



of the hydrologic channel.” Specifically the application does not refer to “shore” erosion control. The statement in Section 20 should be taken to mean control of subaqueous erosion relative to the channel, not shore erosion. The objective in this regard is to control the mobilization of sediments on the bottom of the bay that might be deposited in the hydrologic channel. The islands will be stabilized by planting native herbaceous and woody plants and establishing a sand beach on the bay side. This will preclude the need for hardening the shore with objectionable, unnatural rip rap. Because the islands afford siltation protection and because no sediment-laden tributaries empty into the hydrologic channel, maintenance dredging should not be required.

Therefore, because the islands have other primary purposes and because their design is not for shore erosion control, O.R.C. 1521.22 does not apply to this application.

6.

Policy 6 – Water Quality & Policy 17 – Dredging and Dredged Material Disposal

The proposed project is consistent with these OCMP policies by “enabling the use of the State’s coastal waters for agricultural needs” while not impairing water quality. No dredging or disposal of dredged material has or will take place in wetlands, other than the restored intrusion that is described below.

On May 25, 2001, Barnes Nursery, Inc. submitted an application for a Section 401 Water Quality Certification for the project to the Ohio Environmental Protection Agency. The response to several inquiries (Nos. 8a, 8c, 10a, 10b, & 10f) which are relevant to ODNR’s concerns are summarized here.

Pursuant to Nationwide Permit No. 27 (2000-02170), issued by the U.S. Army Corps of Engineers to Barnes Nursery, Inc. on June 20, 2000, most of the work proposed in elements No. 1 and No. 2 of the current application was completed in July 2000. At the distal (west) end of the hydrologic channel, construction had encroached about 130 feet in an emergent wetland and a mound of earth about 10 to 15 feet high was stock-piled at the distal end of the island. Work on the project was halted in July 2000 before it could be graded to project height. In April 2001 the Corps of Engineers authorized restoration of the encroached wetland. This restoration work was completed on April 19, 2001 by refilling approximately 200 feet of dredged channel and reducing the earthen mound to its original topography.

No additional discharge of dredged material is anticipated for this project. Material excavated from the existing island to create the archipelago will be placed on the islands to the north (lakeward) side of the channel. The islands will serve several purposes: (1) provide erosion control for the channel from waves generated in East Sandusky Bay and Lake Erie during periods of barrier bar overtopping, (2) retard sediment infilling of the hydrologic channel, (3) foster establishment of a diverse wetland plant community by adding approximately 4,000 feet of shoreline to the bay (sloped to provide the proper gradient for plant zonation to occur), and (4) create high-quality, isolated avifauna habitat in a low-disturbance environment. The formation of a sandy beach front on the north side of the island, which has already begun to occur, will foster use by shorebirds which may include the piping plover (*Charadrius melodus*). The shore could be further enhanced for this

purpose by the placement of additional sand from an external source. Barnes Nursery, Inc. has pledged to undertake such a beach nourishment initiative and an unwanted bird species control program with the planning and direction of critical species habitat specialists of the U.S. Fish and Wildlife Service and animal damage control specialists of the U.S. Department of Agriculture, National Wildlife Research Center.

The work required to complete the project, as described in the application, will involve construction in the open water of East Sandusky Bay. No dredged material will be discharged to the surface waters of the bay. Material removed from the existing island, to grade the slopes and form the archipelago, will be placed above ground on the islands. A silt-barrier fence was installed for the wetland restoration component of this project. A similar deployment may be necessary during the island archipelago and shore grading components of the project. The need for other water pollution control measures is not anticipated.

Because the island is composed of ancient lacustrine sediments, minimal human contamination is anticipated. Minimal water discoloration is anticipated during the construction period, which should require no more than three days. Any turbidity resulting from this work should dissipate rapidly and be within the normal turbidity ranges expected from natural processes such as wave dissipation and fish spawning activity. This project will adhere to the State's antidegradation policy as it applies to agricultural practices.

