

1.0 INTRODUCTION

This Land Management Plan of Bells Neck in Harwich, Massachusetts was prepared by the BSC Group, Inc. at the request of and under contract to the Town of Harwich Conservation Commission. The evaluation is intended to be used by the Commission as a living guidance document for making management decisions at Bells Neck, and to assist the Commission in providing a safe multiuse recreation area while protecting wildlife habitat and natural resources.

a) **Purpose of Acquisition:**

The Bells Neck property was acquired by the Town of Harwich to protect the Herring River and Herring Fish Run as well as to protect the public reservoir, provide open space for wildlife and provide a public recreation area.

b) **Acquisition History:**

The Bells Neck property was acquired by the Town of Harwich Conservation Commission through various means from August 19, 1966 through March 22, 2011. See Title Information attachment for more information.

c) **Purpose of This Management Plan:**

The Bells Neck Management Plan was commissioned by the Conservation Commission to evaluate historic information, flora and fauna inventories, invasive species inventories, identification of resource areas, wildlife habitat, public access, impact and safety, and provide management alternatives and recommendations to identify short and long term management priorities for the property for the next five to fifteen years. For instance, the creation of new trails by the general public has adversely created several high erosion areas, which in turn have created sand deltas within Land Under Water of the Reservoir and Bordering Vegetated Wetlands. These resource areas are “areas subject to protection under that Act”, and are environmentally important systems that are protected by the Massachusetts Wetland Protection Act, M.G.L. 131, Section 40, and defined in the Regulations promulgated under the Act at 310 CMR 10.02 (1) and the Town of Harwich Wetlands By-Law Section 1.01.

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2.0 SITE DESCRIPTION

a) Geographical Setting:

The property is situated along the Herring River and includes forested uplands surrounding the East and West Reservoir located south of Great Western Road. It contains a fish ladder installed to maintain the Herring run, which connects the reservoir to the tidal section of the Herring River. The property also extends north of Great Western Road to include a non-tidal section of the Herring River and the uplands to the east of the river, which flows into the reservoir. The property is located in Midwestern Harwich and abuts Depot Street and the Town of Dennis.

The property is located from Great Western Road north to Main Street/Queen Anne Road (west of the Herring River), Great Western Road south to Smith Street and Route 28, east toward Lothrop Avenue and west to Depot Road/Depot Street (see Appendix 1, 2 & 3). The parcel is divided by Bells Neck Road, which is accessed south off Great Western Road and north off Route 28. North Road can be accessed off Bells Neck Road, which leads to a foot bridge over the tidal Herring River. Additional access can be found north off Great Western Road on Bells Neck Road and east off Depot Street which leads to the Herring run fish ladder. Access to Bells Neck can also be gained by the Upper Cape Bikeway.

b) Property Boundaries & Adjacent Lands:

The property is surrounded mostly by single-family homes along Depot Street/Depot Road, Bells Neck Road, Smith Street, North Street, Great Western Road and Lothrop Avenue. There are also several cranberry bogs located adjacent to the property to include the town owned property off Depot Street adjacent to the Herring run, the private property located just north at the corner of Depot Street and the Upper Cape Bikeway, and along Great Western Road. Some commercial areas also surround the parcel at the corner of Great Western Road and Depot Street and along Route 28.

c) Geology, Soils, Climate, Hydrology:

“The geologic history of Cape Cod mostly involves the advance and retreat of the last continental ice sheet (named the Laurentide after the Laurentian region of Canada where it first formed) and the rise in sea level that followed the retreat of the ice sheet. On Cape Cod, these events occurred within the last 25,000 years” (source USGS, Glacial Cape Cod, Geologic History of Cape Cod by Robert N Oldale). The ice sheet advanced just south of the Cape and Islands and began to retreat leaving moraine deposits which formed the Cape and Islands. The site consists of sandy soils, ponds and wetlands all created by the retreat and melt of the ice sheet.

Sandy soils allow for the fast movement of water through the soils and into the groundwater, ponds, rivers and streams. The site consists of a variety of soils but mostly of Carver Coarse Sands ranging in slopes of 0-35% (Source: Soil Survey of Barnstable County, Massachusetts, March 1993 and USDA Web Soil Science Website, see soil map in Appendix 4, and BSC’s field verification from 2011-2012). The rapid movement of water means chemicals and hazardous materials will quickly translocate through the soils and potentially into the resource areas. This information will be important when developing land management options to balance resources versus recreation. A major problem area that BSC noted is the parking lot off Depot Street used to access trails, a boat ramp and the anadromous fish ladder. People using this area are parking cars a few feet from the edge of the Herring River and putting in boats at the top of the fish ladder.

Erosion from the parking area includes hazardous materials leaking from vehicles and trash, and debris which could contaminate the waters at the mouth of the fish ladder. Further, erosion from the parking lot creates suspended sediments within the waterway that can damage the gills of anadromous fish during the strenuous and critical migration to breeding grounds. Relocating/rearranging the parking lot and boat ramp so that cars are parked away from the Herring River and boats are launched into the reservoir, along with reestablishing the vegetated buffer zone, can greatly improve the quality of the water at the mouth of the fish run and reduce potential contamination of the fish ecosystem.

The climate and hydrology of Bells Neck consists of an average rainfall of approximately 46" with average summer high temperature in the 75-80 degree range and lows in the winter in the single digits. Climate directly influences hydrology and the quality of the water within the resource areas. Extreme heat can increase the risk of eutrophication and algae blooms within the waterways which lead to fish mortality and stress. It can also make the fresh water toxic to animal and human consumption. Global warming and droughts will play a major factor in climate and hydrologic influences on the resource areas. Stronger storms and heavier rains will increase erosion and sedimentation of streams, ponds, and lakes while droughts increase the potential of eutrophication and algae blooms, as will wildfires like that of which occurred in 2010. This Land Management Plan takes into account potential climate changes in the management of Bells Neck.

- d) Historic and Archeological Resources: During our field work, BSC scientists discovered what appeared to be Native American artifacts which were photodocumented and submitted to the Commonwealth of Massachusetts Archaeologist at the Massachusetts Historical Commission for classification (see Appendix 10, 11 & 12).

3.0 HABITAT AND SPECIES DESCRIPTION

Much of Bells Neck is considered a resource area or buffer zone to a resource area with respect to the Wetland Protection Act and Town of Harwich Wetland Protection By-law. These wetland resources are identified below. BSC's Senior Wildlife Biologist and Professional Wetland Scientist (PWS) Norman W. Hayes and Wetland Professional In Training (WPIT) Matthew Creighton visited the site during the fall and winter of 2011-2012 and spring 2012 to evaluate the site. Subsequent field evaluations continue to document flora and fauna.

