs and carries out the general nature interpretive programs on the preserve, including the operation of the visitor-research center as well as other visitor interpretive facilities; schedules group usage of interpretive research facilities; assigns & provides interpretive services; plans & develops exhibits & educational programs for center; functions as nature interpretive & nature center instructor. Speaks to school & civic groups.	5, 7, 9, 10, 11, 18 (Field Biology & Field Ecology & Nature Interpretation); 30E, 31C, 32E, 33E, 34D, 35B.
10	Supervises & performs routine patrol work, including the enforcement of applicable laws, rules and regulations of the division.	5, 9, 10, 11, 14, 29 (Law Enforcement); 30E, 32D, 34D, 35A.
10	Responsible for supervision & coordination of baseline data collection and monitoring research projects at the preserve.	5, 9, 11, 18 (Field Ecology); 30E, 31C, 32D, 34D, 35A.

List Position Numbers and Class Titles of positions supervised. If more than eight, list totals only.

SIGNATURE OF AGENCY REPRESENTATIVE

DATE

ADM 4107
(Rev. 6-75)

POSITION DESCRIPTION

OHIO DEPARTMENT OF ADMINISTRATIVE SERVICES

PERSONNEL DIVISION

AGENCY	
Ohio Dept. of Natural Resources	
DIVISION OR INSTITUTION	
Natural Areas & Preserves	
UNIT OR OFFICE	
Old Woman Creek Estuary	

Do not write in shaded area

POSITION CONTROL NUMBER 6334.0

CLASS TITLE Ecological Analyst 2

CLASS NUMBER

[X] State Agency [ ] County Agency [ ] New Position [ ] Change

COUNTY OF EMPLOYMENT: Erie

USUAL WORKING TITLE OF POSITION: Sanctuary Ecologist

POSITION NO. AND TITLE OF IMMEDIATE SUPERVISOR: 6490.0 - Preserve Manager

NORMAL WORKING HOURS (Explain unusual or rotating shift)
FROM 8:00 a.m. TO 5:00 p.m.

JOB DESCRIPTION AND WORKER CHARACTERISTICS

%	Job Duties in order of Importance	Minimum Acceptable Characteristics
50	Participates in collecting, classifying, and evaluating baseline data including determination of degree of sensitivity and adverse effects of various projects on ecological system within Old Woman Creek Estuary and the surrounding Great Lakes region.	11, 14, 18 (Ecology, zoology, botany), 30E, 31F, 32E, 33E, 34D, 35A.
20	Administers and conducts inventory and study of ecological systems within the Old Woman Creek Estuary; Coordinates, reviews and monitors research projects sponsored by universities, various agencies and individuals.	11, 14, 18 (Ecology, zoology, botany), 30E, 31F, 32F, 33E, 34D, 35A.
20	Analyzes baseline data and research information to aid in the development, management and use of Old Woman Creek National Estuarine Sanctuary and State Nature Preserve.	5, 10, 11, 18 (Ecology, zoology, botany) 30E, 31F, 32F, 33E, 34D, 35A.
10	Provides technical assistance & information to various divisions, governmental agencies and public & private organizations; prepares and presents speeches & slide talks concerning agency programs & activities.	11, 14, 18 (Ecology, zoology, botany), 30E, 31F, 32F, 33E, 34D, 35A.

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OHIO DEPARTMENT OF ADMINISTRATIVE SERVICES

PERSONNEL DIVISION

AGENCY	Ohio Dept. of Natural Resources
DIVISION OR INSTITUTION	Natural Areas & Preserves
UNIT OR OFFICE	Old Woman Creek Estuary

Do not write in shaded area

POSITION CONTROL NUMBER 6493.0

CLASS TITLE Conservation Aide

CLASS NUMBER

[X] State Agency [ ] County Agency [ ] New Position [ ] Change

COUNTY OF EMPLOYMENT: Erie

USUAL WORKING TITLE OF POSITION: Conservation Aide

POSITION NO. AND TITLE OF IMMEDIATE SUPERVISOR: 6490.0 - Preserve Manager

NORMAL WORKING HOURS (Explain unusual or rotating shift.) FROM 8:00 a.m. TO 5:00 p.m.