To address concerns that the project will draw off water that would normally continue to flow eastward into Sheldon Marsh, I have analyzed the hydrologic circumstances of this portion of Sandusky Bay and have computed the water balance for various lake levels. East Sandusky Bay (between the Willow Drive and Sheldon Marsh causeways) has a surface area of approximately 290 acres (12,660,000 square feet) as calculated from USGS topographic maps. The bottom of East Sandusky Bay is virtually flat and lies at an elevation of 570.7 feet (IGLD, 1985) or 1.5 feet above Low Water Datum (LWD), rising slightly to an elevation of +1.6 feet LWD at the project site. As recorded by the Ohio Geological Survey (OGS), the long-term mean water level in Sandusky Bay is 571.4 feet in elevation or +2.2 feet LWD. OGS has calculated that on average, Sandusky Bay experiences a daily water level fluctuation of 0.6 feet (Donald Guy, personal communication). The major sources of water flowing into East Sandusky Bay are (1) the main portion of Sandusky Bay via the Willow Drive bridge opening and (2) directly from Lake Erie via the breach in the Cedar Point sand spit at Point Retreat. Minor contributions of water to the East Bay also come from surface runoff, tile drains, and small tributary ditches.

The fluctuations of water level in Lake Erie and Sandusky Bay are primarily wind induced surges, winds tides, or seiches. As the water level in Lake Erie or Sandusky Bay rises above the water level or bottom in East Sandusky Bay, water flows into the East Bay until it has equalized with the larger bodies of water surrounding it. Conversely, as the water level in Lake Erie or Sandusky Bay drops below the water level in the East Sandusky Bay, water flows out of the East Bay

until it has either equalized with the larger bodies of water or it has been drained dry.

At the project site, the existing berm island is approximately 1,500 feet long and 50 feet wide, yielding an area of 75,000 square feet or 1.7 acres. This equates to less than 0.6% of the bottom of East Sandusky Bay. The existing dredged channel at approximately 1,500 feet long, 5 feet deep, and 40 feet wide with a 2 to 1 side slope, can hold 262,500 cubic feet or 1,962,500 gallons of water. This equates to less than 3% of the water volume of East Sandusky Bay at mean water level.

The following table shows the volume of water entering East Sandusky Bay for each 0.1 foot rise in water level and the corresponding percentage of water that could be held in the irrigation channel if filled to capacity:

<u>Water Level</u> <u>(feet LWD)</u>	<u>Water Depth</u> <u>(feet)</u>	<u>Water Volume</u>		<u>Channel</u>
		<u>(cubic feet)</u>	<u>(gallons)</u>	<u>(%)</u>
+1.5	0.0	0	0	
+1.6	0.1	1,266,000	9,469,680	20.7
+1.7	0.2	2,532,000	18,939,360	10.4
+1.8	0.3	3,978,000	29,755,440	6.6
+1.9	0.4	5,064,000	37,878,720	5.2
+2.0	0.5	6,330,000	47,348,400	4.1
+2.1	0.6	7,596,000	56,818,080	3.3
+2.2 [mean]	0.7	8,862,000	66,287,760	3.0
+2.3	0.8	10,128,000	75,757,440	2.6
+2.4	0.9	11,394,000	85,272,120	2.3
+2.5	1.0	12,660,000	94,696,800	2.1
+2.6	1.1	13,929,000	104,166,480	1.9
+2.7	1.2	15,192,000	113,636,160	1.7
+2.8	1.3	16,458,000	123,105,840	1.6
+2.9	1.4	17,724,000	132,575,520	1.5
+3.0	1.5	18,990,000	142,045,200	1.4

Considering that the mean daily water level fluctuation in Sandusky Bay is 0.6 feet, this equates to a mean daily exchange of water between East Sandusky Bay and the adjoining larger bodies of water of nearly 7,600,000 cubic feet or over 28 times the volume of water held in the channel. Even with a minimal 0.1 foot rise in water level, about 5 times as much water enters East Sandusky Bay as can be stored in the channel.