Field observations identified the following flora and fauna at the site:

FLORA AND FAUNA INVENTORY

Wildlife and Vegetation

BSC's list of wildlife and vegetative species observed at Bells Neck is broken down by common and scientific name, and location. Vegetation starting with the salt marsh and transitioning landward through the BVW and uplands. Note species with an asterisk are invasive species as identified in *A Guide to Invasive Plants in Massachusetts* prepared by the Massachusetts Division of Fisheries and Wildlife, and the Massachusetts Biodiversity Initiative by Pamela B. Weatherbee, Paul Somers, and Tim Simmons.

a. WILDLIFE OBSERVED AND DURING FIELD INVENTORIES

3.1.1

Birds

Common Name	Scientific Name
Tree Swallow	<i>Tachycineta bicolor</i>
Yellow Rumped Warbler	<i>Dendroica discolor</i>
House Finch	<i>Carpodacus mexicanus</i>
Purple Finch	<i>Carpodacus purpureus</i>
House Sparrow	<i>Passer domesticus</i>
American Gold Finch	<i>Carduelis tristis</i>
Song Sparrow	<i>Melospiza melodia</i>
Carolina Wren	<i>Thryothorus ludovicianus</i>
Brown Headed Cow Bird	<i>Molothrus ater</i>
Northern Cardinal	<i>Cardinalis cardinalis</i>
Northern Mockingbird	<i>Mimus polyglottos</i>
Grey Catbird	<i>Dumetella carolinensis</i>
Black Capped Chickadee	<i>Poecile atricapilla</i>
American Robin	<i>Turdus migratorius</i>
American Crow	<i>Corvus brachyrhynchos</i>
Blue Jay	<i>Cyanocitta cristata</i>
Eastern Starling	<i>Sturnus vulgaris</i>
Red Winged Blackbird	<i>Agelaius phoeniceus</i>
Common Grackle	<i>Quiscalus guiscula</i>
Belted Kingfisher	<i>Ceryle alcyon</i>
Red Tail Hawk	<i>Buteo jamaicensis</i>
Northern Harrier	<i>Circus cyaneus</i> (Flight)
Killdeer	<i>Charadrius vociferus</i>
Herring Gull	<i>Larus argentatus</i>
Osprey	<i>Pandion haliaetus</i>
Laughing Gull	<i>Larus atricilla</i>
White Winged Scoter	<i>Melanitta fusca doglandi</i>
Black Backed Gull	<i>Larus marinus</i>
Brant	<i>Branta bernicla</i>
Canada Goose	<i>Branta canadensis</i>
Double Crested Cormorant	<i>Phalacrocorax auritus</i>
Common Eider	<i>Somateria mollissima</i>
Lesser Yellowlegs	<i>Tringa flavipes</i> (Flight)
Greater Yellowlegs	<i>Tringa melanoleuca</i>
Least Tern	<i>Sterna antillarum</i> (Flight)
Common Tern	<i>Sterna hirundo hirundo</i>
Red Breasted Merganser	<i>Mergus serrator</i>
Sanderling	<i>Caldris alba</i>
Mallard Duck	<i>Anas platyrhynchos</i>
Mourning Dove	<i>Zenaida macroura</i>
Marsh Wren	<i>Cistothorus palustris</i>
Bufflehead	<i>Bucephala albeola</i>
Great Horned Owl	<i>Bubo virginianus</i>
American Black Duck	<i>Anas rubripes</i>
Ring-billed Gull	<i>Larus delewarensis</i>

Mute Swan	<i>Cygnus olor</i>
Broad Winged Hawk	<i>Buteo platypterus</i>
Sharp Shinned Hawk	<i>Accipiter striatus</i>
Black Crowned Night Heron	<i>Nycticorax nycticorax</i>
Green Winged Teal	<i>Anas crecca</i>
Great Blue Heron	<i>Ardea herodias</i>
Wilson's Snipe	<i>Gallinago gallinago</i>
Long-billed Dowitcher	<i>Limnodromus scolopaceus</i>
Virginia Rail	<i>Rallus limicola</i>
Pine Warbler	<i>Dendroica pinus</i>
Rusty Blackbird	<i>Euphagus carolinus</i>
Coopers Hawk	<i>Accipiter cooperii</i>
American Woodcock	<i>Scolopax minor</i>
Turkey Vulture	<i>Cathartes aura</i>
Green Heron	<i>Butorides virescens</i>
Wild Turkey	<i>Meleagris gallopavo</i>

Note: BSC also used the Massachusetts Audubon Society's bird sighting reports for spring 2012 as a resource for updating this list. These reports can be found online at www.massaudubon.org/birds_and_birding/sightings.php

3.1.2

Mammals

Common Name	Scientific Name
Red Fox	<i>Vulpes vulpes</i>
Coyote	<i>Canis latrans</i>
Raccoon	<i>Procyon lotor</i>
White Footed Mouse	<i>Peromyscus leucopus</i>
Meadow Vole	<i>Microtus pennsylvanicus</i>
Striped Skunk	<i>Mephitis mephitis</i>
Virginia Opossum	<i>Didelphis virginiana</i>
Eastern Cottontail Rabbit	<i>Sylvilagus floridanus</i>
Muskrat	<i>Ondatra zibethicus</i>
White-Tailed Deer	<i>Odocoileus virginianus</i>
Eastern Chipmunk	<i>Tamias striatus</i>
Woodchuck	<i>Marmota monax</i>
Mink	<i>Mustela vison</i>
Northern River Otter	<i>Lutra canadensis</i>
Black Bear†	<i>Ursus americanus</i>
Eastern Gray Squirrel	<i>Sciurus carolinensis</i>

† June, 2012: Animal relocated off Cape Cod.

3.1.3

Mollusks

Common Name	Scientific Name
Quahog (Lower portion, Herring River)	<i>Mercenaria mercenaria</i>
Periwinkle	<i>Littorina spp.</i>
Soft Shell Clam (Lower portion, Herring River)	<i>Mya arenaria</i>
Ribbed Mussel (Salt Marsh)	<i>Modiolus demissus plicatulum</i>

3.1.4

Crustaceans

Common Name	Scientific Name
Blue Crab	<i>Callinectes sapidus</i>
Fiddler Crab	<i>Uca pugnax</i>
Green Crab	<i>Carcinides meanas</i>
Hermit Crab	<i>Pagurus pollicarus</i>

3.1.5

Merostomates

Horseshoe Crab	<i>Lumulus polyphemus</i>
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b. VEGETATION

