Aquinnah Headlands Preserve

Aquinnah,
Massachusetts

North Head

South Head

Management Plan

May 5, 2010

Approved by the Aquinnah Town Advisory Board (February 25, 2010, amended 5-5-2010)
Approved by the Martha's Vineyard Land Bank Commission (March 1, 2010, amended 4-26-2010)
Approved by the Secretary of the Executive Office of Energy & Environmental Affairs (May 28, 2010)

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Executive Summary

Aquinnah Headlands Preserve is 48.5 acres located on the western promontory of Martha's Vineyard, MA. The conservation of this land not only protects the animals and plants that inhabit the preserve; it conserves the cliffs and surrounding land which are "historically, geologically and scenically….the most important site(s) on Martha's Vineyard" (Eleanor Mayhew 1959, p. 126).

The cliffs including the land atop are sacred to the Wampanoag Tribe as they were chosen by Moshup as his home. Moshup is considered by the Wampanoags as a "benevolent being" (Aquinnah Cultural Center (ACC) Map) who created the island "Noepe". The fossils found in the cliffs today represent the leftovers from Moshup's table (ACC Map). As time unfolded, the cliffs continued to inspire sailors, explorers and all those lucky enough to afford a steamboat passage from local and distant ports. The famous explorer, Bartholomew Gosnold, who named the island Martha's Vineyard, was so awestruck by the cliffs he referred to them as "Dover Cliffs" in 1602 (Banks 1966). The cliffs were later given the name, "Gay Head Cliffs" by sailors on British whaling ships in 1662 who sailed out of New Bedford. The site of the cliffs on their return signified "home" to local sailors and was mentioned in whaling logs and journals (Mayhew 1956). Birders from around the globe seek out the cliffs for rare sitings of birds to add to their "life-lists" and, if they are lucky, witness the visual migration of thousands of birds during the spring and fall.

The area of the preserve was once part of the "Indian Reservation" on Martha's Vineyard although the land was presumably sold into private ownership as early as 1661. It was not until 1870 that the "reservation" became the "District of Gay Head" (Banks II 1966). In the 1870 division of common lands, a survey plan by Pease and Pease of Gay Head divides the cliff into the "North Head Place" north of the Gay Head lighthouse and the "South Head Place" south of the lighthouse. For the purpose of this management plan the descriptive names of North Head and South Head will remain in use.

The preserve flanks the Aquinnah Circle. Much of the South Head has been open to the public since 1991. The existing Aquinnah town parking area provides vehicle parking for both the North and South Heads of the preserve. An existing trail connects the town parking area to the "drop-off" and main entrance onto Moshup Beach on the South Head. Four shorter trails, with no in-season vehicle parking, cross the dune to connect Moshup Beach to Moshup Trail in various locations between the "drop-off" and Philbin Beach. An estimated 26,000 visitors frequent the existing Moshup Beach during the summer months of July and August (based on summer use data from 2000-2009).

The preserve is located in an area close to the Aquinnah Shops and lookout, along the bike route from the Menemsha bike ferry and on the public transit authority route.

The preserve provides a unique opportunity for avian and floral studies as the land rises from sandy/cobble beaches to perched wetlands atop +100'-tall cliffs. Four general coastal habitats – coastal shrubland/grassland, coastal woodland, perched wetland and coastal dune/beach – compose the preserve. Of those four habitats, the coastal

shrubland/grassland complex dominates the preserve.

Six Massachusetts state-listed wildlife species – [redacted] – were recorded during surveys on the preserve; one state-listed avian species – [redacted] – was observed off-shore of the preserve; and seven state-listed avian species – [redacted] – were documented for the area of Gay Head Cliffs which includes the preserve. Three state-listed plant species – [redacted] – occur on the preserve. In addition, two plant species – [redacted] – are on the 2007 watch list in Massachusetts and occur on the preserve.

This management plan proposes creating 1,717 feet of off-season-use-only trail on the North Head to connect to 1,120 feet of existing old roads; creating two viewing areas on the North Head by utilizing past viewing areas, installing 16' of boardwalk over existing concrete footings and using low-impact symbolic fencing; creating an up-to-five-vehicle trailhead with one universal access space in a land bank easement area on town property abutting the Edwin Vanderhoop Homestead; creating 2,724' of a loop trail from the proposed trailhead and south of the Edwin Vanderhoop Homestead; maintaining an existing 3-vehicle trailhead (off-season use only) on the South Head of the preserve near Philbin Beach; and creating approximately 150' of universal access trail on the South Head with sweeping views of the South Head.

The management plan also proposes to relocate portions of the Moshup Beach trail and maintain other existing trail systems and boardwalks on the South Head to control erosion, heal the eroded dunes and stop the parabolic dune formation; remove the existing wooden tent platform and vegetate over the concrete slab on the North Head; maintain the coastal shrubland/grassland complex through annual mowing at a maximum and mowing every 3 to 5 years at a minimum of three areas for a total of 11.5 acres; monitoring and removing invasive species; closing existing trails; and protecting rare wildlife and plant species habitat on the preserve. (Site Management Maps follows the executive summary).

All planning goals, objectives and strategies are outlined in detail in the final section of this management plan. To be implemented, this plan must be presented at a public hearing and approved by the land bank's Aquinnah town advisory board, the Martha's Vineyard land bank commission and the secretary of the executive office of energy and environmental affairs (EOEEA). Additionally a notice of intent and Massachusetts endangered species act (MESA) review will be filed with the Aquinnah conservation commission and Massachusetts natural heritage and endangered species program (MA-NHESP) for work proposed within any bordering vegetated wetland and buffer zone as well as activity proposed in estimated and priority habitat for rare species.

About the authors

Julie Russell is the primary author and has been the land bank ecologist since August

1999. She is certified as a Wildlife Biologist by the Wildlife Society and holds a Master of Science in zoology from the Cooperative Wildlife Research Lab at Southern Illinois University, Carbondale, and a B.S. in wildlife biology from the School of Natural Resources at the University if Vermont. Property Foreman Matthew Dix has worked on land bank properties since 1990. He attended the School of Natural Resources at the University of Vermont and has extensive knowledge of the region's agriculture, natural history and local geography. Jeffery Komarinetz began as a conservation land assistant in March 2000; James Dropick began as a conservation land assistant in February 2006; and Jean-Marc Dupon began as a conservation land assistant in July 2007. Maureen McManus-Hill has been the administrative assistant since July of 2006; she has a B.A. in economics from Lafayette College.

Aquinnah Headlands Preserve, Aquinnah, MA
North Head Site Management Map

0 120 240 480 Feet

map created by JSS 2-25-2010

Aquinnah Headlands Preserve, Aquinnah, MA
South Head Site Management Map A

map created by JSS 3-01-2010

Aquinnah Headlands Preserve, Aquinnah, MA
South Head Site Management Map B

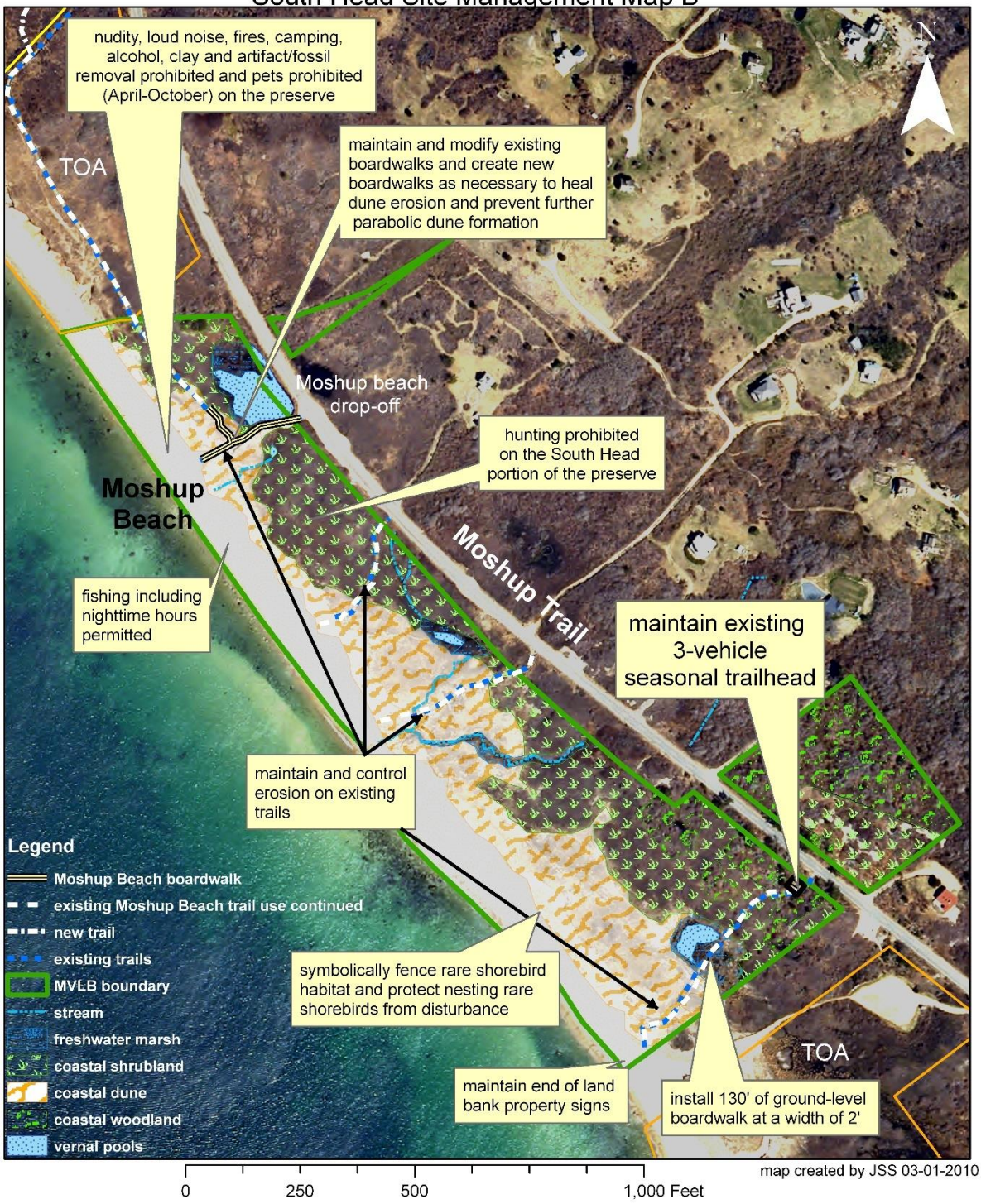


Table of Contents

I. Natural Resource Inventory 2
A. Physical Characteristics 2
1. Locus 2
2. Survey Maps, Deeds and Preliminary Management Plan Goals 2
3. Geology and Soils 2
4. Topography 3
5. Hydrology 4
6. Ecological Processes 5
B. Biological Characteristics 6
1. Vegetation 6
2. Wildlife Habitat 7
C. Cultural Characteristics 10
1. Land History 10
2. Planning Concerns 13
3. Abutters 14
4. Existing Use and Infrastructure 15
II. Inventory Analysis 20
A. Constraints & Issues 20
1. Ecological Context 20
2. Natural and Cultural Resource Concerns 20
3. Sociological Context 22
4. Neighborhood Concerns 23
B. Addressing Problems and Opportunities 23
1. Land Bank Mandate 23
2. Goals at Purchase 24
3. Opportunities 24
4. Universal Access (UA) 25
III. Land Management Planning 26
A. Nature Conservation 26
B. Recreation and Aesthetics 30
C. Natural Products 35
D. Community Interaction 36
E. Land Administration 37
IV. Literature Cited 40
Appendix A: Locus, Topography, Planning and Wetland Maps 44
Appendix B: Surveys, Deeds and Preliminary Management Plan Goals 51
Appendix C: Soils Maps and Descriptions 52
Appendix D: Vegetation 57
Appendix E. Wildlife 76
Appendix F: Avian Checklist and Seasonal Tables 85
Appendix G. Endangered Species 99
Appendix H. Abutters 104
Appendix I. Universal Access 108

I. Natural Resource Inventory

A. Physical Characteristics

1. Locus

Aquinnah Headlands Preserve is located at roughly 41°21' 00" N latitude and 70° 50' 00" W longitude. The property consists of 48.5 acres located along the bluffs of the Gay Head Cliffs and is shown on Aquinnah tax maps as 6-35, -37, -38, -39, -40, -41, -47.2, -15, -14, -12, -13, -4, -5, -6 and 10-57, -56, -55, -53, -54, -47, -48, -49, -46, -45, -44, -43, -42, -41. A **Locus Map** (USGS Topo 1973 1:24,000) follows as Appendix A.

2. Survey Maps, Deeds and Preliminary Management Plan Goals

Larger copies of all surveys are on file at the land bank office and are available for inspection by appointment. Deeds, preliminary management plan goals and reduced copies of surveys are included in Appendix B and are saved as the filename *Aquinnah Headlands Preserve Appendix B-1.doc, -2.doc, and -3.doc*.

3. Geology and Soils

The **General Soils Map** (Appendix C) depicts general classes of soils across Martha's Vineyard. A star indicates the location of the Aquinnah Headlands Preserve. The property occurs in soils classified as Eastchop-Chilmark-Nantucket that are generally identified as very deep, excessively drained to well-drained sandy and loamy soils. This broad soil type is often found in woodland or vegetated areas; has a nearly level to moderately steep topography; in general is not suitable for homesite use due to soil permeability; and covers approximately 27% of Dukes County. These general soils are formed from a combination of reworked glacial outwash, ice-thrusted coastal plain sediment, or glacial till over moraines (Soil Conservation Service (SCS) 1986). Outwash is material, primarily sand, that dropped out of suspension in glacial meltwater streams as these streams slowed and spread on their advance to the Atlantic Ocean. Rocks and coarser stones compose the moraine that marks the furthest advance of the glaciers (Hale 1988).

The SCS (1986) mapped eight soil series – Beaches, Berryland loam sand, Freetown/Swansea muck, Moshup loam, Nantucket/Plymouth complex, Ridgebury variant, Udipsamments and Whitman variant silt loam on the preserve. Within these five soil series there are eleven different soil types on the preserve as each series contains soils that differ in slope, permeability and stoniness. The complete list of soil types and discussion are included in Appendix C following a **Detailed Soils Map**.

The preserve sits atop one of the more famous geologic formations of the eastern seaboard – the Gay Head Cliffs, a U.S. Department of the Interior national natural landmark. The cliffs are a remarkable window into the time

before glaciation and tell a story of plants and marine life, warmer climates, swamps, marshes, lagoons and embayments as well as changes in climate. They are composed of pre-glacier coastal plain sediments from the late Cretaceous period (75 million years ago) including multicolored sands, clays, gravels and lignites. The cliffs also have a green layer from the Tertiary period (25-50 million years ago) (Oldale 1992).

The Wisconsin glacial advance, some 20,000 years ago, pushed the earlier strata into a pile that became the cliffs resulting in older layers occurring over younger layers. The boulders, off-shore, on the beach, and in the soils of the preserve, are part of a top layer of glacier till that covers the Cretaceous sediments (Oldale 1992).

The boulders on the preserve range from small to large and include a uniquely enormous conglomerate boulder inland approximately 300 feet from the cliff edge and a jagged boulder that resembles a shark fin located approximately 150' from the cliff edge. A conglomerate rock is a consolidated sedimentary rock made of rounded to subangular pebbles to boulders (Oldale1992). Other examples of this unique boulder can be seen protruding from the scarp and on the beach below the cliffs. Small stone were likely carried and deposited by meltwater streams. However, the glaciers themselves transported the larger boulders that were too big to be moved by streams (Oldale 1992).

Aquinnah Headlands Preserve is part of both the Martha's Vineyard Moraine and the Gay Head Moraine and includes recent Holocene deposits. The Gay Head Moraine consists of undulating hills and valleys formed by glacial deposits. The deposits include older Pleistocene deposits and sand, silt, and clay from the Cretaceous and Tertiary periods. The Martha's Vineyard Moraine is considered the terminal moraine and consists of sand and gravel (SCS 1986). These moraines may both be Wisconsonian deposits from the last glacier, or the Gay Head Moraine may be older and deposited during the Illinois glaciation – 150,000 years ago (Oldale 1992). Recent deposits from the Holocene are beach and dune sand and are wind and water driven (SCS 1986).