Essentially the water level in East Sandusky Bay is controlled by the forcing function of the water level in the larger adjoining bodies of water. Therefore, a depression within East Sandusky Bay will not govern the water level in East Sandusky Bay nor will it influence the distribution of water to various portions of the bay. The elevation of the bay bottom in relation to lake level dictates whether the bottom is covered with water or not. Because the sill at the channel intake is about 0.1 feet above the common bottom of the East Bay, water will not drain into the channel when water levels in the lake are below the bay threshold.

Also, concerns have been raised about the need for continued maintenance of the proposed feeder channel. Barnes Nursery, Inc.'s position is that the natural oscillation of bay water levels would create adequate velocities in the channel to keep it open. To support this contention, I have determined velocities in the feeder channel, under various water level heads, and related them to sediment transport capabilities.

My calculations relate to water flowing from the open lake, through the feeder channel, to the reservoir (hydrologic) channel and conversely, from the reservoir channel to the open lake. Water levels in Sandusky Bay continually oscillate with a mean daily excursion of about 0.6 feet. Thus, on average this produces a hydraulic head of 0.6 feet first on one side of the feeder channel, say on the lake side as the lake rises, then a head of similar magnitude on the reservoir channel side of the feeder channel as the lake falls.

Torricelli's equation can be applied to determine the velocity in the feeder channel under various head conditions. The lake can be considered a reservoir with an opening in its side (the feeder channel). Torricelli's theorem states that the velocity of water through the opening is equal to the square root of the product of two times the acceleration due to gravity times the head (Henke 1966 *Introduction to Fluid Mechanics*, Addison-Wesley Publ. Co., Reading, MA, p. 57). The following table shows the calculated velocity in the feeder channel for various hydraulic heads from 0.1 to 1.0 feet at either the lake side or reservoir channel side of the feeder channel:

Hydraulic Head (feet)	Velocity	
	(feet/sec)	(cm/sec)
0.1	2.5	76
0.2	3.6	110
0.3	4.4	134
0.4	5.1	155
0.5	5.7	174
0.6	6.2	189
0.7	6.7	204
0.8	7.2	219
0.9	7.6	232
1.0	8.0	244

Hjulström (1935 *Studies of the Morphological Activity of Rivers as Illustrated by River Fyris*, Upsala Univ., Sweden, Geol. Inst. Bull. V. 25, p. 295; and 1939 *Transportation of Detritus by Moving Water*, in P. D. Trask, ed., *Recent Marine Sediments*, Am. Assoc. Petroleum Geologists, Tulsa, OK, p. 10). has developed a classical, and well accepted, graph which predicts the velocities required to place loose particles in motion and transport them in a channel for different size grades of sediment. The offshore sediments in Sandusky Bay are dominated by silt-sized particles, with lesser amounts of clay and sand (Shaffer 1951 *Shore erosion on Sandusky Bay*, Ohio Journal of Science 51(1): 1-5. [reprinted in 1968 by Ohio Department of Natural Resources, Division of Geological Survey as Report of Investigations No. 7], p. 3; and U.S. Army Corps of Engineers 1953 *Ohio Shore Line of Lake Erie, Sandusky Bay, Ohio, Beach Erosion Control Study*, Appendix

IV. 83rd Congress, First Session, House of Representatives Document No. 126, p. 8). The threshold velocities to mobilize and transport sediment particles of these size grades are shown below:

<u>Particle</u>	<u>Median Diameter</u> <u>(microns)</u>	<u>Threshold Velocity for</u> <u>Sediment Mobilization</u> <u>(cm/sec)</u>
Clay		
Medium	1	150
Coarse	2	100
Silt		
Fine	4	75
Medium	8	50
Coarse	31	20
Sand		
Fine	62	17
Medium	250	15
Coarse	1000	20

Thus it can be seen that the Torricelli or "jet" effect developed in the feeder channel with a minimal head of about 0.4 feet will be sufficient to keep the channel clear of deposited clay particles. A head of less than 0.2 feet will generate velocities great enough to keep silt and sand from being permanently deposited.