3.1.6

Salt Marsh

Common Name	Scientific Name
Salt Marsh Cord Grass	<i>Spartina alterniflora</i>
Salt Meadow Cord Grass	<i>Spartina patens</i>
Salt Reed Grass	<i>Spartina cynosuroides</i>
Seaside Goldenrod	<i>Solidago sempervirens</i>
Northern Seaside Lavender	<i>Limonium carolinianum</i>
Glass Worts	<i>Salicornia spp.</i>
Salt Marsh Aster	<i>Aster tenuifolius</i>
Salt Marsh Bulrush	<i>Scirpus maritimus</i>
Marsh Elder	<i>Iva frutescens</i>
Spike Grass	<i>Distichlis spicata</i>
Black Grass	<i>Juncus gerardi</i>
Halberd-Leaved Orache	<i>Atriplex patula</i>
Sea-Blite	<i>Suaeda maritima</i>
Coast-Blite	<i>Chenopodium rubrum</i>
Common Reed	<i>Phragmites communis*</i>
Groundsel Tree	<i>Baccharis halimifolia</i>
Cattails (2 Types)	<i>Typha spp.</i>
Salt Reed Grass	<i>Spartina cynosuroides</i>

3.1.7

Bordering Vegetated Wetlands**Lower Herring River**

Common Name	Scientific Name
Dusty Miller	<i>Artemisia stelleriana</i>
American Beachgrass	<i>Ammophila breviligulata</i>
Beach Pea	<i>Lathyrus japonius</i>
Sea Rocket	<i>Cakile edentula</i>
Greene's Rush	<i>Juncus greenei</i>
Northern Bayberry	<i>Myrica pensylvanica</i>
Virginia Rose	<i>Rosa virginiana</i>
Rugosa Rose	<i>Rosa rugosa</i>
Morrows Honeysuckle	<i>Lonicera morrowii*</i>
Beach Plum	<i>Prunus maritima</i>

Sweet Fern	<i>Comptonia peregrina</i>
Northern Arrowwood	<i>Viburnum recognitum</i>
Smooth Sumac	<i>Rhus glabra</i>
Highbush Blueberry	<i>Vaccinium corymbosum</i>
American Cranberry	<i>Viburnum opulus</i>
Inkberry	<i>Ilex glabra</i>
Black Alder	<i>Alnus glutinosa</i>
American Witch Hazel – Upland/BVW edge	<i>Hamamelis virginiana</i>
Cinnamon Fern – Upland/BVW edge	<i>Osmunda cinnamomea</i>
Royal Fern	<i>Osmunda regalis</i>
Sphagnum Moss	<i>Sphagnum flexuosum</i>
Hydrophilic Grasses (Wetland)	<i>Graminae spp.</i>
American Elderberry	<i>Sambucus nigra</i>
Soft Rush	<i>Juncus effusus</i>
Cardinal Flower	<i>Lobelia cardinalis</i>
Sweet Pepperbush	<i>Clethra alnifolia</i>
Swamp Azalea	<i>Rhododendron viscosum</i>
Swamp Leucothoe	<i>Eubotrys racemosa</i>
Panic Grass	<i>Dichanthelium acuminatum</i>
Switch Grass	<i>Panicum virgatum</i>

3.1.8

Uplands

Pitch Pine	<i>Pinus rigida</i>
Japanese Blackpine	<i>Pinus thunbergii</i>
White Pine	<i>Pinus strobus</i>
Black Oak	<i>Quercus velutina</i>
Red Cedar	<i>Juniperus virginiana</i>
Black Locust	<i>Robinia pseudoacacia*</i>
Apple spp.	<i>Malus spp.</i>
Choke Cherry	<i>Prunus virginiana</i>
American Holly	<i>Ilex opaca</i>
Black Gum	<i>Nyssa sylvatica</i>
White Oak	<i>Quercus alba</i>
Green Ash	<i>Fraxinus pennsylvanica</i>
Atlantic White Cedar	<i>Chamaecyparis thyoides</i>
Sycamore Maple	<i>Acer pseudoplatanus*</i>
Norway Maple	<i>Acer platanoides*</i>
Scrub Oak	<i>Quercus ilicifolia</i>
Common Dandelion	<i>Taraxacum officinale</i>
Poverty Rush	<i>Juncus tenuis</i>
Bebb Willow	<i>Salix bebbiana*</i>
Narrowleaf Plantain	<i>Plantago lanceolata</i>
Chicory (Blue Sailor)	<i>Cichorium intybus</i>
White Aster	<i>Aster spp.</i>
Cypress Spurge	<i>Euphorbia cyparissias*</i>
Common Tansey	<i>Tanacetum vulgare</i>
Common Mullien	<i>Verbascum thapsus*</i>
Yarrow	<i>Achillea millefolium</i>
Hair Cap Moss	<i>Polytrichum commune</i>

Canada Toadflax	<i>Linaria canadensis</i>
Sheep Fescue	<i>Festuca ovina</i> *
Little Bluestem	<i>Schizachyrium scoparium</i>
Switch Grass	<i>Panicum virgatum</i>
Panic Grass	<i>Dichanthelium acuminatum</i>
Common Evening Primrose	<i>Oenothera biennis</i>
Slender Goldentop	<i>Solidago tenuifolia</i>
Common Milkweed	<i>Asclepias syriaca</i>
Oriental Bittersweet	<i>Celastris orbiculatus</i> *
Russian Olive	<i>Elaeagnus angustifolia</i> *
Multiflora Rose	<i>Rosa multiflora</i> *
Poison Ivy	<i>Toxicoden radicans</i>
Virginia Creeper	<i>Parthenocissus quinquefolia</i>
Woolly Beachheather	<i>Hudsonia tomentosa</i>
Common St. Johnswort	<i>Hypericum perforatum</i>
Queen Anne's Lace	<i>Daucus carota</i>
Western Pearly Everlasting	<i>Anaphalis margaritacea</i>
Canada Thistle	<i>Cirsium arvense</i>
Russian Thistle	<i>Salsola kali</i>
Earth Star	<i>Cryptanthus spp.</i>
White Clover	<i>Trifolium repens</i>
Red Clover	<i>Trifolium pratense</i>
Hydrophobic Grasses (Upland)	<i>Graminae spp.</i>
Eastern Hemlock	<i>Tsuga canadensis</i>
Winged Euonymus	<i>Euronymus alatus</i> *
Eastern Hayscented Fern	<i>Dennstaedtia punctilobula</i>
Haircap Moss	<i>Polytrichum commune</i>
Curly Dock	<i>Rumex crispus</i>

Note: for a complete "working" list of plants and animals please see the attached and electronic Excel workbook, which lists all Conservation Commission owned parcels associated with this project and can easily be updated as information from additional observations become available. This workbook is created as a working document which can be continually updated.

c. **AQUATIC, RIPARIAN OR WETLAND FEATURES**

3.2.1 *Land Under the Ocean*

As defined in 310 CMR 10.25(2), "land under the ocean means land extending from the mean low water line seaward to the boundary of the municipality's jurisdiction and includes land under estuaries." As such, the tidal portion of the Herring River and its estuaries are considered land under the ocean, which is protected by the Act and the Town of Harwich wetlands bylaw.