JOB DESCRIPTION AND WORKER CHARACTERISTICS

%	Job Duties in order of Importance	Minimum Acceptable Characteristics
75	Maintains preserve grounds & buildings; mows lawn, maintains shrubbry, performs routine building & vehicle maintenance; cleans & maintains public use areas, assists with conservation of trails, boardwalks, fences, etc.	10, 29 dump truck, backhoe, boats, 30C, 31A, 32C, 34B, 35C - 25-75 lbs.
10	Assists in routine law enforcement & patrol activities including watercraft patrol, makes visitor contact; observes, summons preserve officer when necessary	10, 30C, 31C, 32C, 34C, 35B.
8	Assists with surveying & monitoring estuary biota; assists with water chemistry analysis, habitat management and geological surveys; surveys biota, collects metorological data; maintains data records.	10, 30C, 31C, 32C, 34C.
5	Assists in public programs; opens & closes meeting rooms; assists volunteer staff; meets & greets visitors.	10, 30C, 31C, 32E, 34C.
2	Prepares periodic activity reports; vehicle operational reports; equipment maintenance reports; weekly progress reports and others as required.	13A, 30C, 31C, 32C, 33B, 34B.

List Position Numbers and Class Titles of positions supervised. If more than eight, list totals only.

SIGNATURE OF AGENCY REPRESENTATIVE _____ DATE _____

ADM 4107
(Rev. 5-75)

POSITION DESCRIPTION

OHIO DEPARTMENT OF ADMINISTRATIVE SERVICES

PERSONNEL DIVISION

AGENCY: Ohio Dept. of Natural Resources

DIVISION OR INSTITUTION: Natural Areas & Preserves

UNIT OR OFFICE: Old Woman Creek

Do not write in shaded area

POSITION CONTROL NUMBER: 6493.3

CLASS TITLE: Laboratory Assistant

CLASS NUMBER: 86110

[X] State Agency [ ] County Agency [ ] New Position [ ] Change

COUNTY OF EMPLOYMENT: Erie

USUAL WORKING TITLE OF POSITION: Laboratory Technician

POSITION NO. AND TITLE OF IMMEDIATE SUPERVISOR: 6334.0 Sanctuary Biologist

NORMAL WORKING HOURS (Explain unusual or rotating shift)
FROM 8:00 a.m. TO 5:00 p.m.

JOB DESCRIPTION AND WORKER CHARACTERISTICS

%	Job Duties in order of Importance	Minimum Acceptable Characteristics
90	Assists sanctuary biologist with surveying and monitoring estuary biota; collects samples; conducts routine laboratory tests; maintains data records; conducts bi-weekly field surveys; studies comparative food habits of selected fish species.	10, 18 Aquatic biology, 28 Basic Lab. Equipment, 30c, 31c, 32c, 33d, 34c, 35a.
5	Assists with special educational field activities; prepares exhibits; collects specimens; conducts facilities tours; demonstrates laboratory testing techniques.	10, 18 Aquatic Biology; 28 Lab. Equipment, 30c, 31c, 32c, 33d, 34c, 35a.
5	Assists with visitor center duties; greets visitors; answers inquiries, interprets exhibits; performs maintenance and housekeeping chores.	10, 30c, 31c, 32c, 33d, 34b, 35a.

List Position Numbers and Class Titles of positions supervised. If more than eight, list totals only.

SIGNATURE OF AGENCY REPRESENTATIVE

DATE

ADM 4107
(Rev. 5-75)

POSITION DESCRIPTION

OHIO DEPARTMENT OF ADMINISTRATIVE SERVICES

PERSONNEL DIVISION

AGENCY: Ohio Dept. of Natural Resources
DIVISION OR INSTITUTION: Natural Areas & Preserves
UNIT OR OFFICE: Old Woman Creek

Do not write in shaded area

POSITION CONTROL NUMBER: 6493.2
CLASS TITLE: Conservation Worker
CLASS NUMBER: 22831

[X] State Agency [ ] County Agency [ ] New Position [ ] Change

COUNTY OF EMPLOYMENT: Erie

USUAL WORKING TITLE OF POSITION: Education Coordinator

POSITION NO. AND TITLE OF IMMEDIATE SUPERVISOR: 6490.0 Preserve Manager

NORMAL WORKING HOURS (Explain unusual or rotating shift): FROM 8:00 a.m. TO: 5:00 p.m.