An alternative approach is to use the Chezy-Manning formula (Zilly 1975 *Handbook Of Environmental Civil Engineering*, Van Nostrand Reinhold, New York, NY, p. 520-522). Assuming a channel roughness factor of 0.013 to 0.017 for a straight, uniform earth channel (Newson 1994 *Hydrology and the River Environment*, Clarendon Press, Oxford, England p. 23) the following velocities are obtained for various hydraulic heads:

<u>Hydraulic Head</u>		<u>Velocity</u>	
<u>(feet)</u>	<u>(slope)</u>	<u>(feet/sec)</u>	<u>(cm/sec)</u>
0.1	0.0002	1.7	51
0.2	0.0004	1.9	58
0.3	0.0006	2.1	64
0.4	0.0008	2.3	70
0.5	0.0010	2.5	76
0.6	0.0012	2.7	82
0.7	0.0014	2.9	88
0.8	0.0016	3.1	94
0.9	0.0018	3.3	101
1.0	0.0020	3.5	107

In this approach it can be seen that the slope created by a head of 0.5 feet is required to remove settled silt and sand from the feeder channel, whereas a head of 1.0 feet or greater would be needed to erode the clay from the channel bottom. However, because clay-sized particles stay in suspension even under very low velocities (<0.1 cm/sec), no deposition of particles in this size range would be anticipated in the feeder channel.

In summary, the foregoing calculations indicate that the normal water level fluctuations in East Sandusky Bay are sufficient to create the hydraulic heads and attendant velocities necessary to maintain a free and clear feeder channel. Thus, no maintenance dredging will be required under typical conditions. However, devastating storms, such as those experienced in 1972 and 1987, could reconfigure or destroy the feeder channel.

7. Policy 8 – Nonpoint Source Pollution & Policy 12 – Wetlands

The proposed project is consistent with this OCMP policy, particularly management measures 8.3.1 and 8.3.2 (Protection and Restoration of Riparian Areas and Wetlands). *Glossary of Geology* (Bates and Jackson 1980) defines riparian land as “situated along or abutting upon a stream bank.” Because the project is located on East Sandusky Bay, an embayment of Lake Erie rather than a flowing stream, it would be more accurately described as “littoral” instead of “riparian.” However, the wetland aspects of this policy do apply to the project.

The project will provide protection to adjacent wetlands by forming a quiescent water body between the islands and the coastal wetlands along the south shore. As discussed earlier, the hydrologic channel will supply water for groundwater recharge to these wetlands during low lake level intervals. This East Sandusky Bay hydrology restoration project will result in approximately five acres of new emergent wetlands to occupy the barren mud bottom between the present wetland border and the hydrologic channel. Because the interior slope of the islands will be graded to a gentle 4 to 1 slope (run to rise) they will foster the development of a diverse zonation of hydrophytic plants along 1,500 feet of shoreline. As described earlier, a small intrusion of approximately 0.3 acres into coastal wetlands was made as the project was constructed in July 2000. Although this intrusion was permitted under the Corps of Engineers permit that was in effect at the time of the construction, as a good faith effort, with the Corps approval, Barnes Nursery, Inc. restored the intruded area to its original topography in April 2001 .

The project area, as specified in the current application, constitutes an open water environment lacking any wetland plants and is typically submerged by the waters of Sandusky Bay. The boundary of coastal wetlands at the project site is delineated on Revised Figure 2 of the application. To resolve the question of wetlands verses mud flats verses open water environment, I have taken average conditions to be typical of the site. Under these conditions the project area is submerged and no emergent, submersed, or floating-leafed aquatic plants are present.