Land under the ocean includes all the Herring River south of the fish ladder located off Depot Street. The tidal area is significant to the interests of storm damage protection as well as wildlife habitat (e.g. a tremendous Blue Shell Crab fishery, shellfish, finfish to include the anadromous Herring fish run, and shorebird habitat).

3.2.2 *Salt Marshes*

As defined in 310 CMR 10.32(2), “salt marsh means a coastal wetland that extends landward up to the highest high tide line, that is, the highest spring tide of the year, and is characterized by plants that are well adapted to or prefer living in, saline soils. Dominant plants within salt marshes are salt meadow cord grass (*Spartina patens*) and/or salt marsh cord grass (*Spartina alterniflora*). A salt marsh may contain tidal creeks, ditches and pools.” According to this definition, there are extensive salt marsh resources along the tidal portion of the Herring River that span for several hundred feet along sections of the tidal river. These salt marsh resources are protected stringently by the Act, and are significant to the interests of storm damage protection and wildlife habitat, including refuge for finfish, shellfish, and shorebirds. Of note are several large areas of the invasive Common Reed (*Phragmites australis*) that are taking over large areas of salt marsh. This can be seen along several sections of Bells Neck Road and North Road.

BSC scientists recorded ten holes in the salt marsh where *Iva frutecens* was dug and removed.

3.2.3 Land Containing Shellfish

“Land containing shellfish means land under the ocean, tidal flats, rocky intertidal shores, salt marshes, and land under salt ponds when any such land contains shellfish” [310 CMR 10.34(2)]. There are minor shellfish resources within the southern portion of the Herring River adjacent to Route 28, its surrounding land under that ocean, tidal flats, and salt marshes, which are protected by the Act. Land containing shellfish is limited by mucky soils and reduced tidal flushing as you move up the river and away from the Ocean and Route 28.

3.2.4 Land Under Salt Ponds

A salt pond is a shallow enclosure or semi-enclosed body of saline water that may be partially or totally restricted by barrier beach formation. Land under salt ponds is defined in 310 CMR 10.33 as providing an excellent habitat for marine fisheries. The high productivity of plants in salt ponds provides food for shellfish, crustaceans and larval and juvenile fish. Salt ponds also provide spawning areas for shellfish and are nursery areas for crabs and fish. In addition to the many birds which feed on fish found in salt ponds, waterfowl also eat invertebrates such as mollusks and crustaceans, which in turn depend on bottom sediment vegetation. There is a large salt pond located west of Bells Neck Road and north of North Road that is tidally influenced by the Herring River. This Blue Shell Crab spawning ground provides exceptional habitat for the crabs and a wonderful crab fishery at the walking bridge at the end of North Road. It also provides an exceptional spawning ground for bait fish and a food source and resting area for migratory birds.



3.2.5 Bordering Vegetated Wetlands (BVW)

BVW is defined in 310 CMR 10.55(2) as freshwater wetlands which border on creeks, rivers, streams, ponds, lakes, or on a coastal wetland resource areas touching a water body. Often BVW's are considered wet meadows, marshes, swamps, and bogs. BVW's provide, the most important inland wildlife habitat, and as such, are regulated strictly by the Act. Bells Neck includes large expanses of BVW's associated with the Herring River and West & East Reservoir. Large stands of *Phragmites* have been noted in several of these areas along the southern section

of Bells Neck Road and North Road. These areas provide important wildlife habitat and an invasive species monitoring and removal program should be considered to prevent spreading of *Phragmites* (see Appendix 4).

3.2.6 Land Subject to Coastal Storm Flowage (LSCSF)

Land subject to coastal storm flowage is afforded protection under 310 CMR section 10.02(1)(D) and is defined in 310 CMR 10.04 as “land subject to any inundation caused by coastal storms up to and including that caused by the 100-year storm, surge of record or storm of record, whichever is greater” and is identified on the Town of Harwich FEMA Flood Maps. Typically LSCSF refers to any land within the 100 year floodplain which is within the zone as designated by the Office of Coastal Zone Management. Please note, LSCSF is not specifically listed in the regulations, but is covered in the language of 310 CMR 10.02(1)(D) and 310 CMR 10.21 and defined at 310 CMR 10.04. The southern tidal section of the Herring River from the fish run to the ocean including some of the surrounding uplands is within LSCSF.

3.2.7 Land Under Waterbodies and Waterways (Inland Wetlands).

Land Under Waterbodies and Waterways is presumed to be significant to all the values in the act (310 CMR 10.56) and is defined as the land under any creek, river, stream, pond, or lake. The Herring River above the fish ladder and the West reservoir are considered Land Under Waterbodies and Waterways. Streams are defined at 310 CMR 10.04 as a body of water which moves in a definite channel on the ground due to hydraulic gradient and which flows in, out or within areas subject to protection under the Act at 310 CMR 10.54(4)(a). The Herring River is considered a perennial stream.

3.2.8 Isolated Vegetated Wetlands/Isolated Land Subject to Flooding & Vernal Pools

Isolated Vegetated Wetlands/Isolated Land Subject to Flooding is presumed to be significant to all the values in the act (310 CMR 10.57) and is defined as an isolated depression or a closed basin which serves as a ponding area for run-off or high ground water which has risen above the ground surface. According to the 2008 Natural Heritage and Endangered Species Atlas, 13th Edition, there are no vernal pools listed for the site (as of October 1, 2008). However, the Town of Harwich has certified two vernal pools at the Site, as shown on the Mass GIS online viewer OLIVER, with a third listed as “potential” (see Appendix 6, Vernal Pool Certifications). BSC has also identified a potential vernal pool located north of Great Western Road, northwest of the active cranberry bog located adjacent to the property. This pool, in particular has been used in the past as a dumping ground and contains a large amount of debris to include scrap metal, car parts and tires. These potential vernal pools should be considered high priority habitat, monitored, and certified as vernal pools with the Natural Heritage and Endanger Species Program to ensure protection to be protected. Additional efforts to clean some of the debris from the potential northern pool may be beneficial to the longevity and health of the pool. These areas are also important in the protection of ground water, storm water run-off and retention. Additional studies should be considered to see if the pool north of Great Western Road has a hydrological link to the Herring River, and if the debris within the wetland is impacting the water quality of the river.