JOB DESCRIPTION AND WORKER CHARACTERISTICS

%	Job Duties in order of Importance	Minimum Acceptable Characteristics
30	Assists manager with public programming: conducts interpretive tours; conducts ecological awareness walks; assists with special estuarine-related educational programs; assists with leader and teacher workshops.	10, 18 Natural History, 30d, 31c, 32e, 33e, 34d, 35a.
20	Develops programs; creates program materials; develops hands-on activities & follow-up materials; develops educational materials, resource reference files.	30e, 31c, 32c, 33e, 34c, 35a.
20	Performs visitor center tasks; greets visitors, conducts tours of center; answers inquiries; schedules programs; types files; maintains exhibits; performs housekeeping tasks.	10, 18 Natural History, 25, 30e, 31c, 32c, 33d, 34c, 35a.
20	Maintains research library; develops acquisition lists for publications; inventories publications; maintains card file.	30d, 32d, 33d, 34c.
5	Assists with field surveys and monitoring as necessary.	18 Aquatic biology, 30d, 32d, 33c, 35a.
5	Performs various custodial duties; maintains grounds, buildings, trails and other public use facilities as necessary.	10, 30a, 32c, 34b, 35a.

List Position Numbers and Class Titles of positions supervised. If more than eight, list totals only.

SIGNATURE OF AGENCY REPRESENTATIVE

DATE

ADM 4107 (Rev. 5-75)

APPENDIX C

CHECKLIST FOR VOLUNTEERS

1. Application for Volunteer Service (NAPV-1)

2. Volunteer Employee Personal Data Sheet (NAPV-2)

3. Personal Services/Volunteer Personnel Data Sheet

4. Agreement of Volunteer Status (NAPV-3)

5. Waiver of Liability

   A. Community Volunteer and Release from Liability (NAPV-6)
   B. Student Volunteer - Waiver and Release
      (Discontinue the use of this form)
   C. Minor Participant - Waiver of Liability and Assumption of All Risks - Parent/Guardian Consent (NAPV-7)
   D. Waiver of Liability and Assumption of All Risks
      * C. & D. are used for volunteer special work projects, i.e., Audubon and Sierra Clubs (NAPV-8)

6. Job Description - A short description of job duties written on a sheet of paper

7. Volunteer Employee Time Report (NAPV-4)
   *Completed and kept on file in Central Office by Supervisor

8. Volunteer Performance Evaluation (NAPV-5)
   *Completed whenever desired but at least once a year

9. Potential Liability of State Supervisory Personnel
   *For your information

10. Volunteer Interview Guide
    *For your help and guidance in interviewing potential volunteers

*Original of Number 1, 2, 3 4, 5c, 5d, 6, 7, & 8 are kept in a Central Office file but copies can be retained at local sites. It is most efficient when Numbers 1 thru 6 are mailed to the Central Office as package rather than piecemeal.

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF NATURAL AREAS AND PRESERVES

COMMUNITY VOLUNTEER PROGRAM -- YOUR STAKE IN THE FUTURE

Fron the natural areas inventorying efforts of the 1950's to the enactment of the Natural Areas Preservation Act of 1970, the natural areas movement in Ohio has historically been spearheaded by concerned and dedicated individuals and organizations. It is in that spirit of community involvement that the Ohio Division of Natural Areas and Preserves Community Volunteer Program has been forged.

WHO MAY APPLY?

Anyone 16 years of age and older who wants to take an active part in preserving Ohio's few remaining high quality natural areas and scenic rivers is encouraged to apply. The Ohio Division of Natural Areas and Preserves has a place for qualified individuals who want to make a personal commitment to help preserve and protect our natural heritage for the enjoyment and use of this as well as future generations. Participants are encouraged to volunteer from a few hours of their time each week to a full time commitment. Or, they may elect to participate intermittently for short-term organized group projects. Whichever the case, there may be a place for you in this worthwhile program.

WHY VOLUNTEER?

The Natural Areas and Preserves Community Volunteer Program offers you an excellent opportunity to become directly involved in Ohio's natural areas and scenic rivers programs, not as a spectator, but rather as an active and vital participant. As a volunteer member of a top-notch team of professionals, volunteer employees not only make a significant impact on the program as a whole, but also develop new skills, gain new knowledge, receive job experience, make new friends, tackle new challenges and have fun in the process. Volunteer employees are also entitled to a number of benefits under the charitable contributions provisions of the Internal Revenue Code.