The long-term mean water level of Sandusky Bay as recorded at the ODNR, Division of Geological Survey gaging station in Sandusky is +2.2 feet above low water datum (LWD) or elevation 571.4 feet (IGLD, 1985). For reference, the water level during the agency site visit (May 22, 2001 at 2:00 PM) was +2.1 feet LWD, or elevation 571.3 feet, very close to the mean or normal water level in East Sandusky Bay. The general elevation of the bottom of East Sandusky Bay is +1.5 feet LWD and about +1.6 feet LWD at the project site. This indicates that under

normal (mean) conditions, the water depth at the project site prior to construction was at least 0.6 feet.

Based on these data, my opinion is that the project area constitutes an open water environment. The mud flat in East Sandusky Bay that has periodically appeared in recent years is the result of abnormally low lake levels and should not be taken as typical or normal conditions. Because the project was constructed in an open water environment, I do not believe that further wetland or mud flat restoration/mitigation efforts are appropriate for this project.

Under the "Discussion" heading on page 5 of ODNR's letter of June 11, 2001, Mr. Wayne Warren makes the statement that the Sheldon Marsh "wetland is hydrologically unrestricted with no lakeward or upland border alterations." This statement is not accurate. Firstly, ODNR, Division of Natural Areas and Preserves (in conjunction with NASA, Plum Brook Station) maintains and has enlarged a 3,000-foot-long causeway that totally restricts natural drainage and connectedness with several coastal zone marshes along the east side of the Nature Preserve. Thus the upland border is most definitely restricted. Secondly, the western border of the wetland complex is severely restricted by the stone rip rap causeway that supports Willow Drive. Thirdly, the NASA pumping station at the Northeast corner of the Preserve is armored with large dimension stone capped with concrete and protected by massive cells of steel sheet piling that were driven into the barrier beach. To say that these imperious structures do not restrict hydrologic circulation is nonsense.

Conversely, the proposed project calls for six hydrologic openings along the 1,500-foot length of the project to insure free circulation. Connection between coastal marshes and the lake is essential to the viability of the wetlands—this feature is a keynote of the design.

Mr. Wayne Warren also states on page 5, "Activities conducted by the applicant have already adversely affected Sheldon Marsh State Nature Preserve." However, he neglected to specify in what way the project has adversely affected the Preserve. Without any specific information it is impossible to address this statement in any meaningful way.

In summary, it can be seen that the proposed project will both protect and enhance existing wetlands, will create new wetlands, and restore damaged wetlands without intruding existing marshes. Because of the unrestricted circulation design of the project and its location beyond the border of existing wetlands, no adverse impact to the adjoining marshes is foreseen. By restoring all disturbed coastal wetlands to their pre-existing condition, is now in compliance with the State's wetland policy. By creating at least five acres of new wetlands and 1,500 feet of additional wetland shore on a non-vegetated, bay bottom, the project supports OCMP's policy to "where feasible, restore and create wetlands to increase the State's wetlands base."

#### 8 Policy 14 – Rare and Endangered Species

The proposed project is consistent with this OCMP policy by providing additional habitat for rare and endangered plant and animal species. The project lies on about 3.5 acres of East Sandusky Bay bottom (about 1% of the bay's bottom), but protects over 5 acres of bottom that would normally be exposed to storm action if

not for the project. This protected area will form a quiescent refuge where shorebirds can forage during rough conditions in the bay and where state-listed rare wetland plants (annuals and low in stature) can thrive.

As discussed earlier, the formation of a sandy beach front on the north side of the island, which has already begun to occur, will foster use by shorebirds which may include the piping plover (*Charadrius melodus*). The shore could be further enhanced for this purpose by the placement of additional sand from an external source and at the same time help stabilize the island's bay shorelines. Barnes Nursery, Inc. offers to cooperate with the U.S. Fish and Wildlife Service and the U.S. Department of Agriculture, National Wildlife Research Center in formulating and undertaking a beach nourishment initiative and an unwanted bird species control program that would create additional plover habitat in East Sandusky Bay. The island habitat would be far less susceptible to open-lake wave attack than the barrier beach to the north.