3.2.9 Banks of or Land Under the Ocean, Ponds, Streams, Rivers, Lakes or Creeks that Underlie Anadromous/Catadromous (“Fish Runs”)

Banks of or Land Under the Ocean, Ponds, Streams, Rivers, Lakes or Creeks that Underlie Anadromous/Catadromous fish runs are presumed to be significant to the values of the act (310 CMR 10.35) and the protection of marine fisheries. The “Fish” are renewable protein resources

that provide recreation, aesthetic and commercial benefits. In addition, throughout their life cycle, such fish are important components of freshwater, estuarine, and marine environments and are food sources for other organisms.

Spawning migrations of fish also provide a direct link between marine and freshwater ecosystems. This link plays a role in maintaining the productivity of fisheries. The Herring River is an Anadromous/Catadromous fish run used by Herring to access a series of ponds for breeding to include West Reservoir, Hinckleys Pond, Seymour Pond, and Long Pond which are also connected to Robbins Pond, Black Pond, Greenland Pond, Smalls Pond, Mill Pond, and Cahoon Pond. All of the ponds eventually drain into the Herring River and potentially affect the water quality of the river and fish run. Equally important is the role of the river and ponds as American Eel habitat.

3.2.10 Estimated Habitat of Rare Wildlife

Estimated Habitat of Rare Wildlife is significant and presumed to be significant to all the values in the act (310 CMR 10.37 (Coastal) 310 CMR 10.59 (Inland)) and is defined as those vertebrate and invertebrate animal species officially listed as endangered, threatened, or of special concern by the Massachusetts Division of Fisheries and Wildlife under 321 CMR 10.60. All of Bells Neck is within Estimated Habitat of Rare Wildlife, which should be considered when managing the areas network of trails, parking and roads. A supplemental document containing the endangered species shall be submitted to the Conservation Commission with this report. Identification and locations of endangered species information contained in this report should be kept separate from the user public in order to protect the listed species.

d. *INVASIVE SPECIES AND NOXIOUS WEEDS, PRESENCE OR ABSENCE*

Please note all invasive species found are noted with an asterisk in “Vegetation” (part b.) above. However, several invasive species were NOT noted within Bells Neck and should be monitored and removed if introduced into the area. Common species found and to look for are:

Japanese Knotweed	<i>Polygonum cuspidatum</i>	Found
Mile-A-Minute Weed	<i>Persicaria perfoliata</i>	Not Found
Glossy Buckthorn	<i>Frangula alnus</i>	Not Found
Norway Maple	<i>Acer platanoides</i>	Found
Common Reed	<i>Phragmites australis</i>	Found
Black Locust	<i>Robina pseudoacacia</i>	Found
Russian Olive	<i>Elaeagnus angustifolia</i>	Found
Bittersweet Vine	<i>Celastrus scandens</i>	Found
Nightshade	<i>Solanum spp.</i>	Found
Pitch Mass Borer	<i>Synanthedon pini</i>	Found
Winter Moth	<i>Operophtera brumata</i>	Found
Hemlock Woolly Adelgid	<i>Adelges tsugae</i>	Not Found
Asian Long Horned Beetle	<i>Anoplophora glabripennis</i>	Not Found
Multiflora Rose	<i>Rosa multiflora</i>	Found
Sycamore Maple	<i>Acer pseudoplatanus</i>	Found
Morrow's Honeysuckle	<i>Lonicera morrowii</i>	Found
Purple Loosestrife	<i>Lythrum salicaria</i>	Found
Gypsy Moth	<i>Lymantria dispar</i>	Found

The aforementioned listed invasive species that were not found in Bells Neck are found within the Town of Harwich and other parts of Massachusetts and therefore should be monitored. Currently the best treatment for invasive species (plants) is Glyphosate herbicide solution (such as Rodeo Brand). This herbicide has a very short half life in Cape soils and can be used within and around wetland resource areas. Each species should be treated differently and only by a knowledgeable professional specializing in invasive species removal and certified as a Licensed Chemical Handler by the State of Massachusetts. Three basic types of treatment consist of cutting vegetation and wiping or spraying the chemical on the stumps or stems, using a foliar sprayer to spray foliage, and stem injections. Treatment of the moths and borers can also be done by spraying species specific pesticides (such as Sevin) in high volume areas where the “pests” are doing the most damage. This course of action is not recommended because Sevin is non-selective and will harm beneficial species.

Treatment and removal of invasive species should be directed to small new colonies of invasives. These areas should be eradicated and monitored to prevent spreading. Control should then shift to mid-size areas that have the potential to spread, but are small enough to control. Finally, large areas should be monitored and prevention should turn to stopping the spread of the invasive and not complete eradication of invasives. This may be too expensive and labor intensive.

e. THREATENED, RARE OR ENDANGERED SPECIES

Please see Section 3.2.10 (Estimated Habitat of Rare Wildlife) above and the attached supplemental documentation obtained from Natural Heritage and Endangered Species Program. This information is not being provided in this public document as the location of types of rare and endangered species should be protected and remain unknown to the general public unless absolutely necessary. By doing so, the Town of Harwich Conservation Commission can be assured that no one will go out looking for or collecting the protected species.

4.0 PHYSICAL LAND USE, PUBLIC ACCESS

Bells Neck has many different access points and land uses. The land is used by hunters, fisherman, walkers, hikers, bike riders, wildlife observers, artists, people using metal detectors, a cranberry operation, Blue Shell Crab fishing, Herring observers, Boy Scouts, classroom field trips, canoe and kayakers, etc. Access to Bells Neck can be gained off Bells Neck Road (north and south of Great Island Road or north of Route 28), Depot Street, North Street, the bike path and the Herring River. Parking can be found off Bells Neck Road adjacent to the Reservoir where canoes, kayaks, fisherman, walkers, bikers access at the end of North Street and Smith Street where a walking bridge is used to access Blue Shell Crab Fishing and off Depot Street where the Herring Fish Ladder is located with parking, boat access, hiking trails, fishing, hunting and cranberry operations.

Alterations in parking should be considered at the Depot Street parking area. The current parking abuts the Herring River at the top of the fish ladder. There is no buffer zone or erosion protection in this area. Measures should be taken to move the parking area upland and to create a shrub and herbaceous buffer zone along the edge of the river. The new buffer zone should be protected and interpretative signage should be used to keep people out of this sensitive area. Additional considerations should be taken to relocate the boat ramp away from the Herring River to a less sensitive location, such as Bells Neck Road.