4. Topography

The elevations at Aquinnah Headlands Preserve range from 0 to over 100 feet above sea level. On the South Head the land gradually rises from the beach and the southern portion of the preserve to 100 feet above sea level at the Edwin Vanderhoop Homestead. The highest point on the North Head is located at over 100 feet above sea level at the southern lookout where the life-saving station and later coast guard facility once stood. The lowest points on the North Head, at 50 feet above sea level, are located in the northeast and southwest corners of this portion of the preserve. This rolling landscape is typical of the broad Eastchop-Chilmark-Nantucket soil type discussed previously. The contours of the property are illustrated in a portion of the USGS Squibnocket quadrangle labeled **USGS Topographic Maps** in Appendix A.

The cliffs are eroding at an average erosion rate of up to 2-4 feet per year although portions can remain stable for years and erode 50 feet in a few hours (Aubrey 1991). Surveys show an average loss of 95 feet of land along the cliff edge since 1951. At a loss of 95 feet every 40 years, the North Head and the northern portion of the South Head will be lost to the ocean below in approximately 180 years or 2189 A.D.

A parabolic dune such as the one at the main Moshup Beach access point and Philbin Beach will form where a blowout occurs either due to natural causes or anthroprogenic causes where a path, with significant use resulting in lack of dune vegetation, crosses perpendicularly to a dune, enters the beach, and results in a blowout. In both cases, wind blows sand along the beach; sand enters the blowout where it travels unimpeded by dune vegetation up and over the foredune. Sand builds up behind the foredune creating a perpendicular rise in the dune (Bird 1972). The land bank has been successful at healing portions of the blowout caused by the access path by redirecting the angle of the path to prevent the prevailing headwinds from depositing sand behind the foredune.

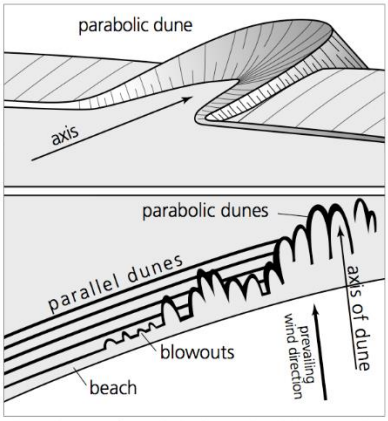


diagram adapted from Bird (1972)

5. Hydrology

A stretch of approximately 2000 feet of beach abuts the Atlantic Ocean on the South Head portion of the preserve. Several freshwater streams, from wetlands on the opposite side of Moshup Trail, traverse the South Head and drain into the ocean in two locations. The more southern stream is culverted under Moshup Trail and has a definite cut channel with spurs that spread into small patches of sphagnum and other wetlands plants (Walton 1987). A 0.291-acre vernal pool is situated along the trail from the “drop-off” to Moshup Beach and another 0.028- acre vernal pool is situated behind one of the tallest dunes on the preserve at the southern end of the South Head. These vernal pools are shallow and filled with water most of the year apart from approximately one sometimes two months of the summer when they dry up and lush wetland vegetation replaces open water. In the South Head near the Edwin Vanderhoop Homestead a depression occurs with Ridgbury Variant soils. In this area the vegetation is shrubby and similar to the surrounding area; however, the ground is soggy at times due to the perched water table.

The North Head is a little over 100 feet above the Aquinnah town under-cliffs-beach that abuts the Vineyard Sound. There are four perched wetlands in the

eastern portion of the preserve. These are in glacial till that is layered above the coastal plain sediments below. They are small in size, less than 1/2 of an acre total, develop during the wet seasons, and can be ephemeral. These pools presumably fill from subsurface stormflow and from direct precipitation which produces peaks in pool volume. No field evidence suggests significant overland flow and the soils are deep and highly permeable. The pools are shrubby, which protects the soils from packing and allows the soils to continue to absorb water from rainfalls. Depending on the direction of groundwater flow, the same water that fills these lowlands may flow in the direction of the cliffs and may add to the significant erosion forces of groundwater seepage and seawater undercutting (Aubrey 1991).

The Ecological Communities Maps in Appendix D show the locations of these perched wetlands and streams.

6. Ecological Processes

Succession, erosion and beach/dune migration are the primary ecological processes occurring at Aquinnah Headlands Preserve.

As in other coastal areas, the maritime shrubland/grassland complex is an edaphic climax community and on the preserve is dominated by brambles such as rose, blackberry, and prickly dewberry that are interspersed with plants such as poison ivy, sumac, goldenrod, *agrostis* and fescue. It is stalled in this successional stage by the impacts of salt spray, wind, nutrient-poor sandy soil and disturbances such as fire and mowing. Since the tree oaks present in and around the shrubland grow relatively slowly, only periodic cutting or top-kill following a fire may be necessary (along with the environmental factors listed previously) to maintain the shrubland in its successional state. One species of non-native tree, the Japanese black pine, was planted in various locations on the South Head to control erosion. In only a few decades it has seeded into areas of the coastal shrubland/grassland; however, it is not long-lived in this harsh environment and has suffered extensive die-off (possibly due to decline syndrome or insect damage) (Bartlett 1999).

The coastal grassland component is a pioneer community also maintained by salt spray, soil conditions, wind, and disturbance. Intensity of disturbance events is a determining factor between establishment of concentrated areas of coastal grassland verses shrubland areas. Proximity of the ocean and more frequent disturbances such as mowing and grazing have occurred during various times in the past and have set back succession in these areas. Continued disturbance in varying intensity is necessary to maintain the grassland and shrubland components of this unique and stagnant coastal community.

The beach changes with the seasons from sand to stone and back to sand again

as wind and wave actions bring sand in the spring and take it away in the fall and winter. Wave action at the base of the cliff accounts for some of the cliff-face erosion; groundwater seepage at higher elevations accounts for the rest.

Another ecological process on the preserve is the parabolic dune formation that was discussed above in the Topography section of the plan. The parabolic dunes may grow to a height that is difficult to walk over. The blowout destabilizes the foredune reducing the amount of protection the foredune provides to the land inland during storms.

B. Biological Characteristics

1. Vegetation

Aquinnah Headlands Preserve comprises four general habitat communities – coastal shrubland/grassland complex, coastal woodland, beach/dune and perched wetlands. They are described in detail and shown on the **Ecological Communities Maps** in Appendix D. Much of the preserve is coastal shrubland/grassland with briers such as rose, prickly dewberry and blackberry as a contiguous cover and pockets of sumac arrowwood, bayberry, poison ivy shrubs and honeysuckle scattered throughout.

A total of 232 plant species is known to occur on Aquinnah Headlands Preserve and these plants compose approximately 1/4 of all known plants occurring on Martha's Vineyard (Swanson and Knapp 1997). The coastal grassland/shrubland contributes the greatest to the floristic richness of plants occurring on the preserve; it is represented by approximately 60% of the total number of plant species known to occur on the preserve; and it also covers approximately 60% of the preserve. Species richness is the number of species present in a community (Begon et al. 1990). The perched wetland is a close second in plant diversity and accounts for nearly 50% of plants known to occur on the preserve. The perched wetland, unlike the coastal shrubland/grassland, occurs on only 2% of the preserve (Table 1, Appendix D).

Four plant species listed as rare by the commonwealth occur on the preserve. [redacted] occurs in three areas on the North Head: along the old road to the former life-saving station site and west on the adjacent hill, to the east of the perched wetlands in the grassy clearing and along most of the cliff edge predominantly between the two lookout locations. The [redacted] was observed along the old grassy road on the North Head. The [redacted] was observed on the sandy beach at the foot of the dune on the South Head.

Two watch-listed plants occur on the preserve as well. [redacted] was observed on the North Head in the coastal shrubland/grassland complex. [redacted] was observed throughout the preserve in the coastal

shrubland/grassland complex.

Aquinnah Headlands Preserve supports a diverse population of native species with a touch of introduced plants. Bittersweet, Russian olive and Japanese pine trees plague the South Head while Japanese honeysuckle and bittersweet form small hedges on the North Head.

2. Wildlife Habitat

Quality of wildlife habitat on Aquinnah Headlands Preserve depends on the characteristics of the vegetation communities. Formal avian and invertebrate black-light traps were the primary tools used for analysis of rare wildlife habitat. Additional direct observations of wildlife occurrences and signs throughout the year contribute to the understanding of habitat value at the Headlands. Fourteen Massachusetts state-listed wildlife species – five bird species and one moth species – occur on the preserve and eight bird species are known to occur in the general area of the Gay Head Cliffs.

(a) Invertebrates

A variety of invertebrate species inhabits Aquinnah Headlands Preserve. The preserve provides forage, breeding habitat and cover for invertebrates in the perched wetlands, dunes, and in nectar-producing herbs and shrubs such as goldenrods, cow parsnip, milkweeds, roses and sumac. Visits to the preserve over a period of 15 years revealed eight common butterfly species, 128 nocturnal moth species and one diurnal but not state-listed moth species. Direct observations of invertebrates on the preserve revealed an additional twelve species including praying mantis, eastern fairy shrimp, bees, ticks and pesky biting insects such as mosquitoes (Appendix E, Table 3).

Most of the invertebrate species recorded for the preserve were observed during nocturnal black-light trap surveys conducted in June and July in 2004 and 2008. A total of 128 moth species was identified; one of which is designated as rare by the commonwealth (Appendix E, Table 2). The dune noctuid moth was on the North Head on July 15, 2004 and on the South Head on June 25, 2008.

(b). Amphibians, Reptiles and Fish

Two amphibians, two reptiles and no fish were observed on the preserve during general property surveys. Spring peepers were heard vocalizing during the spring and into the summer and a green frog was observed in the perched wetlands of the North Head. Peepers are one of the first frogs to breed on the Vineyard. They only come to ponds to

mate and their chorus can be deafening. A northern black racer was observed sunning on the southern lookout on the North Head. A common snapping turtle was observed in the vernal pool near the Moshup Beach drop-off area. Snapping turtles may inhabit brackish ponds behind barrier beaches (Klemens 1993). They lay their eggs in loose sand. The eastern fairy shrimp was counted in good numbers in the two northern vernal pools on the North Head in 1993. The vernal pool south of the old road and closest to the small pond on neighboring property did not suport fairy shrimp. Fairy shrimp are typically not present in water bodies if fish occur.

(c) Birds

The Aquinnah Headlands Preserve is an internationally famous location for birding due to the unique location of the preserve at the headland of the Martha's Vineyard and the proximity of the island to the mainland. Sixty-six bird species were observed at Aquinnah Headlands Preserve during 5-minute point count surveys conducted during 1993, 2003 and 2004 during spring and fall migration, summer breeding and winter. An additional 106 bird species were observed on and around the preserve by local birding experts (Appendix F). Of these additional birds 26 are ocean birds or overhead fliers, 13 are uncommon for the Vineyard and twelve are unusual for this part of the United States.

The shrubland component of the coastal shrubland/grassland complex provides habitat for a consistently greater diversity of bird species in comparison to the other habitats. In this case, acreage of the habitat as well as incorporation of the perched wetlands into the shrubland community for the shrubland bird survey points may account for the skewed diversity.

The trees in the coastal woodland attract woodland/edge species such as the Carolina wren, song sparrow, grey catbird, blue jay and American robin. The dense shrubs, grassy areas and perched wetlands provide habitat for swallows catching insects overhead, as well as warblers and sparrows. Mallard and American black ducks occur in the perched wetlands on the preserve. Due to the shallow beach and often-times lack of sand, very few shorebirds utilize the preserve for breeding. However, [redacted] periodically nest on the preserve, terns can be seen fishing just off-shore and gulls of different species are all-too-common lunch thieves on the beach.

The abundance of birds that gather on and around the preserve results from "the 'land's end' effect of concentrating birds at 'funnel' spots, with no big trees", according to Vernon Laux. As birds fly south they are pushed by prevailing winds to the coast; once there they follow the

coastline as far south as possible before heading out over the ocean. The autumn is a good time to witness the migration south, as more birds are out flying including the young, first- time migrants plus hawks and falcons which prey on the smaller songbirds.

(d) Mammals

Ten mammal species or signs thereof were observed on Aquinnah Headlands Preserve (Appendix E, Table 3). The coastal shrubland/grassland complex provides good forage and breeding habitat for rabbits, mice, voles, and moles. The eastern cottontail lives among the dense brambles and other vegetation in the shrubland and forages in the grassland. White-footed mice, meadow voles and the eastern mole all live in the grassland component of the coastal shrubland/grassland complex. These small mammal species tunnel under the leaf litter or topsoil to move, rest and breed without being spotted by prey from above. Raccoon scat, river otter tracks and slides, and muskrats all occur near the perched wetlands on the North Head. Squirrel and chipmunk both occur in the small coastal woodland on the preserve. White-tailed deer, their scat and deer beds are common throughout the preserve. Young fawns hide in both the coastal shrubland/grassland of the North Head as well as in the dune grass of the South Head.

(e) Rare and Endangered Species

The Massachusetts natural heritage and endangered species program (MA NHESP) designates that nearly the entirety of the preserve is located within priority and estimated habitat of rare wildlife. Details about the various species and a copy of the Endangered Species Maps are located in Appendix G.

C. Cultural Characteristics

1. Land History

Early 2000s and Late 1900s

The North Head of the preserve, east of the Gay Head lighthouse, was most recently owned by Peter Diem and the Preston family in the 1990s. During the 1960s, 70s and 80s the North Head was owned by Isaac and Gertrude Taylor of North Carolina and Frances Ginnochio of New Bedford. The Taylors regularly mowed portions of the area east of the lighthouse to Pilots Landing for a period of 22 years (Taylor 1993).

The South Head of the preserve was purchased over a period of nearly 20 years starting in 1988 when Moshup Beach was purchased from Virginia Long. Among these purchases was a portion of the South Head bluff near the Aquinnah Circle from the Vanderhoop family who owned the land for over a century. Outside of the "Edwin Vanderhoop Homestead" house the only other signs of development along this stretch of bluff, dune and beach are the land bank Moshup Beach trail and boardwalk; two modest beach paths; and a three-vehicle trailhead on the southern-most portion of the preserve.

Mid 1900s

During the 1940s and 1950s a portion of North Head was owned by George Walker, a Vineyard Haven hardware merchant. He ran the family business, E.T. Walker and Co. in Vineyard Haven, and lived on the corner of State Road and Edgartown Road in the big white house on the right (Lair and Welch http://history.vineyard.net/mainst/five/etwalk23.htm). He had a small summer house on top of the northern-most look-out perhaps near the privet that grows on the bluff near the present-day lookout (Taylor 1993).

In the 1950s Moshup Trail was completed (Mayhew 1956). The road split several of the properties that now comprise the South Head of the preserve. These properties were originally "set-off" during the common land partition by the commonwealth in 1870 and were likely leftover lots after larger homestead lots were designated.

Late 1800s - Early 1900s

During the early 1900s George S. Homer owned portions of the North Head bluff. Mr. Homer purchased land in the Gay Cliffs area from 1879 through 1893 from Horatio N. Pease, the eighth keeper of the Gay Head lighthouse (Banks II, 1966) and various heirs of the common land partitioned in 1870 by the commonwealth.

A portion of the preserve was subdivided off by Mr. Homer in 1894 and sold to the U.S. Secretary of the Treasury for use as a life-saving station. The station was built and

placed into commission on December 20, 1985 with a crew of native surfmen (Banks II 1966) in response to the wreck of the "City of Columbus". The ship left Boston on Jan 17, 1884 and came upon the Devil's Bridge, a line of reefs stretching out into the sound, at 3:45 in the morning. Her crew and passengers were not discovered until 5 am by the lighthouse keeper. Four men landed on shore in one of the ship's lifeboats. Two crews of Gay Header Wampanoags managed to successfully launch a lifeboat later that morning and rescue twenty men from the rigging. One hundred and twenty-one people died in the wreck (Banks II 1966).