One adult and four immature bald eagles (*Haliaeetus leucocephalus*) and two tundra swans (*Cygnus columbianus*) have been seen in the vicinity of the island and in the hydrologic channel. On June 12, 2001, during a Corps of Engineers site visit, a bald eagle landed on the island and was observed feeding on a bullhead (*Ameiurus* sp.) that had been captured in the adjacent channel. When Corps biologists approached the eagle took flight and landed in a large cottonwood tree that overhangs the restoration area. During the same site visit Corps biologists observed and photographed a threatened species of tiger beetle (*Cicindela hirticollis*) near the crest of the island.

9. Policy 15 – Exotic Species

Ohio DNR, Division of Natural Areas and Preserves, manages Sheldon Marsh State Nature Preserve which is located adjacent to the proposed project. Discussions have been held with Preserve personnel and a coordinated plan has been formulated with Mr. Gary Obermiller, District Preserve Supervisor, for the control of invasive plant species, particularly common reed (*Phragmites australis*) and purple loosestrife (*Lythrum salicaria*). The first phase of this plan will be a cooperative effort to chemically control invasive plants on the peninsula at the western end of the project. The northern, undisturbed portion of the peninsula lies within Sheldon Marsh State Nature Preserve, whereas the central portion (the area where wetland restoration was completed in April 2001) is in private ownership. The undisturbed southern portion of the peninsula is also held in private ownership. Both the northern and southern portions are heavily infested with *Phragmites australis* and have substantial growths of *Lythrum salicaria* as does much of the adjacent shoreline of East Sandusky Bay (contained in application for Ohio EPA Water Quality Certification, Figure 16). Invasion of the restored area by these undesirable plants has already begun, therefore a cooperative control program will benefit both the State Nature Preserve and the project area.

This plan was approved in the field, at the project site, by the Corps of Engineers on May 22, 2001. Barnes Nursery, Inc. intends to use this invasive plant control effort on the restored area as a pilot study to limit the spread of *Phragmites australis*. If successful, this effort can be extended to control invasive plant species

along the entire island archipelago. Thus, I believe the proposed project is consistent with OCMP policy by Barnes Nursery, Inc.'s efforts to "control exotic species to preserve the balance and diversity" of the East Sandusky Bay ecosystem.

Fortunately very little *Phragmites* has been observed on the island. Observations on June 27, 2001 revealed that lush growths of smartweed (*Polygonum* spp.) and other desirable native plant species are vegetating the island. The densest growth patterns correspond to the five former Black Channel patches that are shown on enclosed aerial photograph No. 347 (March 14, 2001).

10. Policy 26 – Preservation of Cultural Resources

Archaeological Site. Figure G, attached with Mr. Warren's letter shows an archaeological site in the vicinity of the project. This site, 33-ER-436 is located to the south and west of the project. The site produced only one artifact — a slate, notched, butterfly bannerstone. The artifact was recovered during a survey of the site in September 1986. A preliminary documentation form for the site, prepared by Mr. Eugene Edwards and Dr. Jonathan E. Bowen, was received by the Ohio Historic Preservation Office on May 25, 1994. Mr. Edwards was contacted by Barnes Nursery on June 21, 2001 to inquire as to the specific location of the site and any other archaeological information that he could make available. Mr. Edwards visited the project site on June 22, 2001 and conducted a survey of the island and surrounding area. A report of his findings was submitted to the Ohio Historic Preservation Office on June 29, 2001.

In summary, site 33-ER-436 is located on upland property south of the project (the exact location of site is shown on an aerial photograph contained in Mr. Edwards' report, but not included herein in order to preserve the integrity and security of the site). His survey of the island and environs yielded no specific artifacts, only a few pieces of broken flint. No artifacts other than the bannerstone have been found at site 33-ER-436, although Mr. Edwards has surveyed the site on several occasions. He concluded that the project does not adversely impact site 33-ER-436 or any other archaeological site. He believes that the construction of the project may help protect site 33-ER-436 from destruction by the rapidly receding south shore of Sandusky Bay.