All parking areas should have signage describing the sensitivity of the resource areas and promote trash removal as well as staying on existing trails. Many of the access trails around Bells Neck

contain side trails used to access the water for fishing and swimming. Many of these trails are located on steep slopes and are eroding into the resource areas. These trails should either be removed completely and planted for stability or mulched and graded to prevent run-off. Exposed Pitch Pine roots along trails promote borers that prefer the Pitch Pine and are attracted to the pitch-resin. These well used trails could be covered with Oak chip mulch, which will protect the soils, roots, prevent erosion and reduce the borer damage to Pitch Pines. Finally, reducing the width of trails to a single track walking trail will reduce the use of off road vehicles (ORV), cars and trucks and reduce erosion. As trails continue to widen, more soils are lost and compacted and more roots are exposed damaging more trees. Replanting or mulching and roping off sections for regrowth with signage informing the public of the project should be a consideration in some areas like from Bells Neck Road to the Herring River fish ladder and north of Great Western Road at the end of Bells Neck Road (North) where BSC watched a jeep drive along the walking trail. Also large stones can be used at trail heads to further prevent ORV traffic.

5.0 MANAGEMENT GOALS & ENVIRONMENTAL IMPACTS

a) Biological Elements: Goals and Environmental Impacts:

Primary goals for Bells Neck and all of its parcels is to minimize impacts, maximize passive public usage, protect native habitat and provide interpretive education to the user public. This can be done in many ways and could be achieved by involving the Boy Scouts, local schools, Arbor Day projects, Americorps, volunteers, grants, non-profit organizations¹, etc. Impacts can be minimized the following ways:

- i. **Reducing the width of trails:** Reducing the width of trails will reduce impacts to soils, reduce erosion, increase buffer zones to resource areas, help reduce ORV and vehicular traffic, reduces root impacts and maximizes wildlife habitat protection.
- ii. **Preventing ORV traffic on trails:** ORV and vehicular traffic creates erosion, impacts to tree roots, widens trails, and is a danger to passive recreational users. They are often driven through wetlands, can tip over and leak fuel, oil or coolant which can endanger wildlife and waterways; they also create a noise pollution, which disturbs wildlife and the use of their habitat.
- iii. **Improving buffer zones to resource areas:** This can be done by moving parking lots, like the Depot Street lot and Bells Neck Road, away from the wetlands to recreate a natural buffer zone. Also, by reducing trail width and closing off trails, you will regain buffer habitat. Buffer zones are important for a variety of reasons and are protected by the Wetlands Protection Act and Town of Harwich Wetlands Protection By-law.
- iv. **Reducing erosion from trails and access roads:** This can be accomplished by narrowing trails, removing steep trails leading into the ponds and river, mulching trails with Oak mulch which will also reduce Pitch Pine borers and installing water bars. Symbolic fencing and signage can be used to keep people out of these high erosion areas while they are stabilizing. Large trees, boulders, and gates may be used across trails to prevent access, close an area off or prevent ORV use.
- v. **Maintaining healthy ecosystems:** Removing invasive species and maintaining buffer zones will promote wildlife habitat. Trails should be located to reduce impacts to endangered species habitat, nesting sites for turtles, otter runs and should not block or segment highly used wildlife corridors. Turtle nesting grounds were located in a bank near the last bog off of Depot Street where the bogs drain back into the Herring

¹ Use of volunteer organizations without professional supervision (licensed professionals) can cause significant damage to ecosystems. Use of unsupervised Americorp volunteers at the Talbots Point Conservation Area in Sandwich caused the loss of habitat and resulted in infestations of Pine Borers in century old Pitch Pines.

River. Another important and impacted nesting site was located northeast of the Reservoir (west of Bells Neck Road) on a sandy south facing bank above the pond. This area is being highly used by mountain bikers, fisherman and walkers. An otter run was located just north of the boat launch off Depot Street.

- vi. Herring River: Protection of the Herring run is critical when discussing Bells Neck. Reducing run-off, poaching, debris along the river, erosion and water quality are all factors that should be considered to maintain and improve the quality of this vital resource. These things can be accomplished by improving buffer zones, parking areas, public awareness, installing erosion controls and issuing fines to violators. To further protect the anadromous fish, perhaps the town could approach the Division of Marine Fisheries to determine if a town by-law could be created to provide additional protection to the fisheries. By-laws to protect fisheries have been adapted in the Town of Barnstable which are enforced by non-criminal citations with fines.
- vii. The Depot Street Cranberry Bog: The Depot Street cranberry bogs are currently flooded with reservoir water. The intake to the sluice way is adjacent to the fish ladder. BSC noted hundreds of fish and frogs within the bog ditches to include Herring fry, Bass, Perch, Bull Frogs and Green Frogs. Additional controls should be considered to prevent fish from being sucked in during cranberry bog operations. It is unclear what cumulative impacts this might be having on the Herring Run, but it is clear that herring fry are lost during the flood and flow stages of the cranberry operations. This bog is currently being leased from the town to the bog owner and may be reclaimed to create a natural river outlet from the reservoir with wetland flood plain. This could create a more natural Herring run and all new bordering vegetated wetland and wildlife habitat, which could possibly include a vernal pool, Atlantic White Cedar swamp or native Cranberry/Blueberry picking area open to the public.

b) Invasive Species:

- i. Invasive species are plants or animals that are introduced or not native to an area and that have no natural biologic controls. Invasive species typically spread rapidly and are prolific seeders/breeders that are difficult to remove once established in an area. Invasives create a monoculture and out compete and eradicate native species. Removal and management of invasives is an important part of any land management plan. A healthy ecosystem is a diverse habitat with the ability to provide for an array of wildlife and plants. Removal and management of invasives promotes bio-diversity and native plant and animal communities.
- ii. Bells Neck has eight priority areas for invasive species removal (see map in Appendix 4):
- iii. The most commonly used and safest treatment for invasive plants is a Glyphosate based herbicide solution like Rodeo Brand. Glyphosate is safe to use in and around wetlands and kills the root system of plants by absorption into the circulatory system of the plants via the leaves or fresh cut stumps and destroying the root system; thus eliminating the plant. Glyphosate is NOT listed as a chemical of concern that contaminates groundwater. The best time of year to use the herbicide is typically during the summer months as plants use a great deal of energy to leaf out and flower. The treatments should always take place prior to a plant going to seed to reduce the potential of additional plants forming in following years and spreading invasives upon removal. Treatments should always be done by a licensed chemical handler who has experience treating and removing invasive species.
- iv. Pitch Pine Borers were also noted along trails where Pitch Pine roots were exposed. The borers smell the resin from the damaged roots and attack the trees. This can be managed by reducing erosion, reducing the trail width and putting oak chips over

exposed roots. This should be done in the spring and monitored through summer when resin flows are greatest. There are chemical treatments for borers, however none are being proposed at this time.

c) Public Use Elements: Goals and Environmental Impacts:

Public use recommendations for Bells Neck consist of relocating the parking area at the fish ladder away from the Herring River to include fencing and replanting the buffer zone, minimizing trail width and erosion, and considering a trash receptacle and mutt-mitt program in a few high volume areas. Relocation of the boat launch from the Depot Street Parking area at the Herring River to Bells Neck Road would reduce turbidity and activity at the mouth of the Herring River fish ladder. Berms should be considered on both sides of Bells Neck Road along the Reservoir to prevent erosion into the ponds. Also additional parking should be considered off Bell Neck Road if the boat launch is relocated there. If additional parcel(s) are purchased off of Depot Street adjacent to the Bike Path additional parking should be considered for bike path users and to reduce parking congestion at the redesigned Depot Street fish ladder.