During a period between 1890 and 1897 the Vanderhoops built the house referred to as the "Edwin Vanderhoop Homestead" that is now home to the Aquinnah Cultural Center and is on land abutting the preserve on the South Head bluff. William Adrian Vanderhhop came from Suriname, Dutch Guiana and married Beulah Ocooch Salisbury Vanderhoop. They had several children and according to an 1858 map (Walling) of Gay Head they lived inland in the Old South Road area (Glover 1994a). The building of the Vanderhoop homestead is attributed to one of their elder sons, Edwin DeVries Vanderhoop. Edwin Vanderhoop was many things; he enlisted in the U.S. Navy in 1864 and was a landsman on the Mahaska during the Civil War (Banks 1966, Official Gazette 1888); he was a graduate of the Wayland Seminary (May 1878); he was a Republican representative in the state legislature and a hotel proprietor in 1888 (Official Gazette 1888); he was the brother of the first Gay Header, Leonard L. Vanderhoop, to be the assistant lighthouse keeper of the Gay Head lighthouse under keeper Crosby L Crocker in 1892 (Railton 1982); and he was a fisherman, served on many town boards and was the clay agent according to the 1907 residence directory (http://history.vineyard.net/dukes/chilgh1907.htm).

The cliff area provided an industry of clay and tourism during the turn of the 20th century despite the lack of roadways leading from Chilmark to the cliffs. It was not until 1873 that even a Post Route was completed from Chilmark to Gay Head (Banks II 1966). A steamboat landing was constructed at the end of Pilot's Landing east of the preserve off Lighthouse Road in the late 1880's-early 1890s. The landing serviced excursion steamers from local and distant ports who brought hundreds of tourists to ride on oxcarts across the North Head of the preserve for tours of the lighthouse and to visit the home restaurants and the famous cliffs (Mayhew 1956, Taylor 1993). In and around 1888, a hotel in the Aquinnah Circle between North and South Heads; a pavilion for music and dancing; and shops were built for the amusement of tourist that came to visit the remote Gay Head.

In 1893, the newly incorporated town of Gay Head leased the cliffs to the Gay Head Clay Company for $500 per anum and added much-needed income to the town coffers. The clay was shipped to kilns for brick manufacture (Banks II 1966).

Late 1700s – early 1800s

Mid-nineteenth century historic maps indicate that prior to the construction of the lighthouse in 1799 the nearest structures in the area were those belonging to the Cooper family at Pilot's Landing.

Pre-European settlement

An archaeological assessment of the area completed by the Public Archaeological Laboratory in 1993 determined that the area is highly likely to contain prehistoric and historical archaeological resources. Artifacts discovered on the island date the inhabitants to the Paleo-Indian Period (12,500-10,000 before present) (Glover 1994b). The proximity to water, well-drained sandy soils, elevated and level ground, and known archaeological sites in the area suggest the possibility of prehistoric use even though no evidence was discovered of historic settlements in the area. Historic lack of domestic structures in the area of the cliff suggests the preserve's archaeological resources are of symbolic and social activities and not domestic or agricultural activities (Glover 1994b). Low numbers of artifacts recovered from interior Gay Head sites suggest the land was used for temporary camps set up for the collection of food and other natural resources while locations on the salt ponds to the east were used more intensively as dwelling sites (Glover 1994b).

Historic maps indicate domestic structures did not arrive until the 20th century when the earliest domestic structures consisted of the Edwin Vanderhoop homestead, the folklore site of Thomas Cooper's "wigwam" (Glover 1994b) and the home of the lighthouse keeper, despite "wigwam" (Glover 1994b) sites being reported for many other coastal settings in Gay Head (Glover 1994b).

The sacredness of the area revolves around one of the oldest Wampanoag legends about Moshup the giant (Fein 2006). Devil's Den, a shrubby depression to the east of Devil's Ridge, was said to be the home of the giant Moshup, his wife Squant and his children. As one legend goes, he pulled up trees by the roots to keep a fire going, resulting in the absence of trees on the Headland. He pulled whales out of the ocean to be cooked over his ever-burning fire and shared with the Wampanoags. The red stains on the cliffs are from the blood of these whales. With the foreshadowing of foreigners coming to Moshup's fishing grounds, he, according to one of the versions of the legend, turned his children into killer whales and disappeared down the beach behind Zack's cliff with his wife, never to be seen again (Mayhew 1956). Moshup, or perhaps "Chepy" the evil spirit, created Devil's Bridge either to aid in capturing whales or as a response to the people's wish for more convenient travel to the mainland (Banks I 1966).

The Gay Head Cliffs bear the oldest evidence of past life. Once a shallow seabed, the colorful layers of Gay Head cliffs bear fossils of prehistoric sea monster bones, giant clam shells, crabs and vegetation consisting of palms, logs and seedpods all wedged between the colorful layers of cliff soil. Glaciation from approximately a million years ago is responsible for the stacking of cliff soils (Long 1972).

2. Planning Concerns

(a) Wetland Protection Act:
The land bank must address a number of concerns when planning management actions at Aquinnah Headlands Preserve. The vernal pools, intermittent streams, coastal banks, coastal dunes, coastal beaches and land subject to coastal storm flowage are considered "wetland resource areas" under the Massachusetts wetlands protection act. A 200-foot buffer zone around the wetland resource areas and bordering vegetated wetland is also subject to the jurisdiction of the Aquinnah conservation commission. To undertake activities within the resource area and buffer zone the land bank must file a notice of intent and obtain an order of conditions from the Aquinnah conservation commission. The management plan proposes to implement the following activities in the land subject to flooding resource area and buffer zone of the vernal pool, intermittent stream and coastal dune, beach and bank on the preserve:

(1.) create 2,089 linear feet (0.29 acres) of new trail in the buffer zone of vernal pools and coastal banks/dune;
(2.) maintain 5.05 acres of grassland component to the coastal shrubland/grassland complex in the buffer zone of the coastal bank;
(3.) maintain 2,238 linear feet (0.20 acres) of existing trail in the buffer zone of the coastal bank and maintain 900 linear feet (0.08 acres) of existing trail in the coastal dune resource area;
(4.) maintain 331 linear feet (0.03 acres) of boardwalk in the coastal dune resource area and create 130 linear feet (0.01 acres) of boardwalk in the land subject to flooding resource area.
(5) maintain existing 3-vehicle trailhead (0.02 acres) located on the South Head.

(b) Massachusetts Endangered Species Act:
All management activities proposed in this management plan are within the boundaries of priority and estimated habitat for rare species (NHESP Map Appendix G). The creation of 3,513 ft (0.48 acres) of trail and up to 1,500 ft^2 of trailhead; creation of 146' (0.01 acres) of boardwalk; maintenance of 11.5 acres of coastal grassland in the coastal shrubland/grassland complex including removal of 5.0 acres of invasive species; and maintenance of 4,211' (0.38 acres) of existing trail and 331' (0.04 acres) of existing

boardwalk will generate a Massachusetts endangered species act project review filing for a total of 12.41 acres.

(c) Local and regional planning concerns:
The entire property is within the Town of Aquinnah DCPC, which involves site-plan reviews for most construction, regulations regarding cutting, stone walls, etc. A special permit from the planning board plan review committee will be necessary to cut trees over 3"- wide at the base from an area greater than 200 ft^2 and the removal of trees over 9"-wide at the base. This will include portions of the 11.5-acre area proposed for annual mowing and exotic invasive species removal.

The entire North Head of the preserve as well as the northern portion of the South Head are within the Gay Head Cliff DCPC. The bylaw protects the cliff area from "undue visual intrusion and land use impacts". A special permit from the planning board plan review committee will be necessary for any cutting and building within 150' of the cliff crest. The proposed plan includes creating 859' of new trail, maintaining 316' of existing old road, installing 16' of boardwalk and maintaining 2.89 acres of coastal grassland/shrubland complex through mowing all within 150' of the cliff crest.

Much of the preserve is within the Coastal District DCPC which includes land below the 10' contour or within 500' of the mean high water (mhw), from mean low water (mlw) 100' inland and 100' inland of the crest of a bluff greater than 15'. Special permits are necessary to construct within this zone.

The Moshup Trail DCPC includes much of the South Head but not the land surrounding the Edwin Vanderhoop Homestead. A special permit from the planning board plan review committee is necessary for construction of driveways, private parking areas, clearing of vegetation and relocation of stone walls.

These DCPC areas are shown on a District of Critical Planning Map located in Appendix A.

3. Abutters

A list of those owning land abutting or within 200 feet of the Aquinnah Headlands Preserve appears in Appendix H, as does the Aquinnah Assessors Maps 6 and

10.

4. Existing Use and Infrastructure

The following are existing uses; Existing Use Maps follows this text with numbers below corresponding to numbers on the maps:

1. Trail: There are 3,451 feet of existing trails including 2,331 feet of well-used paths on the South Head and 1,120 feet of abandoned dirt roads on the North Head including the Life-saving station road built in 1890s, the George Walker camp road built in the mid-1900s and the remains of the road from Steamboat Landing to the Cliffs.

2. Trailhead: A 3-vehicle trailhead with a short path to the beach is located off Moshup Trail on the southern end of the South Head portion of the preserve (South Head Map B). A spot for one vehicle is deeded for summer use to the previous owner and the other two spots are closed to public use during the summer. The entire trailhead is open for public use during the off-season (September – May).

3. Trail agreement and trailhead easement: The Town of Aquinnah signed a trail agreement with the land bank to create a trail (±775') connecting the town parking lot to Moshup Beach. The town also granted to the land bank an easement to construct and access an up-to-5-vehicle trailhead to be located in an easement area designated on the South Head Use Map A in pink.

4. Life-saving station/Coast Guard Facility: a concrete slab and retaining wall are all that is left of the Life-saving station and Coast Guard facility.

5. Tent platform: A rotted tent platform approximately 50'x30', constructed of wood, is located in the shrubland of North Head.

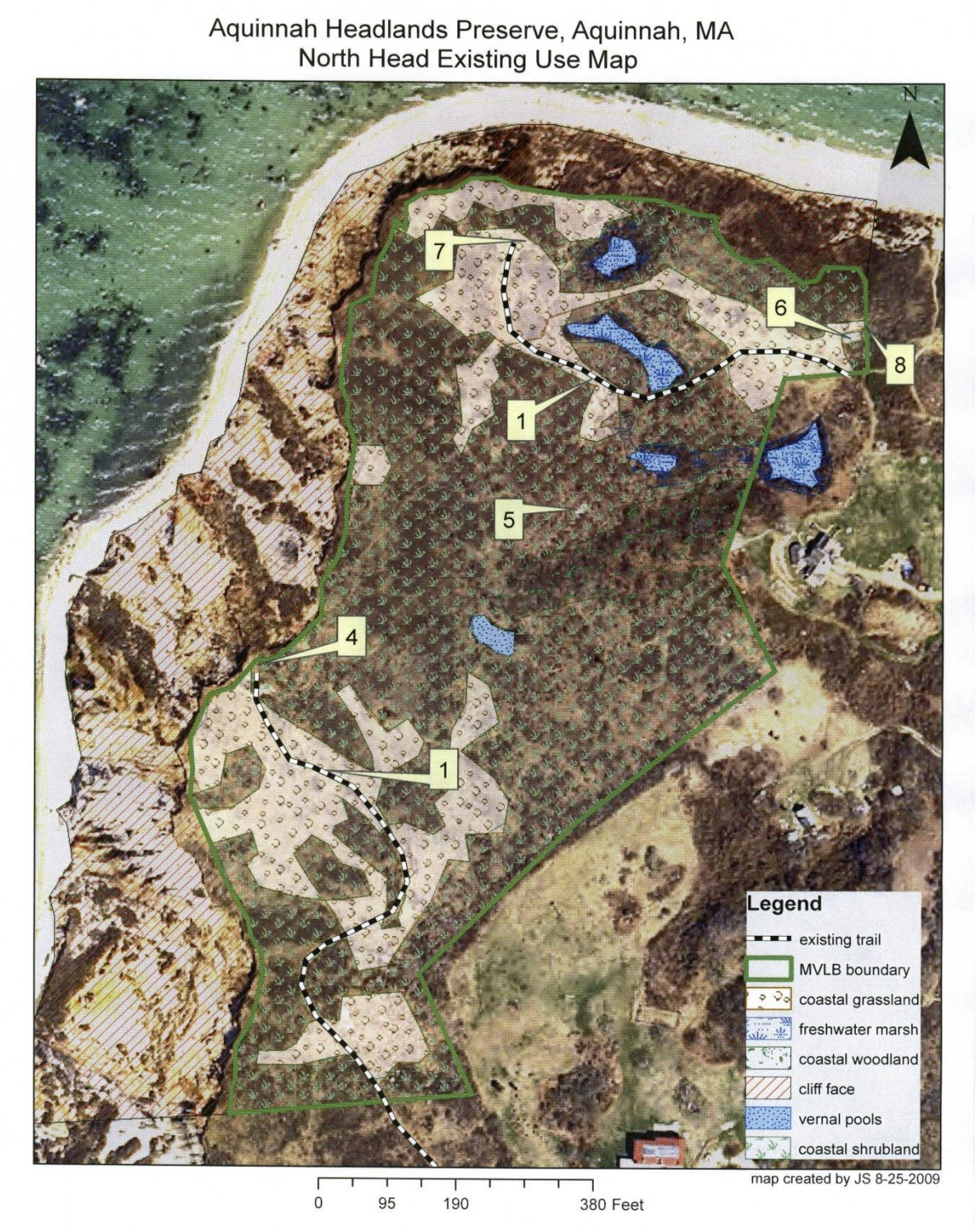
6. Sheep Shed: A concrete slab on North Head is all that remains of a "sheep shed" that was removed in 1993 after the property was purchased by the land bank.

7. Bench: The northern-most lookout, with fantastic views of the cliffs and Vineyard Sound, has a bench and is relatively grass-dominated. It was the location of the George Walker camp that was built in the 1960s. An eight-foot dirt road connects the campsite location to Pilots Landing.

8. Fence: Remains of a metal fence occur on various property lines on the North Head portion of the preserve.

9. Moshup Beach: Moshup Beach on the South Head has been open to the public for 22 years. Summer use data covering nearly a decade indicate an average of 26,000 people visit the beach during the summer months of July and August. Approximately 1,050 visitors come by bike to the beach per season. Visitor attendance is only slightly greater in August compared to July. The average greatest daily visitor count was 1,053 for the nine-year period (2000-2009).

10. Seasonal Latrine: a wooden platform at the Moshup Beach drop-off on the South Head holds four portable latrines during the summer months.


Aquinnah Headlands Preserve, Aquinnah, MA
North Head Existing Use Map
N
7
6
8
1
5
4
1
Legend
existing trail
MVLB boundary
coastal grassland
freshwater marsh
coastal woodland
cliff face
vernal pools
coastal shrubland
map created by JS 8-25-2009
0
95
190
380 Feet


Aquinnah Headlands Preserve, Aquinnah, MA
South Head Existing Use Map A
Aquinnah Circle
State Road
TOA
3
ACC
1
SMF
1
Moshup Trail
TOA
3
Legend
existing trail
boundary MVLB
coastal shrubland
successional grassland
coastal dune
0
145
290
580 Feet
map created by JS 8-25-2009


Aquinnah Headlands Preserve, Aquinnah, MA
South Head Existing Use Map B
N
TOA
Moshup beach
drop-off
10
1
9
1
1
2
1
TOA
Legend
existing trail
MVLB boundary
stream
freshwater marsh
coastal shrubland
coastal dune
coastal woodland
vernal pools
0
265
530
1,060 Feet
map created by JS 8-25-2009

II. Inventory Analysis

In this section, problems and opportunities that may arise in the management of Aquinnah Headlands Preserve are analyzed.