SOME TYPICAL JOBS

Volunteers may participate in all phases of the natural areas program. They are limited only by their willingness to serve. Opportunities include working side by side with the natural areas staff specialists in such areas as habitat management, plant and animal inventory, research, enforcement, planning, real estate, scenic rivers coordination, maintenance and construction, and interpretive programming. There are many opportunities in each of these major areas where your particular talents and concerns can be utilized.

HOW TO APPLY

Simply fill out the form in this brochure and return it to the Ohio Division of Natural Areas and Preserves, Fountain Square, Building F, Columbus, Ohio 43224. Or, contact the preserve manager or scenic river coordinator nearest you. Be sure to indicate any special areas of interest in which you wish to be involved and/or specific skills you are willing to share.

NOTIFICATION

Once your application is received, it will be directed to whichever administrator might best utilize your services based on the information contained within the application. The administrator in turn, will review your application to help determine if and how we can best use you. You will then be contacted within 14 days to arrange for an interview. At the conclusion of this interview, a determination will be made concerning whether or not to formally enroll you in the program based on what positions are open, and your availability as well as your interests and skills. If you are selected, a formal agreement will be entered into between you and the Ohio Department of Natural Resources.

OHIO DIVISION OF NATURAL AREAS AND PRESERVES

APPLICATION FOR VOLUNTEER SERVICE

NAME S.S.# DATE OF BIRTH TELEPHONE Home - Bus. -

ADDRESS

IF UNDER 18 YEARS OF AGE, GIVE NAME OF PARENT OR GUARDIAN TELEPHONE NUMBER

ADDRESS

NAME AND TELEPHONE NUMBER OF PERSON TO NOTIFY IN CASE OF EMERGENCY

INDICATE CATEGORY OF VOLUNTEER ASSIGNMENT DESIRED

___ Student Internship ___ Short-term Projects ___ On-going Assignments

CIRCLE HIGHEST LEVEL OF EDUCATION COMPLETED:

ELEMENTARY: 1 2 3 4 5 6 7 8 HIGH SCHOOL: 9 10 11 12 COLLEGE: 1 2 3 4 5 6

LIST SPECIAL QUALIFICATIONS AND SKILLS

BRIEFLY DESCRIBE PAST AND PRESENT EMPLOYMENT:

ARE YOU PRESENTLY COVERED BY HEALTH INSURANCE?

_____ YES _____ NO

LIST ANY PHYSICAL LIMITATIONS:

DO YOU HAVE A VALID OHIO DRIVER'S LICENSE?

_____ YES _____ NO

INDICATE VOLUNTEER WORK INTERESTS:

____ANIMAL SURVEYS
____CLERICAL
____DATA MAPPING
____ENFORCEMENT
____HABITAT MANAGEMENT
____PUBLIC PROGRAMMING
____LANDOWNER CONTACT
____MASTER PLANNING
____NATURAL AREAS EVALUATION
____PLANT SURVEYS
____PUBLICATIONS
____REAL ESTATE
____SCENIC RIVERS
____SPECIAL GROUP PROJECT
____STREAM MONITORING
____OTHERS (Specify)

INDICATE WORK SITE PREFERRED (CENTRAL OFFICE, PRESERVE, SCENIC RIVER, REGION OF STATE, ETC.)

DATE OF AVAILABILITY:

CIRCLE DAY(S) OF WEEK OF AVAILABILITY & SHOW HOURS:

DAYS:	SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
HOURS:	_____	_____	_____	_____	_____	_____	_____

SIGNATURE DATE

COMMUNITY VOLUNTEER AND RELEASE FROM LIABILITY

In consideration of being allowed to do work as a volunteer on any land owned or administered by the Ohio Department of Natural Resources or on any projects in which the Department is participating, I hereby voluntarily assume all risks of accident or injury and hereby release the Department from all liability for personal injury or damage of any kind sustained in association with such volunteer work, whether such personal injury damage is caused by the negligence of the Department and its employees and officers, myself or otherwise.