Americans with Disabilities Act (ADA) compliance can be gained at the Depot Street parking area near the fish ladder if the parking lot is redesigned to include handicap parking and pervious pavers. Pervious pavers allow water to infiltrate naturally, reduce erosion and are hard enough for wheelchair use. Additional upgrades could include a set of ramps and bridge to cross the Herring River fish ladder to allow for a view of the fish run and a pervious paver seating area for wildlife viewing, fishing, education, and picnicking. This area across the fish ladder could also include an ADA compliant pier with viewing/fishing platform and even a dinghy dock for canoe and kayak access away from the Herring Run. Because the pond elevation is controlled the pier, ramp and float could be designed for handicap use. Another area to be considered is the land adjacent to the bike path, which the town may consider purchasing. A new pervious paver parking area with access to the already paved bike path would provide easy access to Bells Neck and a nice scenic stretch of the bike path. Also, existing cranberry bogs could be allowed to revert into an Atlantic White Cedar swamp, Blueberry patch, vernal pool habitat, or Bordering Vegetated Wetland and could include elevated walkways for handicap access and education. Additional exploration of this area (if purchased) could include a section of pervious paver trail in the woods with overlook and turnaround, again following ADA standards. Grant money may be available for this type of project.

Additional discussions have focused on a bridge and walkway from the existing boat launch off Depot Street moving north toward the bike path. This would make for a beautiful boardwalk but would bisect numerous wetland resource areas, and would require cutting vegetation within the resource area, fill within a water body, and disturbing an existing Otter slide, and would require mitigation for impacts. In addition, the Town of Harwich Engineer would have to look at the ability to build a stable structure within the bordering vegetated wetland and water body. Following assessment from the Town Engineer, and development of construction protocols, construction methodology and permitting protocols, the town can look at impacts, mitigation, and costs. Additional information would be needed before BSC could recommend installing a structure in this area as the environmental impacts appear to outweigh the aesthetic benefits. An alternative to this would include using the existing cranberry bog bridge at the sluice to access the abutting land to create a loop trail north to the bike path. This alternative would include working with the bog operator and keeping recreational users from impacting bog operations. Also, if the town plans to continue leasing the land for bog

operations or considers the alternative previously mentioned regarding restoration of the bogs into wetland habitat; this could include a new bridge and ADA compliant paths and viewpoints.

Habitat fragmentation is of highest concern within the 50-foot buffer zone to the wetlands. An undisturbed buffer zone allows wildlife movement along the wetlands creating wildlife corridors. There are many finger trails off the main trail that extend to the edge of the Reservoir. Many of these trails are on steep hillsides and not only fragment buffer zone habitat but also increase soil erosion into the wetland. Reducing the number of finger trails will greatly improve a buffer zone “habitat corridor” around the wetland resource areas. In addition, closing or reducing trail widths will also increase the natural vegetated buffer zone while reducing animal exposure to predators when crossing or using trails. For example, on the northwest peninsula into West Reservoir, dozens of Painted Turtle nest sites were discovered. These nests had been driven over by off-road vehicles and disturbed by party goers effectively damaging the nesting area which included fire pits in the nesting area. All public use of this valuable nesting site should be stopped.

Bells Neck Road also crosses through the center of the Conservation Area bisecting the two ecosystems (salt water portion of the Herring River and freshwater Reservoir). Maintaining the road as a dirt (secondary) road will reduce disturbance to wildlife movement. Two areas of North Road should be looked at for wildlife passage, tidal influence and invasive species. They are both located in the southern portion of the road closest to Route 28. The two points have salt marsh on both sides and only one has a culvert to allow a flood and ebb of water. These areas may benefit from installing open bottom box culverts to allow for the natural ebb and flood of tidal water. Both of these areas also have a high population of Phragmites, which may be reduced with the additional flooding of salt water. This may also reduce flooding in the tidal section of the Herring River especially just north of the North Road and Smith Street intersection on North Road where no culvert exists and the water elevation is very close to the roadway elevation. This location also maybe a good test area for large Phragmites treatment and response as it is relatively dry and could be treated and planted with native salt marsh grasses before installing the culvert. Finally, Town of Harwich grading operations are pushing a significant volume of road fill into the Bordering Vegetated Wetland and Salt Marsh along Bells Neck Road, which are protected wetlands. Such operations are lowering the road allowing spring tides (April 9th) to cover the road. Also as previously mentioned, *Iva frutescens* is being dug out of the salt marsh east of the parking lot.

6.0 FIVE YEAR MAINTENANCE SUMMARY

a) Goals and Desired Future Conditions:

The overall goals of the Bells Neck Land Management Report is to minimize impacts to the natural resource areas of Bells Neck while still providing an acceptable level of access for recreational use. This can be accomplished in the following phases:

- i. Eliminate small (new) colonies of invasive species. This can be accomplished by hiring an outside consultant who is a Massachusetts Licensed Chemical Handler. The consultant should be knowledgeable in invasive species removal and have prior experience. Additional larger colonies should be managed and monitored within the first 3 years to prevent additional spreading and new colonization.
- ii. Several small finger trails should be eliminated, starting with the steepest grades and highest erosion (located mostly in the northeast portion of the Reservoir).

These trails come in off the power line and significantly damage turtle nesting habitat. Other access points should be outfitted with water bars, grade changes, mulching trails (also use for Pitch Pine Borer Control) and a reduction in trail width. Trail work can be done by volunteers, Boy Scouts, Americorps, Appalachian Mountain Clubs Adopt A Trail Program, Arbor Day festivities, Town of Harwich DPW, Harwich Trails Committee, local arborist, etc.² Costs will vary depending on volunteer time and how much equipment the town currently owns. Symbolic fencing and signs can be used with boulders and large downed trees left in place to prevent access to closed trails. An educational program can be implemented in the public school system to create a website for the parcel and by talking with people who are using the trails. The program can also incorporate trash bins and mutt mitts during high volume periods in the summer and pack out program in the off seasons. Consideration of this program will help to reduce trash and debris being left around the site and resource areas.