A. Constraints & Issues

1. Ecological Context

Aquinnah Headlands Preserve is an interesting gradient from coastal shrubland/grassland dotted with perched wetlands atop of the Gay Head Cliffs ranging down to coastal dunes along Moshup Beach. It is in close proximity to the Aquinnah Circle where public transportation and latrine facilities are located. All of the preserve is designated as priority and estimated habitat for rare species and the mosaic of habitats on the preserve allows it to meet habitat requirements of many of the rare species associated with the priority and estimated habitat designated for the preserve.

2. Natural and Cultural Resource Concerns

There are six main areas of concern at Aquinnah Headlands Preserve, each briefly addressed below and then addressed in more detail in the land management section of the plan:

(a) State-listed rare species

Rare plants, several rare birds and one rare moth species occur on the preserve. They depend on the diversity of habitats on the preserve and utilize them all. Protecting habitat and minimizing potential disturbance to nesting and foraging important to the survival of these species. In the plan trails are sited to avoid rare plant and wildlife populations as well as prevent off-trail excursions into sensitive areas such as the cliffs, wetlands, and dune systems.

(b) Wetlands

The perched wetlands on the preserve are an important component of the diversity of the habitat as they account for many of the plants that occur on the preserve. They are sensitive to changes in water quality which could impact the breeding amphibians and invertebrates that depend on these ephemeral pools. Uses that direct erosion, nitrates and petroleum products towards the wetlands might degrade the quality of the water or alter the

wetlands and impact the plants and animals that depend on them.

(c) Succession

Succession is a natural process. Without the use of mechanical mowing, fire or grazing, the coastal grassland component of the preserve will naturally succeed into the surrounding shrubland component. Succession here appears to be happening at a slow rate compared to inland grasslands. Valuable rare plant habitat would be lost if the grasslands were permitted to succeed into shrub-dominated habitats. Rare plants such as [redacted] would be lost or reduced in number. Other species, such as birds-of-prey, also depend on the grassland ecosystem for food. Althought the rate of succession along the coast is slow, the coastal shrubland is also susceptible to it. Over time trees or taller shrubs may become more dominant. A grove of poison ivy trees exists on the North Head of the preserve that is over 6 feet tall; Japanese black pines and Russian olives are springing up in the coastal shrubland/grassland complex on the South Head. Some shrublands can maintain themselves with the help of salt spray and wind while other areas may require periodic mowing to stimulate new shrub growth to replace old and potentially brittle and top-heavy shrubs.

(d) Shoreline bank erosion

The Gay Head Cliffs, which are owned by the Wampanoag Tribe and are a national natural landmark, are significant for cultural, aesthetic, geological, wildlife habitat and storm buffer reasons. Their sensitivity is linked to the factors outlined in the Soils, Geology and Topography sections. While natural erosion will occur regardless of human activity, activities that direct additional surface run-off towards the cliff edge; that destroy vegetation close to the cliff edge; and that deplete groundwater will speed up the process of shoreline bank erosion. Maintaining vegetation atop the cliff and having vegetation on the cliff face helps stabilize the soils and absorb some of the precipitation that would otherwise find its way to the cliff face either as surface water or groundwater seepage.

(e) Invasive Species

Invasive species are a concern on any property. Annual monitoring and quick control and removal of invasive species is important to maintain an ecological balance and the integrity of habitats on the preserve.

(f) *Migration Habitat*

Many avian and lepidoptera species are directed to the property by a geographical funneling down the east coast during migration periods. These species, including monarch butterflies, songbirds, and hawks, make their way down the coast and concentrate at the preserve on the headlands of Martha's Vineyard. Successful migration is dependent on the availability of ecological "hooks" at staging areas such as the South and North Headlands. These hooks include plants such as milkweed and goldenrod for monarch butterflies' foraging; clumps of trees and shrubs for songbirds to take cover in from the wind; berry- and insect-abundant wetlands for songbird foraging; and abundant prey for migrating hawks. Wildlife in migration is therefore appreciative of habitat diversity and is sensitive to the loss of specific habitats currently available on the preserve.

(g) *Archaeological artifacts*

The preserve is located in a culturally significant area for the Wampanoag Tribe. Archaeological artifacts can surface from erosion and disturbance of the soil. Use of water bars and woodchips on trails reduces erosion and protects artifacts that may already be on the surface. A specific archaeological survey may be arranged prior to disturbance of soil. The use of the property attendants and signage prohibiting mud bathing and disturbance of fossils and artifacts will help protect this valuable cultural resource. The discovery of a fossil or artifact on the preserve will be reported to the appropriate authorities. The artifacts or fossils destiny will depend on the desire of the authority with jurisdiction over the item.

3. Sociological Context

Aquinnah Headlands Preserve is located at the end of State Road and flanks the Aquinnah Circle. The North Head is off Lighthouse Road while the South Head is predominantly off Moshup Trail. It is above one of the most memorable cliffs on the eastern seaboard and includes the famous Moshup Beach. It is near the Aquinnah shops, latrine facilities, public town parking and public transportation. The preserve provides the only public access to Moshup Beach.

4. Neighborhood Concerns

The land bank considers the concerns of neighbors as part of the planning process. All abutting property owners and the local conservation commission are sent written notice of a public hearing on the draft plan. All neighbors -- and all members of the public -- are invited to review the draft plan, attend the public hearing, and make written or oral comments. The land bank's Aquinnah town advisory board and the Martha's Vineyard land bank commission review all comments and can change the draft plan if desired. Anyone may also express concerns at any public meeting of the Martha's Vineyard land bank commission and Aquinnah town advisory board or may simply contact land bank staff.

Planning concerns that already have been brought to the attention of the land bank by neighbors between 1993 and 2010 include:

- increased vehicular traffic on Pilot's Landing Road,
- increased trespassing on an existing, off-premises, unauthorized trail over the cliffs that leads to the beach below,
- signs may not be respected,
- people may go over the cliffs on the preserve if they are discouraged from using the existing, unauthorized trail off –premises,
- cliff erosion,
- spread of Japanese black pine and other invasive plants,
- disturbance of archaeological artifacts,
- people visible on the cliff at the lookouts may encourage people on the beach to climb the cliffs in search of a short cut back to their vehicles,
- fire and safety hazards,
- property is inappropriate for deer hunting

B. Addressing Problems and Opportunities

1. Land Bank Mandate

In 1986, the voters of Martha's Vineyard created the land bank to acquire, hold, and manage land in a predominantly natural, scenic, or open condition. The land bank keeps open space open and allows modest public use. Its "shared-use" policy strives to provide a range of public benefits, from low-impact recreation and aesthetics to wildlife conservation and watershed protection. Protection of natural resources is the land bank's highest priority, yet "shared-use" demands balancing the public use of natural resources with protection of the same.

2. Goals at Purchase

The purchase of Aquinnah Headlands Preserve protects the integrity of a world renowned “natural” destination and meets seven of the land bank's nine criteria for property acquisition: forest land; fresh and saltwater marshes and other wetlands; ocean and pond frontages, beaches, dune, and adjoining backlands; scenic vistas; wildlife habitats; trails; and sites for passive recreation. Preliminary management plans were adopted by the land bank commission and Aquinnah town advisory board and are attached as Appendix B.

3. Opportunities

(a) *Access*: The public vehicular access to Moshup Beach on the Aquinnah Headlands Preserve is by the Aquinnah town public parking lot off Moshup Trail. Public access to the remainder of the preserve’s trails and views is by the up-to-5-vehicle trailhead situated in and easement area on town land near the Edwin Vanderhoop Homestead. Universal access (UA) is proposed for this preserve through a handicap-accessible parking slot in the proposed trailhead and through a separate 150’ stretch of trail from the town parking lot to a small clearing with views of the South Head below.

(b) *Birding*: The shrubland, grassland and shoreline provide good vantage points for bird-watching, especially the spring and fall migration when the funneling of thousands of birds occurs. The area is known internationally as a “hot spot” for birding.

(c) *Fishing*: Finfishing along the +2,000’ of shoreline is possible.

(e) *Trails*: Proposed trails on the preserve will provide trails on the North Head and an additional loop trail on the South Head of the preserve directly below the Edwin Vanderhoop Homestead. Access to the North Head is proposed for the off-season use only. The trail on the North Head is proposed to be mowed once in the fall and allowed to grow back in during the spring and summer.

(i) *Shrubland/grassland maintenance*: The coastal shrubland/grassland supports a variety of typical sandplain grassland species in addition to several rare species such as [redacted]

[redacted] and watch-listed species such as [redacted] The plan proposes to maintain this habitat through early spring mowing on an annual to 3-5-year rotational mowing schedule.

(j) *Views*: As might be expected from the islands western promontory, the views are breathtaking and draw thousands of visitors to this remote area of the island throughout the year. Views of the Atlantic Ocean, Vineyard Sound, South Head, Moshup Beach, the North Head, portions of the Gay Head Cliffs and Dogfish Bar are available from various points on the preserve. Every effort possible will be made to limit visibility of abutting homes from the trail and visibility of the trail from abutting homes.

4. Universal Access (UA)

Aquinnah Headlands Preserve is moderately suited for universal accessibility. The preserve has rolling hills, sandy soils, and long distances from the major amenities to the trailhead. In addition, the archaeological significance of the area makes it difficult to provide universal access as digging and removing soil to add hardener to the trail may expose archaeological artifacts. One location for universal access which avoids disturbance is from the town parking lot 150' along the existing eroded trail to an open grassy lookout with views of Moshup Beach and the Atlantic Ocean. The plan proposes to add hardener to the rutted-out trail (without excavation) and to divert the run-off from the parking area to avoid future erosion of the trail. One universal access vehicle parking is proposed for the new up to 5-vehicle trailhead near the Edwin Vanderhoop Homestead.

The preserve's ROS ('Recreation Opportunities Spectrum') classification is "less-developed." Further details are included in Appendix I.

III. Land Management Planning

This final section of the revised management plan states goals for Aquinnah Headlands Preserve and outlines strategies for achieving them. These goals and strategies are designed to fit within the social and ecological constraints defined previously. The plan addresses five areas of planning concern: nature conservation, recreation and aesthetics, natural products, community interaction and land administration.

A. Nature Conservation

Provide long-term protection for plants, animals and natural processes occurring at Aquinnah Headlands Preserve.

Objective 1 Protect and encourage rare and endangered species on the preserve.

Strategies:

a. Monitor the property for rare plants and animals during regular property checks.
   i. Conduct surveys in the coastal shrubland/grassland for [redacted] in June and [redacted] in July; site new trails outside of known populations and re-route trails as necessary if new populations arise.
   ii. Conduct surveys for [redacted] along the beach and in the dunes in August and rope off areas accordingly to prevent trampling.
   iii. Conduct surveys for nesting [redacted] on the preserve from April through July and continue monitoring any observed nest until chicks are fledged.
   iv. Conduct surveys of rare breeding shorebirds during the spring and summer should appropriate habitat be available.

b. Develop and implement a strategy to protect any additional rare species observed on the property.

c. Report new observations of rare and endangered species to the proper commonwealth authority.

d. Maintain existing coastal shrubland/grassland complex on the preserve that is essential for rare plants such as [redacted] and [redacted] and rare wildlife species such as the [redacted].

i. Mow the designated grassland areas annually in the early spring for 5 years with the goal to increase grassland dominance in this area; re-survey the area to evaluate shrubland-grassland composition; consider the use of fire in coordination with Sheriff's Meadow Foundation, an abutting property owner.
ii. Mow annually after the 5-year annual mowing if the grassland component responds positively to the regime and if it does not mow once every 3-5 years in the early spring with the goal to maintain the area as an open, low mix of shrubs, graminoids and herbs.
iii. Sweep area on foot to locate any northern harrier nests when mowing in April; if a nest is observed either skip mowing for that year in that area or mow in late fall, early winter after the birds have fledged.
iv. Remove invasive plants including but not limited to Japanese black pine through flush cutting and possibly stump grinding or spraying with a stump sprout herbicide.
v. Site trails along existing trails and old roadways as much as possible on the preserve to avoid unnecessary penetration into the habitats.
vi. Mow/prune on the side of the Moshup Trail if requested as part of a larger Moshup Trail vegetation management program.

e. Protect moth habitat.
i. Allow existing habitats to flourish.
ii. Allow some existing trails not proposed for use to revegetate.
iii. Protect the dune vegetation from trampling by prohibiting use in this area (except on boardwalks and existing trails) and prohibit unauthorized vehicles (emergency and land bank management use permitted only) on beach and dune.

f. Protect state-listed avian breeding habitat by.
i. Site new trails in such a way as to maximize contiguous shrublands.
ii. Allow existing trails, not proposed for use, to revegetate.
iii. Prohibit pets (dogs/cats) on the preserve from April to October and otherwise require they be leashed and restrained.
iv. Maintain grassland component of the coastal

shrubland/grassland to provide hunting grounds for the northern harrier and other listed birds of prey.

v. Close trail and/or relocate as needed if active nests are observed.

vi. Maximize the use of existing old roadbeds when siting the trail system.

vii. Adjust the open and closure times of the North Head if active nests are observed.

g. Protecting state-listed shorebird nesting habitat.

i. Symbolically rope off available rare shorebird habitat in April.

ii. Monitor rare shorebird activities and possibly use preditor fencing once a nest has reached a complete clutch.

iii. Enforce “no pets on beach” rule for the preserve.

Objective 2 Protect wetland habitats for a variety of rare and common wildlife and plant species.

Strategies:

a. Close a portion of the existing old road to the northern lookout on North Head; use old road only for maintenance equipment such as the tractor and hand mower; and use the closed portion of old road as a trail if the trail system includes Pilot’s Landing Road

b. Protect vernal pools along Moshup Trail from impacts of road run-off from Moshup Trail by protecting surrounding vegetation from trampling and use.

c. Prevent trespassing onto the cliff-face.

i. Site trails away from the cliff edge.

ii. Sitie trails that are on a similar elevation as the cliff edge in thick shrubland where possible.

iii. Use low-impact fencing at the southern and northern lookouts on North Head.

iv. Install 16 feet of low boardwalk in the shrubs over existing concrete footings at the southern lookout on North Head to clearly define the area intended for use.

v. Remove all visible portions of boardwalk at the North head lookouts during the summer season when the trail is closed if boardwalk or fence is visible from the beach.

vi. Site lookouts in low thick shrublands where possible.

d. Install approximately 130’ of ground-level boardwalk over an existing trail to traverse a low area of bordering vegetated wetland abutting low-land subject to flooding on South Head.

e. Prohibit the following activities:
   i. pets, fires, nudity and alcohol;
   ii. prohibit dumping of carcasses, fishing line and other debris;
   iii. prohibit camping (unless special permission is granted by the MVLBC and it is not prohibited by any town by-law);
   iv. and clay bathing and removal of fossils on the abutting cliffs and beaches of the preserve.

f. Prohibit the public from creating its own trails over the preserve.
   i. Monitor the property regularly for unauthorized trails.
   ii. Close all unauthorized trails.
   iii. If unauthorized trails persist, consider this interest in such trails as potentially a tacit need and consider incorporating them or a more appropriate alternative into the existing trail system.

Objective 3: Reduce and control erosion of trails and shoreline.

Strategies:

a. Install water bars where necessary.

b. Reroute the Moshup Beach trail onto Sheriff’s Meadow Foundation land subject to a written agreement to be drafted and signed by both the land bank and Sheriff’s Meadow Foundation

c. Reroute or temporarily close any trail where necessary.

d. Use switch backs whenever necessary when siting new trails on a slope.

e. Protect and control dune by directing access to conservative dune crossings.

Objective 4: Protect the value of the preserve as migratory and breeding habitat for avian and other wildlife species.

Strategies:

a. Site new trails and relocate existing trails to minimize impacts in vernal

pool areas. Retain snags in woodland where these trees do not pose unacceptable safety or fire hazard.

b. Retain dense shrubs and perching trees along edges of pools and retain some existing cedars in coastal shrubland/grassland complex.

c. Prohibit pets from the preserve during avian breeding season from April through October, approximately and otherwise require that dogs be leashed as stated in the Aquinnah town dog policy.

d. Monitor changes in vegetation cover during regular property checks and by updating ecological inventory in 2019.