Floodplain. In the early stages of the project, Barnes Nursery, Inc. discussed its plans with the local floodplain administrator for Erie County, Ohio. Because the project was being undertaken pursuant to a Corps of Engineers Nationwide permit in an open-water situation and because no development was involved in the project, no local permit was deemed necessary. However, following receipt of Mr. Warren's letter, Barnes Nursery, Inc. contacted Mr. Alex MacNichol, Director of the Erie County Planning Commission to discuss any authorizations that may be required by virtue of the project being located within the 100-year floodplain of Sandusky Bay. If any authorization is required Barnes Nursery, Inc. will of course take the necessary actions to comply with specific development standards and/or permits.

Water Withdrawal Facility. Pursuant to Mr. Warren's inquiry, on June 14, 2001 Barnes Nursery, Inc. submitted a WATER WITHDRAWAL FACILITIES

REGISTRATION PROGRAM form to Mr. Allan Luczyk, ODNR Division of Water for the Sandusky Bay water irrigation system.

11 Policy 27 – Fisheries Management

This policy calls for fisheries of the State of Ohio to be maintained and improved. The proposed project will accomplish these two objectives in East Sandusky Bay. Recent studies show that Lake Erie coastal wetlands function as important fish habitat by exporting large quantities of fish, first to avian, piscine, and mammalian food chains through predation, and second to the lake as young-of-the-year sport and forage fish (Jude and Pappas 1992 *Fish Utilization of Great Lakes Coastal Wetlands*. Journal of Great Lakes Research 18(4):651-672). This research implied (1) that a wetland must be connected with the lake to promote and enhance efficient fish utilization of the high productivity of marshes, (2) that additional resilience is provided to species which spawn in wetlands since they can produce two cohorts (one in wetlands and one in the lake), and (3) that circulation initiated by fluctuating water levels is important in sustaining habitat diversity and productivity.

Mr. Warren's comments imply that the proposal to create a deep water habitat will be "without the presence of submersed aquatic vegetation." Figure 6 of the application clearly shows Barnes Nursery, Inc.'s intent to foster the establishment of submersed aquatic vegetation beds along the sides of the channel. No such beds occupied the bay bottom prior to the construction of the hydrologic channel.

Concern has also been expressed that coastal marshes such as those of East Sandusky Bay serve only as habitats for low-quality or undesirable fish species. However, the research Johnson (1989 *Lake Erie Wetlands: Fisheries Considerations*, in K. A. Krieger, ed., *Lake Erie Estuarine Systems: Issues, Resources, Status, and Management*, NOAA, Estuarine Program Office, Washington, DC, p. 257-274) shows that a diverse group of 46 species utilize Lake Erie coastal marshes, 33 of which are abundant or common—including: bigmouth buffalo (*Ictiobus cyprinellus*), quillback carpsucker (*Carpionodes cyprinus*), shorthead redhorse (*Moxostoma macrolepidotum*), white sucker (*Catostomus commersoni*), crappie (*Pomoxis* spp.), bluegill sunfish (*Lepomis macrochirus*), largemouth bass (*Micropterus salmoides*), smallmouth bass (*Micropterus dolomieu*), pumpkinseed (*Lepomis gibbosus*), rock bass (*Ambloplites rupestris*), gizzard shad (*Dorosoma cepedianum*), carp (*Cyprinus carpio*), emerald shiner (*Notropis atherinoides*), spottail shiner (*Notropis hudsonius*), grass pickerel (*Esox americanus*), black bullhead (*Ameiurus melas*), yellow bullhead (*Ameiurus natalis*), brown bullhead (*Ameiurus nebulosus*), channel catfish (*Ictalurus punctatus*), white perch (*Morone americana*), white bass (*Morone chrysops*), yellow perch (*Perca flavescens*), and freshwater drum (*Aplodinotus grunniens*).