- iii. Increase buffer zones and reduce trail widths. The width of trails should be minimized to reduce erosion, prevent ORV use, increase buffer zones and wildlife habitat and lessen soil impacts. This can be done using a variety of techniques such as planting the trail edges and installing symbolic fencing to keep users out; installing large boulders or fire gates across trail heads to reduce ORV traffic, using citations for ORV use in unauthorized areas and using large tree obstacles across paths to reduce ORV use³.
- iv. Two potential vernal pools are located west off the access trail and Bells Neck Road North and one certifiable vernal pool north of the large working cranberry bog. These should be certified and a large expanse of Russian Olive (*Eleagnus angustifolia*) surrounding the certifiable vernal pool should be scheduled for removal.
- v. Relocating the parking area at the Herring River fish ladder and improving the buffer zone is also a top priority. This can be done with Town of Harwich DPW workers and can be combined to include a pervious paver walk and parking for handicap access and a new (ADA) bridge over the fish ladder. The Town of Harwich Engineer can also look into a bridge near the boat ramp (as proposed by the Trails Committee) and impacts can be mitigated using the relocation of the parking lot and boat ramp as well as additional plantings along the buffer zone. At this time the parking area off Bells Neck Road should be expanded if the boat launch is to be relocated. Also the Town should consider closing the Depot Street access to the Herring ladder during the spring Herring spawning while the Division of Marine Fisheries closure to the taking of Herring is in effect. However, access may be granted for educational purposes.
- vi. Purchasing the land north of the Depot Street parking lot to connect to the bike path and create a loop trail with additional parking near the bike path, which could incorporate ADA standards and pervious pavers for handicap access to the bike path and maybe a trail with overlook through the woods. The cranberry bog should also be considered for conversion into a bordering vegetated wetland, Atlantic White Cedar swamp or maybe community blueberry patch. Restoration of the cranberry bog could be included in an overall improvement for mitigation of other activities such as the parking area, trails, bridges, etc.

² As earlier stated, please refer to Footnote #1

³ In numerous Cape towns the use of noncriminal citations for environmental enforcement of local by-laws are effectively used to control off-road violations. In these cases, the offender has the option to pay a civil fine to the Town or contest it in a court of law.

- vii. Taking the town leased cranberry bogs at the mouth of the fish ladder located off Depot Street and converting them into a natural flowing river and flood zone and bordering vegetated wetland. This could include a new Herring run, connection from the Herring River to the Reservoir, Atlantic White Cedar Swamp, blueberry/native cranberry patch open to the public, vernal pool habitat, new trail system, additional flood storage for the river and Reservoir, ADA compliant boardwalks, bridge, and an alternative trail connection to the northern property (if purchased by the town), and the bike path. This can be done with Town of Harwich workers, volunteers, Boy Scouts, students, etc and funding can be sought from several non-profit organizations, local, State and Federal authorities. A great example of this is the recently completed Town of Plymouth Eel River Headwaters Project, which converted large sections of cranberry bogs along the Eel River back into the natural river with flood zone and removed several dams to allow the American Eels, Brook Trout, and other fish to once again pass unrestricted. Conversion of cranberry bogs to wetlands and rivers also removes any chemicals bog operations may be using from the system and can improve overall health, water quality, and flood storage of the system.
- b) Timing for the above projects should follow the order listed and be considered over the next five years with the final goal being accomplished within the next 10 years depending on the current lease program. They should be accomplished as funds become available. Trail maintenance/monitoring work should be ongoing with work done in the fall and spring.
 - c) Costs for the above a(i-vii) will vary greatly depending upon the use of outside consultants, permits required, volunteers obtained, and how much the Town can do in house. Here are estimates for each goal based on past experience current pricing and without outside consultants.
 - i. Cost for invasive species removal including permitting, treatment, removal, monitoring, and retreating over a 3 year cycle: \$10,000.00
 - ii. Removal of finger trails which can be done in house with volunteers and should only need limited equipment, training, and organization efforts. Estimated costs: depending on existing Town equipment needs: \$5,000.00
 - iii. Trail work and trail maintenance should be done twice a year with the help of volunteers to the extent feasible. Again general equipment and training is needed as well as organization efforts. Estimated costs: \$1,500.00/year
 - iv. Depot Street Parking/Bells Neck Parking Areas should be done by the Town of Harwich DPW and costs would include mitigation plantings, signage, fencing, pervious pavers, ADA access areas and ADA bridge over Herring River fish ladder. Estimated costs: \$35,000.00,
 Bridge through resource area at the boat launch, to include permitting and materials. Estimated costs: \$25,000.00
 Pier with viewing platform (ADA compliant). Estimated costs: \$20,000.00
 Purchasing the land north of Depot Street Parking will be based on the cost agreed to by the seller and the Town of Harwich. Construction of trails depends of if ADA pervious pavers are used for a trail and/or parking. Work to be completed by Town of Harwich DPW, non-profit organizations, and volunteers. Estimated cost for trails and parking with pavers: Estimated \$20,000.00.
 Cost for converting wetlands (depends on vegetation planted), permitting, plants, equipment): Estimated costs: \$45,000.00

- v. Cost to convert town owned and leased cranberry bogs to natural stream with wetlands (also depends of vegetation planted), permitting, equipment, plants: Work done by Town of Harwich DPW, volunteers, non-profit organizations, Estimated costs: \$55,000.00
The Town should consult with the Massachusetts Division of Ecological Restoration (DER) for funding and technical assistance options.

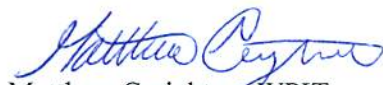
Bells Neck Goals and Objectives Pricing Breakdown in Dollars (\$)

	2013	2014	2015	2016	2017
Invasive Species	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500
Removal of Trails	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000
Trail Maintenance	\$1,500	\$1,500	\$1,500	\$1,000	\$500
Depot Street Parking	\$1,500	\$2,500	\$2,500	\$2,500	\$25,000
	(planting)	(grading, paving)	(fencing)	(signs)	(bridge & platform)
Bells Neck Road Parking	\$1,500	\$2,500	\$2,500	\$2,500	\$25,000
	(planting)	(grading, paving)	(fencing)	(signs)	(bridge & platform)
Land Purchase	-	-	-	\$50,000	\$150,000
Flood Plain Restoration	-	-	\$5,000	\$25,000	\$25,000

Please note these are rough estimates only and all components for work may not be included. Funding for these projects can come from various non-profit organization, State and Federal Grants and local fundraising efforts. Additional funding could come from a change in the Town of Harwich by-law, which would allow Town Officials to issue citations to anyone caught breaking the rules on Town of Harwich owned lands.

After you have had a chance to review this Land Management Report, please do not hesitate to call me with your questions

Sincerely Yours,
BSC GROUP, INC.



Matthew Creighton, WPIT
Project Manager
Environmental Scientist