Objective 5: Control the spread of invasive species.

Strategies:

a. Cut or up-root invasive species as they are observed.

b. Monitor for re-growth and continue to manage invasive plants.

c. Explore other control methods and implement with permission of the MVLBC if physical control methods fail and if physical control methods are not possible due to the archaeological significance of the preserve.

Objective 6: Reduce forest fire danger in shrubland on the preserve and nearby woodlands.

Strategies:

a. Prohibit open flame fires on the preserve unless special permission is granted by the land bank property staff and local fire department.

B. Recreation and Aesthetics

Allow limited, low-impact recreational use of the area for boating, hiking, bicycling, horseback-riding and picnicking and maintain attractive views and landscapes provided that these uses do not preclude attainment of nature conservation objectives.

Objective 1: Create up-to-5-vehicle trailhead on South Head

Strategies:

a. Designate one space for universal access use.

b. Fence potential trailhead with low-impact fencing, if necessary.

c. Install logo marker at the entrance to the trailhead.

d. Install a sign station in an appropriate location and post signage regarding property rules, maps, ecological interests of the preserve, additional nearby trails, and public beach access.

e. Inform visitor, in the land bank map, how to access the preserve's trailhead and its intended use.

f. Regulate the use of the trailhead, if necessary.

g. Install additional boundary markers or fencing along the open border with the Edwin Vanderhoop Homestead, as necessary.

h. Inform visitors, in the land bank map, how to access the preserve's trailhead.

Objective 2: Maintain existing Moshup Beach drop-off

Strategies:

a. Reapply hardener in drop-off as necessary.

b. Supply adequate seasonal (July-September) latrines (3-4) at the drop-off.

c. Maintain latrine platform as needed and erect wood screening annually.

d. Maintain the existing boardwalk from the drop-off to the beach at a width of 6 feet to allow emergency ATV access, per the request of town of Aquinnah.

Objective 3: Maintain existing 3-vehicle trailhead on the eastern end of South Head.

Strategies:

a. Apply hardener on trailhead as necessary.

b. Trim back overhanging vegetation to maintain existing trailhead layout.

c. Remove invasives such as Japanese black pine (flush cut).

d. Maintain wooden fence and gate around the trailhead area.

e. Prohibit vehicular use by the public and lock gate from Memorial Day – Labor Day.

f. Construct 130' of ground-level boardwalk at a width of ±2 feet over an existing trail.

g. Install signage indicate property rules and limitations

h. Continue to implement deed restriction regarding seasonal parking for Joan Higbee.

Objective 4: Create trail system as shown on the Site Management Maps.

General Strategies:

a. Create trail network as shown on the Site Management Map:
   i. create 3513 linear feet of new trail;
   ii. make trail corridors four to six feet wide and eight feet tall when possible, with the exception of existing old roads which may be maintained at their present width;
   iii. free trails of rocks, roots and other obstacles where practical;
   iv. install erosion control measures where needed;
   v. mark trails with colored markers if needed
   vi. site trails so that they are as unobtrusive as possible to nearby homes and sensitive wildlife habitat;
   vii. site trails so that they connect, as well as possible, to other conservation land, ancient ways and trail easements.

b. Screen views of houses as necessary from trails and viewpoints using native vegetation.

c. Minimize need for signs and railings by siting trails appropriately.

d. Allow land bank staff discretion to close or relocate trails or add new trails, such as spur trails for off-property trail connections.

e. Allow multiple uses of trails where appropriate by hikers, Nordic skiers,

horseback-riders, and bicyclists.

f. Prohibit visitor's use of motorized vehicles, such as but not limited to dirt bikes and all-terrain vehicles.

g. Check and maintain trails monthly.

h. Prohibit bicycling and horseback-riding on those paths directly connecting the Moshup Trail and the ocean, in order to avert erosion.

North Head Strategies

i. Designate two existing lookouts on North Head as indicated on the Site Management Map and use symbolic fencing (e.g. rope and wooden stakes), as needed, to prevent off-trail excursions.

j. Create a loop trail on the property using as much of the existing old road beds as possible and staying as far from the cliff as possible.

k. Access the property by using an existing right-of-way (over Aquinnah tax parcel no. 6-32) onto North Head as a public trail for foot/bicycle traffic and maintenance vehicles only; use right-of-way unless alternative trail easement is supplied.

l. Mow out the way which includes the land bank easement crossing Map-lot 6-47.3, in such a manner as to accommodate land bank maintenance vehicles.

m. Decline to use the easement over Pilot's Landing Road as contained in Cert. of Title No. 2580 and in deed from Thomas B. Bracken, Trustee of Isaac M. Taylor Revocable Trust and Gertrude Taylor to Peter Diem (doc No. 21538) as part of the trail system at this time unless the Town Advisory Board and the Commission approve the use.

n. Mow North Head trails prior to opening annually and allow trails to revegetate during the summer growing season.

o. Install a low-visibility sign station on North Head to inform visitors of the property limitation, interests and rules.

p. Open trails from September 15 – June 15, subject to closing at the

discretion of the land bank ecologist; use fencing/gates, signs and any other reasonable means to close trails, as needed.

South Head Strategies

q. Use dune fencing to control and heal blowouts where trails enter Moshup Beach.

r. Upgrade boardwalk from drop-off to Moshup Beach as necessary to encourage dune regeneration.

s. Create ± 150' of universal access trail on the South Head in a location that is feasible and appropriate by adding sand hardener to an existing eroded trail or by adding sand hardener onto the surface of a new trail.

Objective 5: Entertain possibilities for other trail links.

Strategies:

a. Activate trail easements with access to existing conservation areas.

b. Maintain existing links to other conserved properties.

c. Create links to other conserved land and easements.

d. Continue as and if necessary, to work with abutters to negotiate alternative trail easements to the existing right-of-way and easements that provide access to the North Head.

e. Activate alternative ways if any deeded use is successfully contested.

Objective 6: Abide by Aquinnah town dog bylaws (all dogs must be leashed) unless otherwise noted.

Strategies:

a. Prohibit dogs on the preserve from April to October.

b. Encourage visitors to clean up after their pets.

c. Post the dog policy at the various sign stations and property entrances and in the land bank map.

Objective 7: Continue to allow use of Moshup Beach for swimming, sun-bathing, picnicking, hiking, bird-watching and the like providing nature conservation goals are not

precluded.

Strategies:

a. Post the beach with signs indicating “no lifeguard on duty”.

b. Delineate land bank property.

c. Prohibit nudity, removal of clay, fossil digging, dumping, alcohol and loud reveling.

d. Require visitors to carry-in-carry-out their trash.

Objective 8: Remove or heal over existing structures on North Head.

Strategies:

a. Remove rotted wooden tent platform from the shrubland.

b. Heal over existing concrete slab from former “sheep shed” using a clean material and possibly seeding with native little bluestem and switchgrass seed to avoid excavating in an archaeologically sensitive area.

C. Natural Products

Prohibit hunting and allow fishing provided that natural conservation goals are not precluded.

Objective 1: Allow fishing from the shore of the preserve.

Strategies:

a. Allow night-time fishing on preserve from shoreline.

b. Encourage fishermen to carry-in-carry-out their fishing supplies and remove all fishing debris.

Objective 2: Prohibit deer hunting on the preserve.

Strategies:

a. Post no hunting signs on the preserve.

b. Notify the public of the no hunting policy on the preserve in the land bank hunting policy and on the land bank website.

Objective 3: Prohibit camping.

Strategies:

a. Prohibit camping on the preserve unless special permission is granted by the land bank commission and it is in compliance with Aquinnah town bylaw.

b. Post “closed at dark” signs on the sign stations with night-time fishing and star-gazing as the exceptions.

D. Community Interaction

Provide helpful and interesting information about the property for visitors; promote cultural resource conservation and allow educational use of the property.

Objective 1: Help people find the property and avoid trespassing.

Strategies

a. Mark the property on land bank website (www.mvlandbank.com) and map and provide directions.

b. Use discrete land bank logo signs on the Lighthouse Road, Aquinnah Circle and Moshup Trail.

c. Install “end of land bank property” signs where appropriate.

d. Install land bank logo markers on property.

e. Limit trespassing by closing existing trails.

f. Install gates or fencing as needed.

g. Install additional boundary posts along the border between the preserve and the Edwin Vanderhoop Homestead as needed.

h. Post map of property and trails as well as an aerial overview of the connecting conservation land and trails on sign station and website.

i. Plant vegetation where residential dwellings are visible from the trail, as necessary, that blends in with the natural context of its environs to define and screen the boundaries.

Objective 2: Present useful and interesting information about Aquinnah Headlands

Preserve to the public.

Strategies:

a. Provide the Aquinnah public library and conservation commission with copies of this management plan if so desired.

b. Make a copy of this plan available at the land bank office and, when file size is not restrictive, on the land bank website.

c. Inform the public of the educational use of this property through the Martha's Vineyard superintendent of school's office.

d. Post information about the cultural and natural history of the preserve at the trailheads.

Objective 3: Protect cultural and prehistoric resources on the preserve.

Strategies:

a. Contact Wampanoag Tribe and Massachusetts Historical Commission prior to implementation of the management plan for recommendations.

b. Apply woodchips or hardener on the surface of trails in areas prone to surface degradation.

c. Work with the Wampanoag Tribe to create and post educational signs on sign stations informing visitors of the rules and regulations against removal of archaeological and prehistoric artifacts from the preserve.

d. Work with the Wampanoag Tribe to enforce laws against removal of archaeological artifacts and other protected resources in or around the cliffs.

e. Create and maintain trailheads etc. by cutting vegetation, scraping the leaf litter on the surface, and applying a sand hardener where possible to avoid surface disturbances in archaeologically sensitive areas.

f. Follow appropriate town bylaws regarding archaeological surveys if excavation is necessary to create or maintain trailheads, trails, and other features on the preserve.

E. Land Administration

Oversee and police Aquinnah Headland Preserve on a regular basis and develop

good neighborhood relations.

Objective 1 Maintain good relations with abutters and neighbors.

Strategies

a. Establish contact and working relations with neighbors including the Wampanoag Tribe, Sherrif's Meadow Foundation and Town of Aquinnah.

b. Maintain contact and working relations with the Aquinnah conservation commission; send a draft copy of the plan to the Aquinnah conservation commission prior to the public hearing.

c. Implement deed restrictions and agreements (Appendix B).

d. Post the activities allowed and prohibited on the preserve.

e. Employ adequate seasonal coastal field technicians to attend the preserve and implement property rules.

Objective 2 Keep property well-maintained.

Strategies

a. Inspect property at least monthly.

b. Clean up any litter and junk which may occur.

c. Promptly respond to problems.

d. Employ adequate staff to effectively implement land management goals.

Objective 3 Maintain set hours for use.

Strategies

a. Open property every day of the year from sunrise to sunset.

b. Prohibit nighttime use of the preserve except for fishing and star-gazing.

c. Post "closed at dark" signs on the sign station.

d. Prohibit summer use of North Head trails.

Objective 4 Keep well-maintained boundaries.

Strategies

a. Locate corners and walk boundaries annually.

b. Keep photographic record of corners.

c. Post boundary flags where appropriate.

d. Correct encroachments as they occur.

Objective 5 Keep good records of all land management activities and natural events.

Strategies

a. Record all significant events, natural or otherwise.

b. Continue to update plant and animal inventories.

c. Maintain photographic record of landscape appearance.

Objective 6 Comply with all applicable regulations and agreements.

Strategies

a. Comply with Massachusetts wetland protection act and endangered species act and file prior to implementation.

b. Comply with any applicable local conservation by-law, planning board and zoning regulation.

c. File a notice of intent with the Aquinnah conservation commission regarding activities proposed that are within the wetland resource area and buffer zone.

d. File a Massachusetts endangered species act request for review regarding all activities proposed within the designated estimated and priority habitat for rare species.

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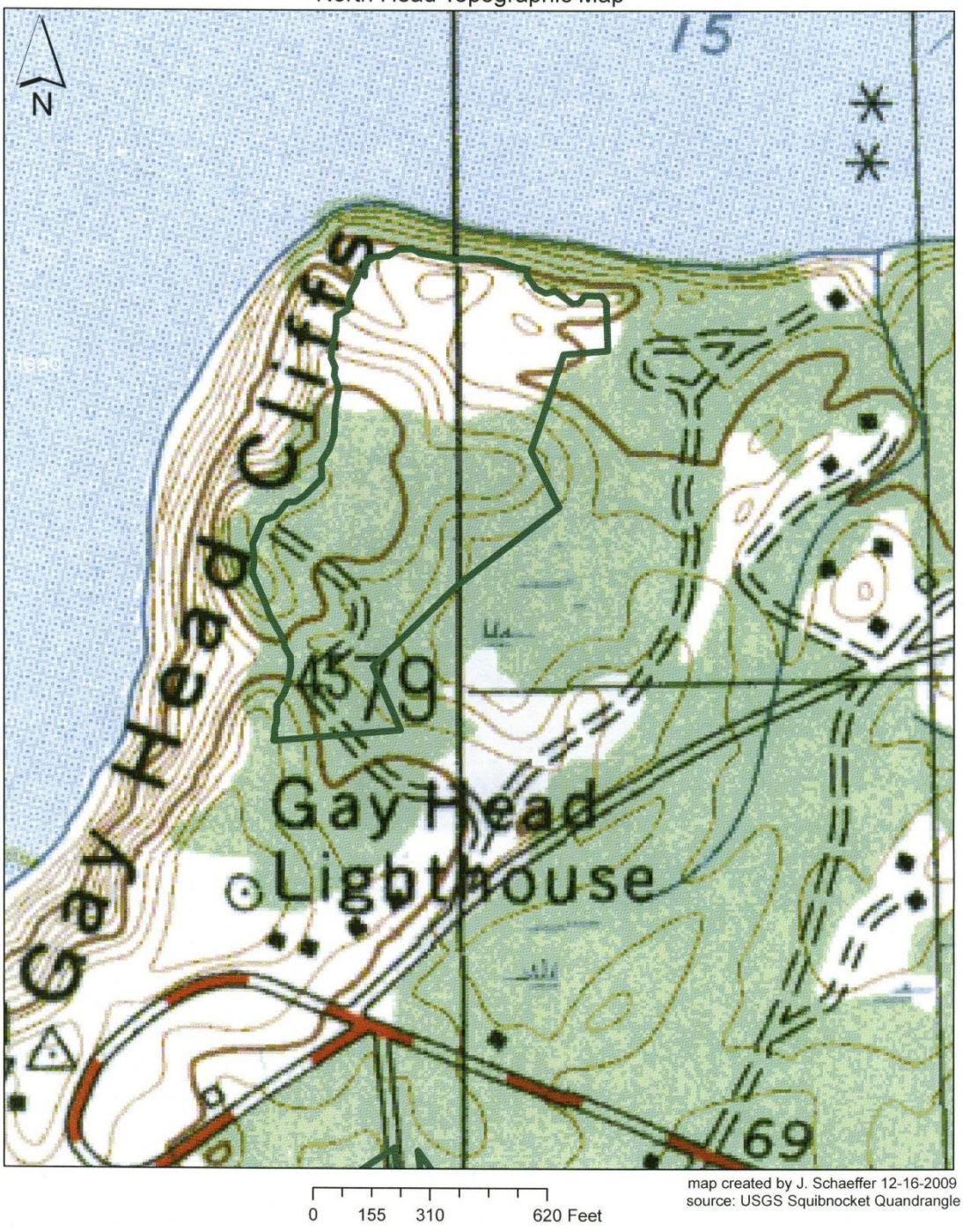
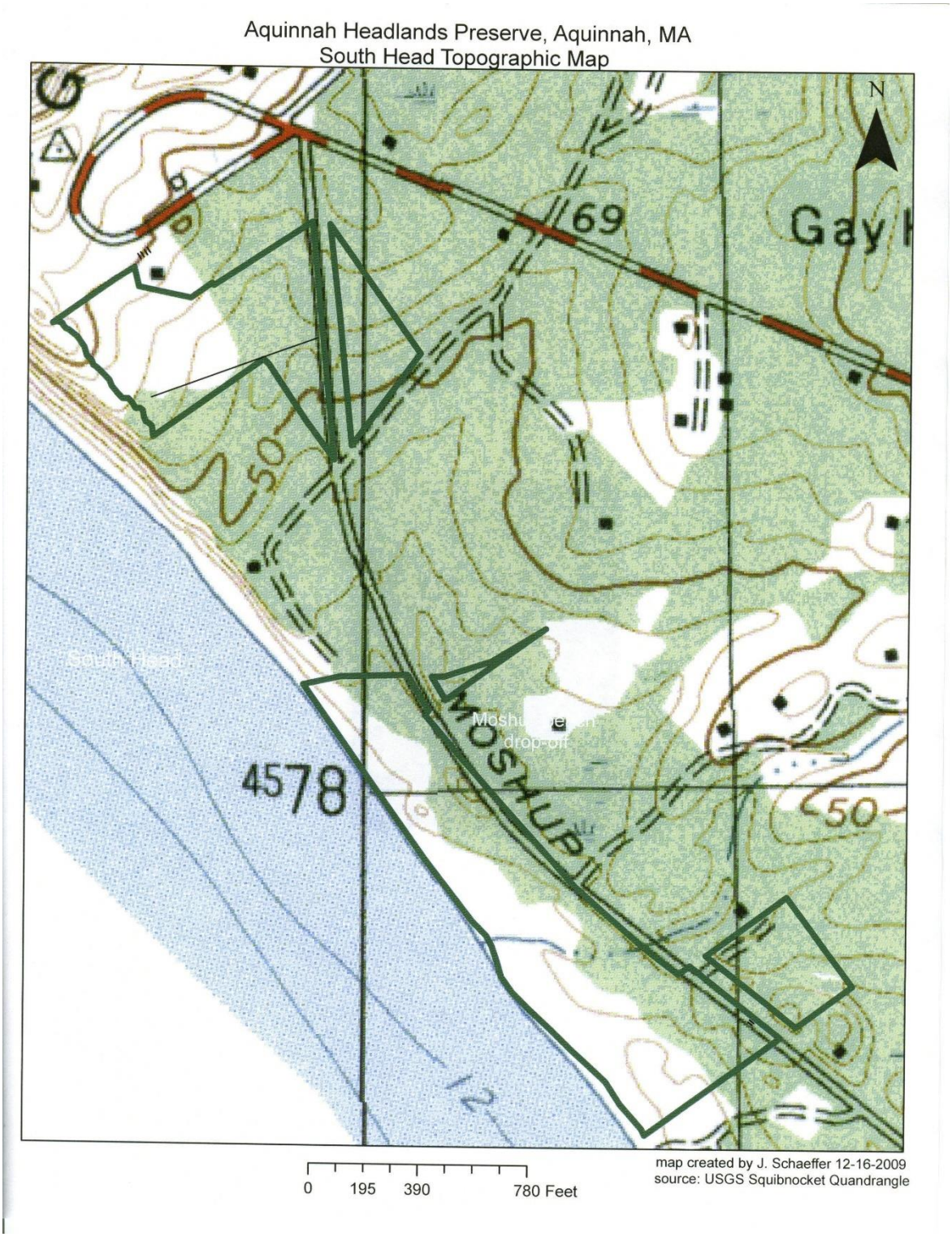
Appendix A: Locus, Topography, Planning and Wetland Maps