SIGNATURE	DATE
NAME PRINTED	WITNESS

APPENDIX D

OLD WOMAN CREEK ADVISORY COUNCIL

Council members' terms established on April 1, 1982

Local Government Agency	William Phillips Berlin Township Zoning Inspector Planning Sub-committee (3 year term)
Natural Areas Council Representative	Bert L. Szabo, Chief Naturalist Akron Metropolitan Parks and Secretary, Natural Areas Council (2 year term)
Local or Statewide Public Interest Group	Charles Corbeil, Sr. The Nature Conservancy and Firelands Audubon Society (1 year term)
	Marcia Goff League of Women Voters (3 year term)
Agricultural Institution Representative	Floren James Retired County Extension Agent - Erie Co. (2 year term)
Great Lakes Research Institution	Dr. Charles E. Herdendorf, Director Center for Lake Erie Area Research (2 year term)
Ohio Educational Institutions	Dr. Ken Hille, Professor of Biology Bowling Green State University - Firelands College (3 year term)
	Dr. David Culver, Zoologist The Ohio State University (1 year term)
Local Landowner	Mrs. Marilyn L. Hooper Oberlin Beach Association (1 year term)

SANCTUARY ADVISORY COUNCIL COMMITTEES

Policy Committee

Marilyn L. Hooper
Charles Corbeil, Sr.
Richard E. Moseley, Jr., Chief,
Division of Natural Areas & Preserves

Management Committee

Floren James
William Phillips
William Loebick, Field Supervisor (DNAP)
Gene Wright, Sanctuary Manager

Education Committee

Bert L. Szabo
Marcia Goff
Linda Feix, Education Specialist

Research Committee

Dr. David Culver
Dr. Charles E. Herdendorf
Dr. Ken Hille
Dr. David Klarer, Sanctuary Ecologist

APPENDIX E

Ohio Department of Natural Resources
Division of Natural Areas & Preserves

OLD WOMAN CREEK ESTUARY

ACCESS PERMIT

Permission is hereby granted for the purpose of _____

on (date) _____ at Old Woman Creek State Nature Preserve

from _____ to _____.

Car: make/model: _____
License No.: _____
Valid canoe registration: Yes _____ No _____
Personal flotation devices: Yes _____ No _____
Number of people: _____
Issued to: Name _____
Address _____
Telephone No. _____

I hereby agree to comply with all rules and regulations established for Interpretive State Nature Preserves. My canoe is currently registered and contains sufficient Coast Guard approved personal flotation devices and required safety gear for each passenger.

_____
Signature

_____
Date/Time

Issued by: _____

_____
Date

APPENDIX F

APPENDIX C

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____HABITAT MANAGEMENT
____PUBLIC PROGRAMMING
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SIGNATURE DATE

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Local or Statewide Public Interest Group	Charles Corbeil, Sr. The Nature Conservancy and Firelands Audubon Society (1 year term)
	Marcia Goff League of Women Voters (3 year term)
Agricultural Institution Representative	Floren James Retired County Extension Agent - Erie Co. (2 year term)
Great Lakes Research Institution	Dr. Charles E. Herdendorf, Director Center for Lake Erie Area Research (2 year term)
Ohio Educational Institutions	Dr. Ken Hille, Professor of Biology Bowling Green State University - Firelands College (3 year term)
	Dr. David Culver, Zoologist The Ohio State University (1 year term)
Local Landowner	Mrs. Marilyn L. Hooper Oberlin Beach Association (1 year term)

SANCTUARY ADVISORY COUNCIL COMMITTEES

Policy Committee

Marilyn L. Hooper
Charles Corbeil, Sr.
Richard E. Moseley, Jr., Chief,
Division of Natural Areas & Preserves

Management Committee

Floren James
William Phillips
William Loebick, Field Supervisor (DNAP)
Gene Wright, Sanctuary Manager

Education Committee

Bert L. Szabo
Marcia Goff
Linda Feix, Education Specialist

Research Committee

Dr. David Culver
Dr. Charles E. Herdendorf
Dr. Ken Hille
Dr. David Klarer, Sanctuary Ecologist

APPENDIX E

Ohio Department of Natural Resources
Division of Natural Areas & Preserves

OLD WOMAN CREEK ESTUARY

ACCESS PERMIT

Permission is hereby granted for the purpose of _____

on (date) _____ at Old Woman Creek State Nature Preserve

from _____ to _____.

Car: make/model: _____
License No.: _____
Valid canoe registration: Yes _____ No _____
Personal flotation devices: Yes _____ No _____
Number of people: _____
Issued to: Name _____
Address _____
Telephone No. _____

I hereby agree to comply with all rules and regulations established for Interpretive State Nature Preserves. My canoe is currently registered and contains sufficient Coast Guard approved personal flotation devices and required safety gear for each passenger.

_____
Signature

_____
Date/Time

Issued by: _____

_____
Date

APPENDIX F