The proposed project is consistent with OCMP's policy to maintain and improve Lake Erie fisheries in several ways. Firstly, it will create additional coastal marshes and will enhance water circulation to them. Secondly, it will provide a deep-water refugia for wetland fish species that would normally be stranded during low water level events when East Sandusky Bay is dewatered or frozen when the bay freezes to the bottom in winter. Thirdly, it will provide a direct conduit for fish to move between the lake and coastal marshes.

12. Policy 29 – Wildlife Management

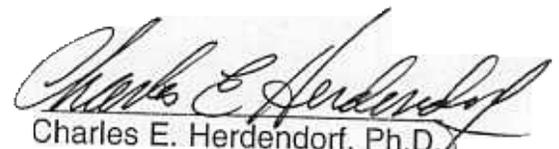
The proposed project is consistent with this OCMP policy by providing benefits to all wildlife, including nongame and endangered species. Mr. Warren's comments appear to be centered around waterfowl species and the notion that Barnes Nursery, Inc.'s intent is to create only waterfowl habitat. The application specifies "avifauna habitat on a series of islands" and "deep water (~5 feet) fish and aquatic vegetation habitat in the restored hydrologic channel." Mr. Warren's points are well taken concerning waterfowl, particularly the Canada goose problem (a species for which breeding colonies were introduced to Ohio by ODNR, Division of Wildlife). I have observed numerous Canada goose nests on the barrier beach of Sheldon Marsh State Nature Preserve and the NASA breakwall, and Barnes Nursery, Inc. does not want to replicate ODNR's problem with this species. By specifying "avifauna habitat" Barnes Nursery, Inc.'s intention is to create a diverse habitat of aquatic plant zones on the inside slope of the islands, upland shrubs and trees on the crest, and beach flora on bay side. In this way the project will be attracting a diverse community of birds to the islands and minimize unwanted species such as herring and ring-billed gulls and the Canada goose. I have already observed bald eagles (*Haliaeetus leucocephalus*), tundra swans (*Cygnus columbianus*), mallards (*Anas platyrhynchos*), great egrets (*Ardea albus*), and great blue herons (*Ardea herodias*) utilizing the island and hydrologic channel. Figure 12 of the application illustrates the concept of how the islands will appear once native vegetation has been established. As a comprehensive plant nursery, Barnes Nursery, Inc. has the labor, equipment, plant stock, and access to appropriate technical resources to convert this concept into reality.

In developing Barnes Nursery, Inc.'s highly-praised composting operation, it worked with the U.S. Department of Agriculture (USDA), National Wildlife Research Center, Animal Damage Control Center (located at the NASA facility in Erie County, Ohio) to successfully minimize the aggregation of unwanted bird species. Plans are now being formulated to conduct research on the project islands to insure that a similar result is obtained.

The USDA center has recommended that Barnes Nursery, Inc. request a permit for nest removal and egg destruction for unwanted bird species on the islands, particularly herring gull (*Larus argentatus*), ring-billed gull (*Larus delawarensis*), double-crested cormorant, (*Phalacrocorax auritus*), and Canada goose (*Branta canadensis*). This permit and control program would involve weekly monitoring (April-June) by USDA biologists to insure that the proper control measures are taken on the target species. With the approval of ODNR this program will prevent these unwanted bird species from establishing nesting colonies on the islands. Barnes Nursery is prepared to undertake this program in conjunction with USDA.

13. On December 7, 2001, Barnes Nursery, Inc. was transmitted a provisional Department of Army permit authorizing it to maintain their existing irrigation channel and earthen berm with proposed modifications along the southern shoreline of East Sandusky Bay. The permit contained a number of special conditions to ensure the environmental integrity of the area and to bring the project in compliance with ODNR coastal management consistency requirements. To my knowledge ODNR has not considered these special conditions in their objections to the project.

FURTHER SAYETH AFFIANT NAUGHT.

  
Charles E. Herdendorf. Ph.D.

SWORN TO BEFORE ME and subscribed in my presence this  
3rd day of September, 2002.

  
Notary Public

MARYANN SCHULTZ KUZILA  
Notary Public, State of Ohio  
My Commission Expires November 1, 2006