Aquinnah Headlands Preserve, Aquinnah, MA
Locus Map 1:25,000

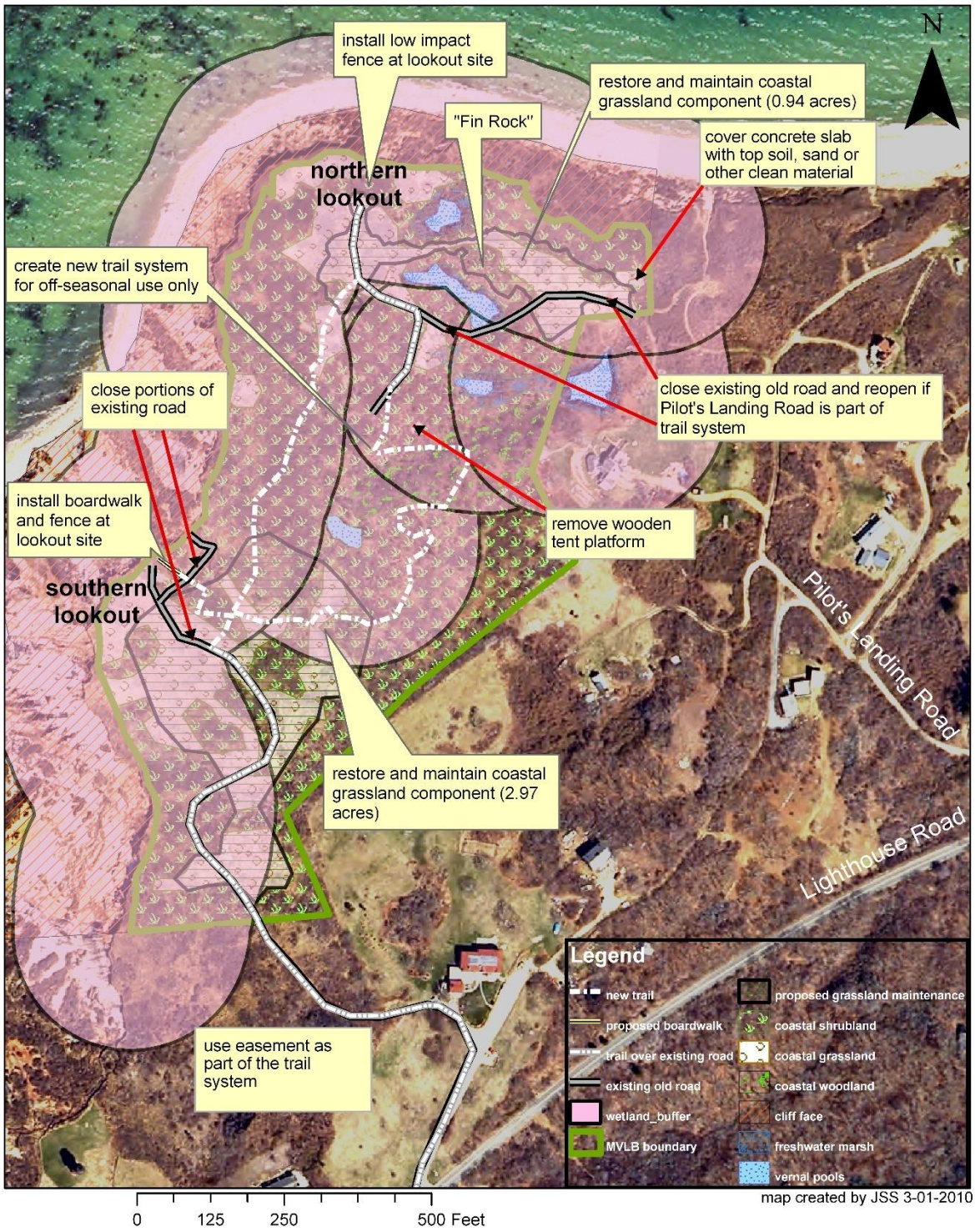
Aquinnah Headlands Preserve, Aquinnah, MA
North Head Topographic Map



map created by J. Schaeffer 12-16-2009
source: USGS Squibnocket Quandrangle

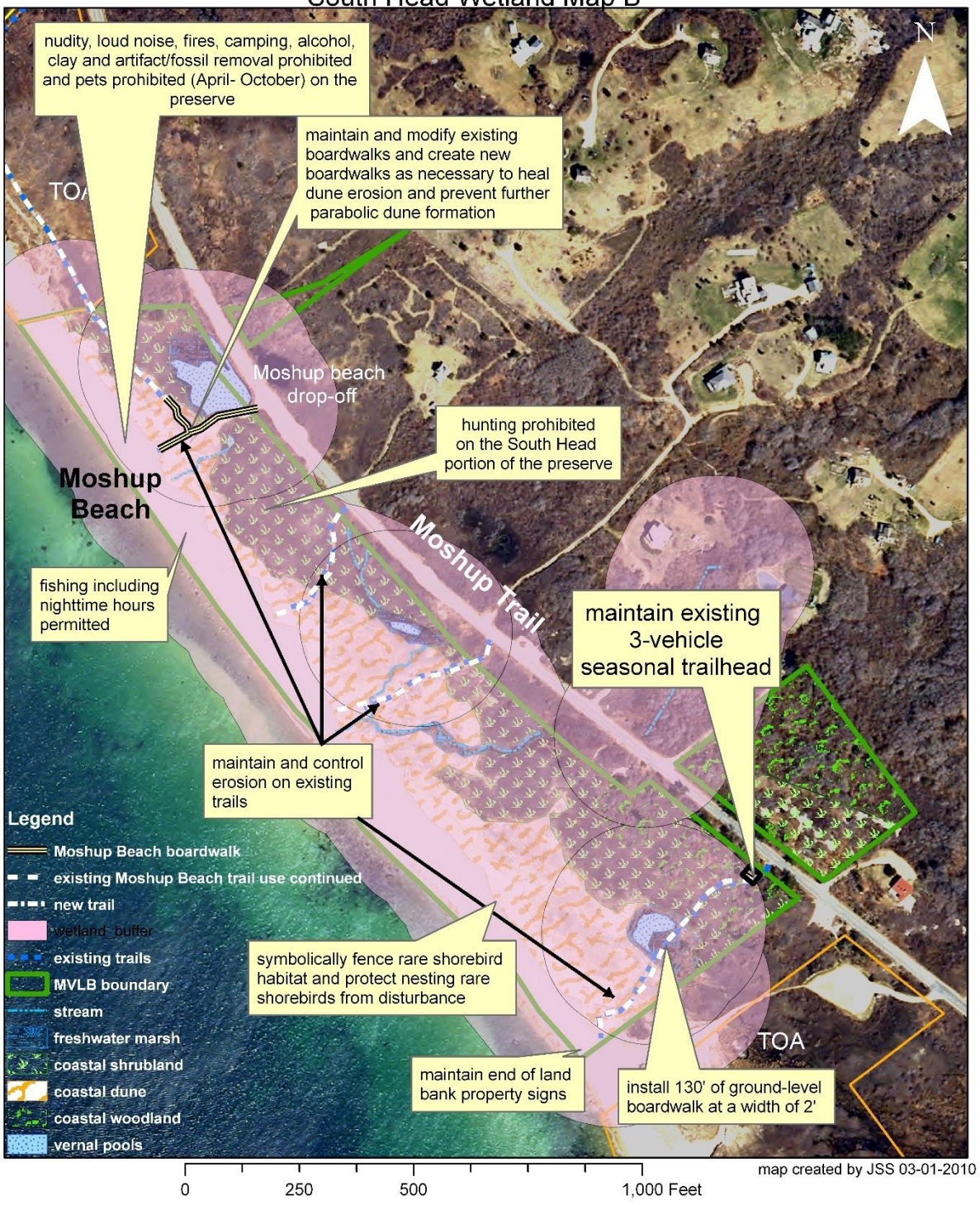

Aquinnah Headlands Preserve, Aquinnah, MA
South Head Topographic Map
N
69
Gay
50
South Head
Moshup Trail
drop-off
4578
MOSHUP
50
12
0
195
390
780 Feet
map created by J. Schaeffer 12-16-2009
source: USGS Squibnocket Quandrangle

Aquinnah Headlands Preserve, Aquinnah, MA
North Head Wetland Map

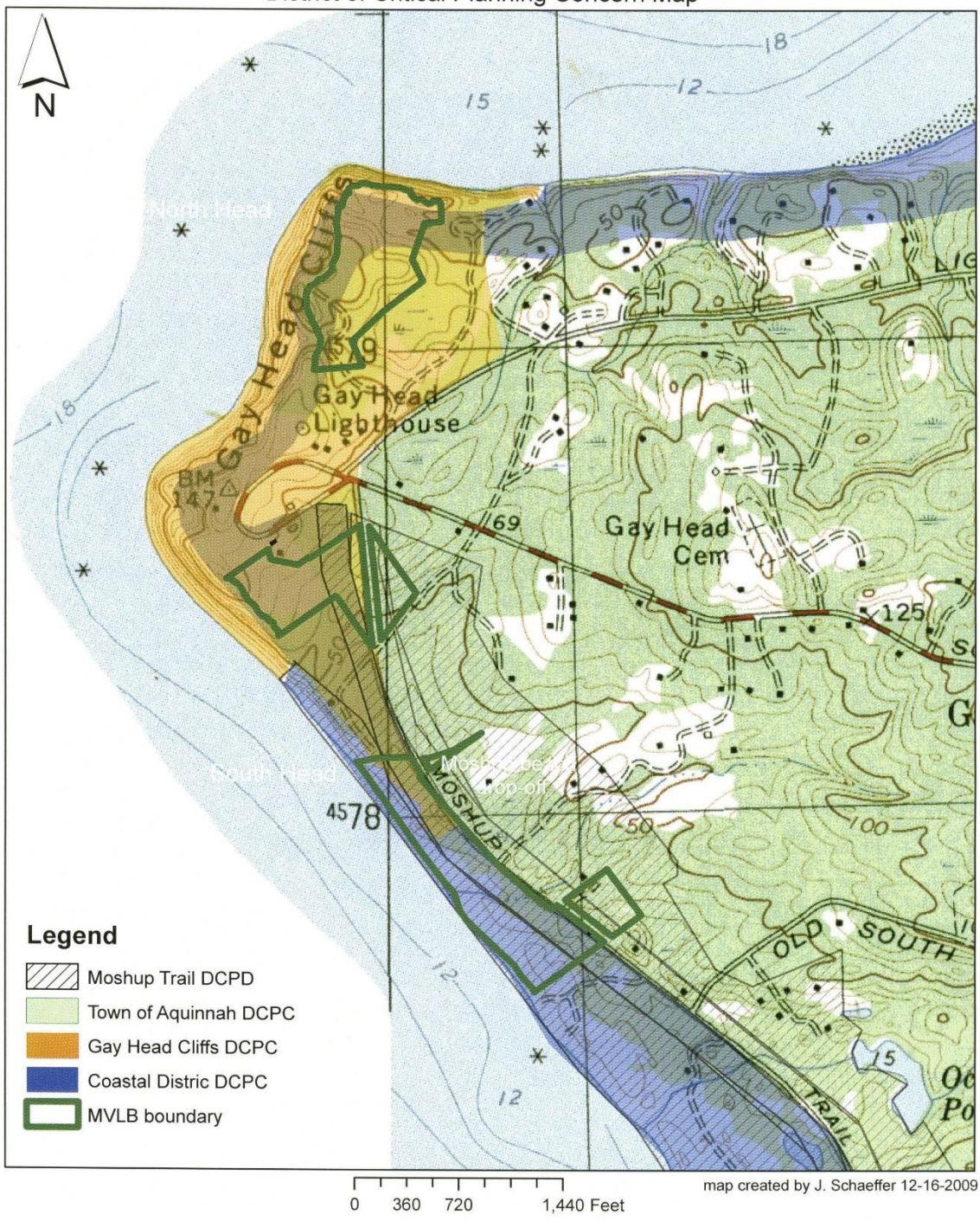


Aquinnah Headlands Preserve, Aquinnah, MA
South Head Wetland Map A

Aquinnah Headlands Preserve, Aquinnah, MA
South Head Wetland Map B



Aquinnah Headlands Preserve, Aquinnah, MA
District of Critical Planning Concern Map



Appendix B: Surveys, Deeds and Preliminary Management Plan Goals

Deeds and larger copies of the surveys are on file at the land bank office. They include the following:
Table of Contents

I. North Head Deeds, Surveys and Preliminary Management Goals

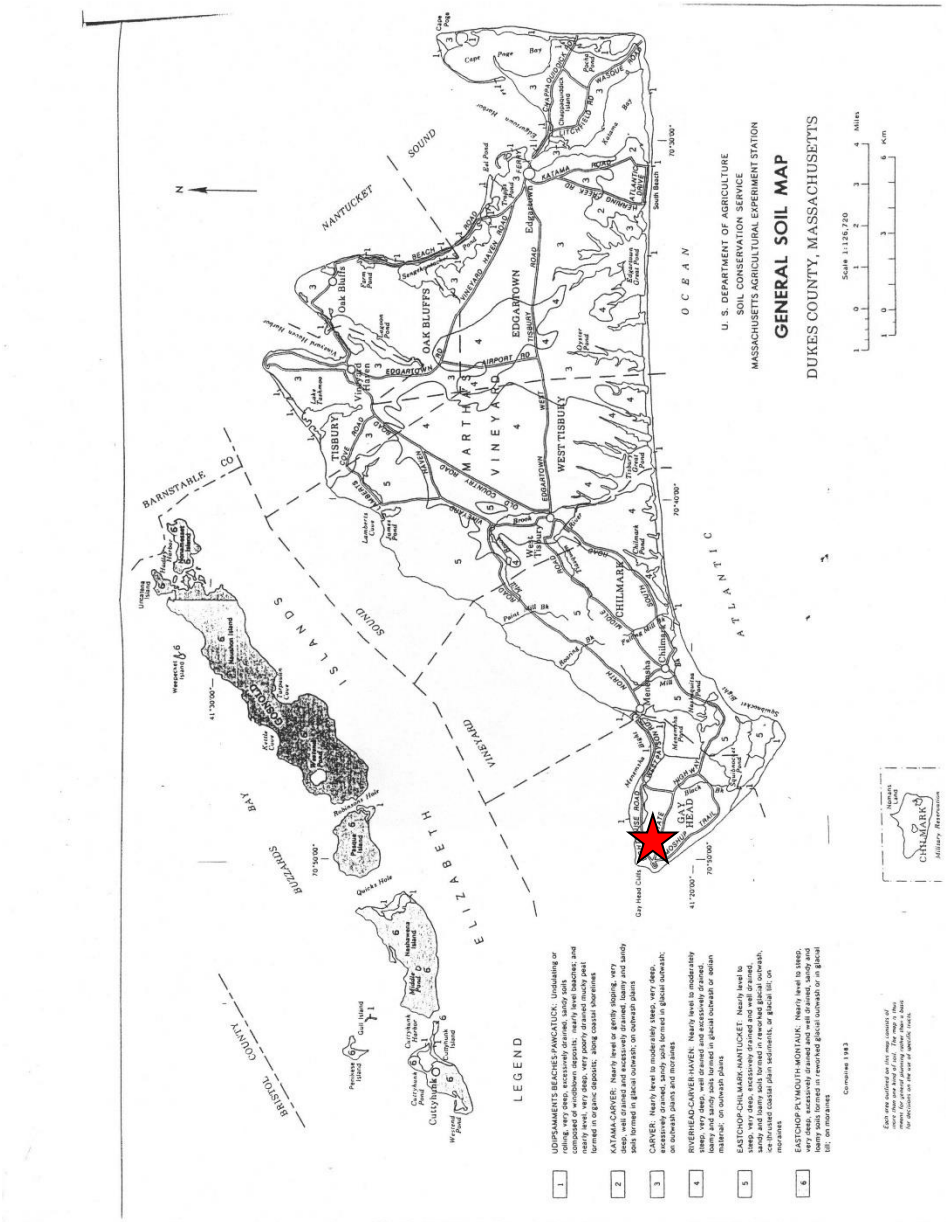
Devil's Bridge Promontory Preliminary Management Goals 09-21-92……..…01
J.B. Nayduch deed to MVLBC 10-22-1992……05
Gertrude W Taylor et al. deed to Peter Diem 12-16-86…..……07
Peter Diem survey of Lot 5 10-07-87……17
Properties off Lighthouse Road Preliminary Management Goals 12-09-92……...18
Mary H. Preston deed to MVLBC 12-24-92……..22
Arnold Zack deed to MVLBC 12-29-92……..24
Janet Shands deed to MVLBC 12-29-92……..26
Joan Wallen deed to MVLBC 4-5-93……28
Dean R Swift subdivision of Lot 2 Doc 19215B, 5-20-77 …..……31
David E. Vanderhoop deed to MVLBC 4-28-94…..…… 32
Hollis A. Smith plan of land Doc 19215A, 9-18-50……...34

II. South Head Deeds, Surveys and Preliminary Management Goals

Moshup Beach Overlook Management Plan October 16, 1991…….. 1
Ronald Perell deed to MVLBC 08-01-1990…… 4
Plan of Land in Gay Head- Set-off lots July 19, 1976…… 6
Leonard F. Vanderhoop Jr. deed to MVLBC 07-29-1992……..7
Leonard F. Vanderhoop Jr. deed to MVLBC 07-29-1992……..8
Leonard F. Vanderhoop Jr. deed to MVLBC 07-29-1992……..9
Leonard F. Vanderhoop Jr. deed to MVLBC 07-29-1992……10
Francis F. Cournoyer deed to MVLBC 07-29-1992……..13
Francis F. Cournoyer survey July 19, 1976……..16
Moshup Beach Overlook (expansion) preliminary management plan ……..17
Barbara A. Vanderhoop deed to MVLBC 06-27-2003 ……19
Marsh Hawk Land Trust Inc. deed to town of Aquinnah 04-28-2004……21
Town of Aquinnah easement and covenant to MVLBC 04-28-2004……..24
Marsh Hawk Land Trust Inc deed to MVLBC 04-28-2004 …….. 30
MVLBC survey 08-21-2003…….. 42

Long Property Management Plan 09-30-1987 ……..43
Moshup Beach Management Plan 10-16-1991 ……44
Virginia L Long deed to MVLBC 01-04-1988 ……47
Plan of Land in Gay Head Doc 18424 A, 03-12-1942 ……..50
Base Map of Moshup Beach property prepared for MVLBC …..……51
MVLBC topography survey of Moshup Beach 05-25-2005 ……52
Town of Gay Head survey by Smith and Dowling 01-22-1981 ……53
Anne W. Tagge deed to MVLBC 06-30-2004 ……54
Moshup Beach (expansion) preliminary management plan 11-13-2006 ……56
Joan Florence Higbee deed to MVLBC 12-20-2006..…… 58
Joan Higbee survey 06-29-2004 …….. 61
Joan Higbee survey 03-09-2006 …….. 62
Tatnall L. Hillman and Sandra Hillman deed to MVLBC 12-05-2007 …… 63
Forrest Vanderhoop deed to MVLBC 12-28-2007 …… 65
Plan of Land in Gay Head – Set-off lots July 19, 1976 …… 67

Appendix C: Soils Maps and Descriptions



Aquinnah Headlands Preserve, Aquinnah, MA
North Head Soil Map

Aquinnah Headlands Preserve, Aquinnah, MA
South Head Soil Map

The dominant soil on the preserve is Nantucket/Plymouth. The following soil descriptions are derived from the SCS (1986) and Latimer (1925) Dukes County Soil Surveys.

(a.) Beaches – BA

Beaches are nearly level to gently sloping in some areas adjacent to the ocean. Beaches are devoid of plant cover and include the beach proper, the low area of wind-blown sand at the rear of the beach and the cliffs along the beaches (Latimer 1925), They consist of fine to coarse sand. Although some areas are gravely to stony (SCS 1986).

(b.) Berryland loamy sand – BeA

This berryland soil has a 0-2% slopes and is very deep, nearly level and poorly drained. It occurs in closed depressions, at the base of swales and in low areas which border ponds and swamps. Permeability is moderately rapid and most suited for use as wetland wildlife habitat (SCS 1986).

(c.) Freetown/Swansea mucks – FsA

With a slope of 0-1% and poor drainability these soils are located in depressions and adjacent to streams and open water bodies. These soils are often wooded or shrubby and are most suited to use as wetland wildlife habitat (SCS 1986).

(d.) Moshup loam

Moshup loam soils are deep and moderately well drained. They occur on broad hill tops and lower areas of long slopes. In the stony type of soil, stones and boulders cover 1-3% of the surface area. The stones make this soil unsuited to cultivation but suited to pasture. Moshup soils without the stony aspect are typically in abandoned pasture and shrubby cover and are suited to cultivation and pasture (SCS 1986).

(MoB) Moshup loam, 3-8% slope

(MsB) Moshup loam, 0-8% slope, very stony

(d.) Nantucket/Plymouth complex

The Nantucket/Plymouth complex is undulating and rolling, very deep soils on side slopes and crests of uplands. The hilly soil type occurs on steep side slopes and ridges with 15-30% slope and 1-5% boulder coverage. Slopes of the rolling soil range from 3-15% and permeability is moderate to rapid. The rolling, stony Nantucket/Plymouth soils consist of stones and boulders that cover 1-3% of the surface area and thus are not suitable to cultivation but suited to pasture (SCS 1986). The stoneless Nantucket/Plymouth soils are suitable to cultivation and pasture. However, erosion can be a problem (SCS 1986).

(NpC) Nantucket/Plymouth, rolling

(NsC) Nantucket/Plymouth, rolling, very stony

(NsD) Nantucket/ Plymouth, hilly, very stony

(e.) Ridgebury variant fine sandy loam – RgA

This Ridgebury soil has a slope of 0-3%. It is deep, poorly drained and occurs in depressions and low-lying areas. Agriculture is possible on this soil. However, the seasonal high water table can be a limiting factor (SCS 1986).

(f.) Udipsamments, rolling – UaC

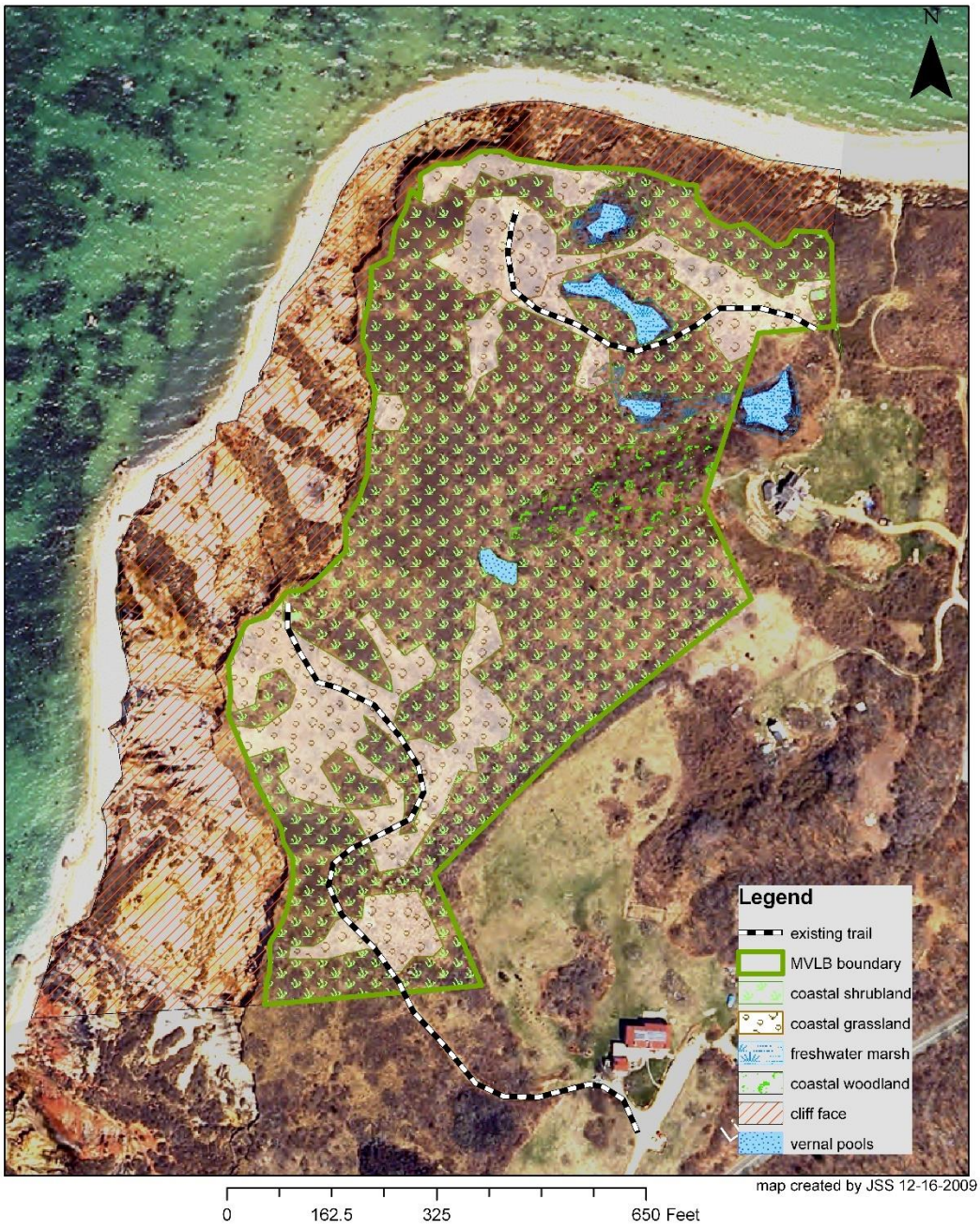
Udipsamment soils are on sand dunes and are excessively well drained and very deep. Slopes vary and range from 3 to 15%. Grasses and shrubs may cover these soils; however, they are shallow rooted and susceptible to destruction from vehicle and foot traffic.

(g.) Whitman variant silt loam – WmA

This Whitman soil is nearly level and poorly drained. It is in depressions and low-lying areas and has stones and boulders covering 1-3% of the surface area. Unlike in Ridgebury soil the surface layer consists of grey-brown silt loam and not sand. The soil is unsuitable to farming and dwellings but is well suited to use as wetland wildlife habitat (SCS 1986).

Appendix D: Vegetation

Aquinnah Headlands Preserve, Aquinnah, MA
North Head Ecological Communitites Map



Aquinnah Headlands Preserve, Aquinnah, MA
Ecological Communities Map A

Aquinnah Headlands Preserve, Aquinnah, MA
South Head Ecological Communities Map B

Vegetation inventories and surveys of Aquinnah Headlands Preserve were conducted from 1993 to 2009. The coastal shrubland/grasslands were inventoried following modified methods described by Dunwiddie (1986). A circular hoop with an area of 0.2 m^2 was used in 1993 and a hoop with an area of 0.373 m^2 was used in subsequent surveys. Species diversity and density were recorded for all surveys. Rare species were inventoried on the preserve during ongoing plant inventories conducted by land bank staff in May – October 1993-2009. Flora at Aquinnah Headlands Preserve is listed in Table 1 with proper nomenclature according to Gleason and Cronquist (1991). A description of each cover type and quantitative summary of surveys follows:

Habitat description

a. Coastal shrubland/grassland complex

This 31-acre maritime community supports two of the three state-listed plant species – [redacted] and two watch-listed species – [redacted] The coastal shrubland/grassland is the most prevalent community on the preserve and covers 60% of the preserve. It is also the richest in species diversity and houses 60% of plants known to occur on the preserve. Species composition is variable, but the general structure of this maritime community is one of dense growth of shrubs with a sparse herbaceous and grassy understory.

The mosaic quality of this vegetation community is derived from a mixture of the following features.

1. The above-mentioned composition of low growing roses, currants and poison ivy, herbs such as goldenrods and cow parsnip and grasses such as fescue.
2. Areas with less shrub overstory and a dense understory cover of herbs including various goldenrods and asters, [redacted], mountain mint and oxeye daisy and gramminoids such as little blue stem, big blue stem, redtop and switch grass. These areas most commonly occur in previously mowed areas and old pathways and roadbeds.
3. Areas where a thick tangle of vines such as grape and greenbrier cover a shrub layer of bayberry, sambuca, rose and huckleberry and shade out the herbs and graminoids.
4. Areas where the shrubs such as sumac, poison ivy, arrowwood, honeysuckle and bayberry grow taller than 6 feet in thick isolated clumps.

b. Coastal woodland

The preserve has historically lacked trees. The woodland community on the preserve is minute and covers a total of 3.76 acres. It comprises wind-blown oaks and sassafras and drought-tolerant pitch pine and Japanese black pine. The understory is a tangle of vines such as greenbrier and grape and dense shrubs such

as arrowwood and huckleberry.

b. Perched Wetland

The perched wetland consists of open water in the form of vernal pools for various times of the year and a ring of wetland shrubs, herbs, sedges, rushes, and ferns. This community is small in area (vernal pools ±0.53 acres; freshwater marshes 0.826 acres) but mighty in species richness with 50% of plants known to occur on the preserve being located within its well-defined topographic depressions with low-permeable soils and high water-retention capabilities. These wetlands occur throughout the preserve from the crest of the cliff to the back of the coastal dune system. The cliff wetlands differ from the dune wetlands in that the vegetation surrounding the vernal pools is dense and shrubby on the cliffs with the dominant shrubs being winterberry and blueberry, compared to the wetland vegetation behind the dunes that is herbaceous and graminoid in nature with rose mallow.

c. Coastal dune/beach

One state-listed rare plant – [redacted] – grows inconsistently along the upper reaches of the beach at the foot of the dune. The coastal dunes account for 6.87 acres of the preserve and the coastal beaches account for ± 4 acres of the preserve. The dunes are characterized by their sandy soil and dominant vegetation – American beach grass. Other grasses such as switchgrass, shrubs such as beach rose and herbs such as seaside goldenrod and beach pea grow in the dune as individuals or small patches. The most diverse area of the dune occurs where the dune is low and almost even with the beach. The more established portions of the dunes have fewer species on them. The coastal beaches on the preserve are devoid of vegetation and constantly changing from cobble in the winter to sand in mid- to late- summer.

The quantitative survey of the maritime grassland/shrubland above the Gay Head Cliffs was conducted in 1993 and repeated in 2003. In 1993 41 circular 0.2 m^2 plots were randomly located on 5 transects and surveyed for plant species dominance (% cover) and density (stem count). The survey was repeated in 2003 using 0.373 m^2 circular plots located in the same general areas as plots in the 1993 survey. The 2003 plot locations were determined following measurements and bearings from known locations on the property as determined in the 1993 survey; exact locations of the plots were not marked with pins or other devices in 1993 and therefore exact locations of plots could not be certain.

Data from 1993 and 2003 were compared using the Wilcoxon rank sum test ($p>0.05$). The Kruskal-Wallis One-way Nonparametric Analysis of Variance was used to compare percent cover of four vegetation types (graminoid, herb, shrub, and vine) for each year. A Kruskal-Wallis All-Pairwise comparison test was used to determine differences among the vegetation types. All statistical tests were run using the software Statistix 9.0.

Importance values (sum of relative dominance, density, and frequency) were calculated for both data sets and compared. The relative importance values for all plants surveyed for each year did not differ significantly (n=71, p=0.7592). Relative dominance of the individual vegetation types did not differ between years (graminoid p=0.2157, herb p=0.1315, shrub p=0.2850, vine p=0.6751).

In general, the data indicate the maritime grassland/shrubland above the cliffs east of the lighthouse is changing slowly in terms of vegetation structure. There were no significant differences (Wilcoxon Rank Sum results for average percent cover = graminoid: n=18, p=0.4400; herbaceous: n=23, p=0.1777; shrub: n=13, p=0.3282; vine: n=13, p=0.6797; average stem count = graminoid: n=18, p=1.000; herbaceous: n=23, p=0.7106; shrub: n=13, p=0.1713; vine: n=13, p=0.8492) in density and dominance values from 1993 compared to 2003 between individual vegetation cover types (graminoid, herbaceous, shrub and vine). This suggests that something, be it the raw environment on the cliffs and/or another factor, is influencing the rate of succession on the property. However slow, succession is occurring. In 1993 half of the plots surveyed were dominated in terms of percent cover by graminoid or herbaceous plants. Ten years later in 2003, more than double the number of plots surveyed were dominated by shrubs or vines compared to graminoid and herbaceous plants.

Closer inspection of the data on a species level indicates several shifts in species composition within the vegetation cover types even though the cover types themselves are remaining more or less constant with respect to the statistical result. For example, grasses such as redtop, switchgrass and velvet grass have increased in dominance over the 10-year period where sheep fescue has decreased overall on the property. The goldenrods have decreased in dominance while wavy leaf aster has increased. Shining sumac and Carolina rose dominance has increased while Virginia rose, bayberry and huckleberry dominance has decreased. Vines such as oriental bittersweet, Japanese honeysuckle and Virginia creeper have increased over the ten-year period while poison ivy appears to be decreasing in percent cover.

Additionally, photographs of the site in 1993 compared to 2008 suggest some areas have indeed changed from graminoid/herb dominant to shrub/vine dominant. The plot size and number of plots surveyed may not have been adequate to detect these visual changes in cover as they appear to be more localized than generic to the entire property.

A similar survey was conducted on the maritime grassland/shrubland south of the lighthouse off Moshup Trail. Twenty-four circular plots (0.373 m^2) were randomly located along 4 transects running east-west from the cliff edge towards Moshup Trail. Percent cover and stem counts of vegetation present in the plots were recorded during September 2004. A 4.8-acre section of the maritime shrubland/grassland was mowed in June 2007 to restore habitat for listed species [redacted] that are losing habitat to succession. Additionally, this one-time

mowing was conducted to facilitate a search for possible populations of [redacted] that may have otherwise gone undetected beneath the overstory shrubs. Surveys for [redacted] were conducted on the 4.8-acre mowed area in July 2007 and June and July 2008 during the plants vegetative and flowering periods. However, no evidence of [redacted] in this area was observed during these surveys.

Seven of the 24 survey plots from 2004 were located in the mowed area. These seven plots were surveyed again in July 2008 and compared to the 2004 data. The data sets were compared as two groups. Individual plots could not be directly compared since plots were not marked in 2004 making relocating exact plots impossible. However, the general area of each plot was relocated using measurements and bearings from known locations.

The repeated surveys suggest that the grasses remain the most frequent vegetation type in the area. However, the dominant grass changed from red top in 2004 to sheep fescue and switch grass in 2008. Lance-leaf and rough stemmed goldenrod continue to be the dominant herbs in terms of importance value and frequency of occurrence. Poison ivy and prickly dewberry remain the dominant vines in the area. A slight shift in rose species was observed over the 4-year period. Pasture rose increased in frequency over Virginia rose. Oriental bittersweet, the only invasive observed in this 4.8-acre area, increased in frequency from 2004 to 2008 and was observed in 5 out of 7 plots in 2008 verses 3 out of 7 plots in 2004.

Table 1. Flora of Aquinnah Headlands Preserve, Aquinnah, MA (1993-2009)

				Vegetation Community							Survey Period									
	Scientific name	**Common name**	**Rank[a]**	93-08 maritime grassland/shrubland [b]	2004 maritime grassland/shrubland south	2003 maritime grassland/shrubland north	1993 maritime grassland/shrubland north	maritime woodland	perched wetland	coastal dune/beach	1993[c]	1994	1996	1997	2003	2004	2005	2007	2008	2009
	Non-vascular plants																			
	Lichen																			
1	*Usnea strigosus*	old mans beard						x												F
	Moss																			
2	*Polytrichum species*	haircap moss						x												F
3	*Sphagnum sp*	sphagnum moss							x		S				S			S		F
	Vascular plants																			
	GRAMINOID																			
	Cyperaceae																			
1	*Carex pensylvanica*	pennsylvania sedge	AN	x			U				F	S			Sp					
2	*Carex scoparia*	a sedge	UN						U							S				
3	*Carex cf. Howei*	sedge	?						x		F									
4	*Carex crinita*	fringed sedge	UN						U		F					S				
5	*Carex interior*	sedge	?						x		F									
6	*Carex intumescens*	sedge	UN						u		S,F									
7	*Craex lupulina*	sedge	?						x										S	F
8	*Carex lurida*	sallow sedge	FN						x		F			Sp					S	
9	*Carex stricta*	tussock sedge	FN						x		F									

10	*Cyperus dentatus*	pondshore flatsedge	UN						x								S			
11	*Cyperus filiculmis*	sand flat-sedge	?	x							S									
12	*Eleocharis fallax*	atlantic spikerush	UN						x					Sp						
13	*Scirpus americanus*	saltmarsh threesquare	UN						x							F	S			
14	*Scirpus cyperinus*	woolgrass	FN						x					Sp					S	
15	*Scirpus pungens*	common three square	FN						x					Sp						
	Juncaceae																			
16	*Juncus bufonius*	toad rush	UN						x						S					
17	*Juncus canadensis*	Canada rush	FN						x		S			Sp		F				
18	*Juncus effusus*	soft rush	AN						U		S,F		Sp			F	S	S	Sp	
19	*Juncus greenei*	Greene's rush	FN	x					x		S							S		
20	*Juncus tenuis*	path rush	AN							x								S		
	Poaceae																			
21	*Agrostis alba*	redtop	FI	x	C	U	U		x		S,F	S	Sp		Sp		S			
22	*Agrostis capillaris*	rhode island bentgrass	UI						x							S				
23	*Agropyron repens*	quackgrass	?	x								S								
24	*Ammophila breviligulata*	American beach grass	AN	x	U					x	S,F		Sp			Y	S	Sp,S	Sp	
25	*Andropogon gerardii*	big bluestem	RN	x			U				F	S			S, F					
26	*Andropogon virginicus*	broom sedge	O/FN	x											S			Sp,S		
27	*Anthoxanthum odoratum*	sweet vernal grass	FI	x					x	x	F							Sp,S	Sp	
28	*Dactylis glomerata*	orchard grass	FI	x							S,F		Sp							
29	*Danthonia spicata*	poverty grass	FA	x															Sp	
30	*Descampsia flexuosa*	crinkled hairgrass	FN	x		U														
31	*Eragrostis spectabilis*	purple lovegrass	FN	x							F									
32	*Festuca cf. rubra*	red fescue	FN	x		U														
33	*Festuca filiformes*	hair fescue	UI	x							F							Sp		
34	*Festuca ovina*	sheep fescue	FI	x		C	A				S,F	S							Sp	
35	*Glyceria obtusa*	coastal mannagrass	UN						x		F					F				
36	*Holcus lanatus*	velvet grass	AI	x	U	U	U			x	S,F		Sp		Sp			S	Sp	S
37	*Panicum clandestinum*	deertongue grass	?	x											Sp					
38	*Panicum lanuginosum*	panic grass	?	x			U								Sp					

39	*Panicum virgatum*	switchgrass	FN	x	U	U	U		x	x	F	S		Sp	S	S	S	Sp,S	Sp	
40	*Phleum pratense*	timothy grass	AI	x		U					S,F									
41	*Schizachyrium scoparium*	little bluestem	FN	x	U		U				S,F	S								
42	*Spartina alterniflora*	salt water cordgrass	AN							x							S			
43	*Spartina patens*	saltmeadow cordgrass	AN							x							S			
44	*Spartina pectinata*	freshwater cordgrass	AN						x				Sp	Sp		S				
	FERN																			
	Aspleniaceae																			
45	*Athyrium filix-femina*	lady fern	ON						u		F									
	Onocleaceae																			
46	*Onoclea sensibilis*	sensitive fern	AN	x					x		S,F				S				Sp	S
	Osmundaceae																			
47	*Osmunda cinnamomea*	cinnamon fern	AN						u		S,F				S, Sp	F			Sp	S
	Thelypteridaceae																			
48	*Thelypteris palustris*	marsh fern	AN						U		S,F					F		S	Sp	
49	*Thelypteris noveboracensis*	New York fern	FN						x		S									
	HERB																			
	Anacardiaceae																			
50	*Toxicodendron radicans*	poison ivy	AN	x	C	C	C	x	x	x	S,F	S	Sp	Sp	S	S	S	Sp,S	Sp,S	
	Apiaceae																			
51	*Daucus carota*	Queen Anne's Lace	FI	x							Y									
52	*Heracleum lanatum*	cow parsnip	ON	x		U	U				Sp,F							Sp,S	S	S
	Araceae																			
53	*Arisaema triphyllum var. stewardsonii*	n. jack-in-the-pulpit	RN						x		Sp								Sp	
54	*Symplocarpus foetidus*	skunk cabbage	FN						x					Sp		Sp			Sp	
55	**Asclepiadaceae**																			
56	*Asclepias incarnata*	swamp milkweed	FN						x					Sp		S			S	
57	*Asclepias syriaca*	common milkweed	AN	x							S,F				S			S		
58	**Asteraceae**																			
59	*Achillea millefolium*	yarrow	AI	x	U	U	U	x			S,F	S	Sp		Sp			Sp,S		S

60	*Ambrosia artemisiifolia*	ragweed	FN		U															
61	*Anaphalis margaritacea*	pearly everlasting	FN	x														Sp		
62	*Anetennaria neglacta var. neglacta*	fiekd pussytoes	UN	x														Sp		
63	*Artemisia stelleriana*	dusty miller	FI							x							S		Sp	
64	*Aster linariifolius*	stiff aster	AN	x						x	S	S							S	
65	*Aster novi-belgii*	New York aster	FN						x							F				
66	*Aster patens*	late purple aster	ON	x							F									
67	*Aster undulatus*	wavy-leaved aster	FN	x	U	U	U				S,F	S				S				
68	*Aster vimineus*	small white aster	U							x								S		
69	*Bidens connata*	swamp beggar-ticks	UN						x							S				
70	*Chrysanthemum leucanthemum*	oxeye daisy	AI	x	U	U	U			x	Y				Sp			Sp,S	Sp	S
71	*Cichorium intybus*	chicory	OI	x							F						S			
72	*Cirsium discolor*	field thistle	ON	x						x	F	S			Sp			Sp		
73	[redacted]	[redacted]	FN	x					x	x	S,F			Sp	S				Sp	S
74	*Cirsium vulgare*	bull thistle	UI	x							Sp									
75	*Erigeron annus*	daisy fleabane	ON	x							S,F									
76	*Eupatorium dubium*	e. joe-pye weed	ON	x							F				S					
77	*Eupatorium perfoliatum*	boneset	ON	x							F									
78	*Euthamia graminifolia*	lance-leaf goldenrod	AN	x	A	C	C	x	x		S,F	S	Sp	Sp	S	S		S		
79	*Euthamia tenuifolia*	slender-leaved goldenrod	AN	x						x							S	S	Sp	
80	*Gnaphalium obtusifolium*	sweet everlasting	AN	x								S				S	S			
81	*Helianthus strumosus*	pale-leaved sunflower	RN	x							S,F									
82	*Hieracium caespitosum*	field hawkweed	UN					x										S		
83	*Hieracium piloselloides*	smooth hawkweed	UI	x								S								
84	*Lactuca canadensis*	wild lettuce	FN							x							S			
85	*Lactuca serriola*	prickly lettuce	UI	x															Sp	
86	*Solidago elliottii*	Elliott's goldenrod	FN	x	C	C	A		x		S,F		Sp		S			S	Sp	S
87	*Solidago nempralis*	gray goldenrod	FN	x							F									
88	*Solidago odora*	sweet goldenrod	AN					x										S		
89	*Solidago rugosa*	rough-stemmed goldenrod	AN	x	C	C	A	x	x		S,F	S	Sp			S		Sp,S	Sp	
80	*Solidago sempervirens*	seaside goldenrod	AN	x						x	S,F		Sp			F	S	Sp,S	Sp	

81	[redacted]	[redacted]	U-WL	x											S	S				
82	*Xanthium strumarium*	cocklebur	ON							x			Sp				S			
	Balsaminaceae																			
83	*Impatiens capensis*	spotted jewelweed	FN						x				Sp						Sp,S	
	Brassicaceae																			
84	*Cakile edentula*	sea rocket	AN							x			Sp				S			
85	*Raphanus raphanistrum*	wild radish	OI	x								S								
	Caprifoliaceae																			
86	[redacted]	[redacted]	RN-E	x			U		x		Y	S							S	S
	Caryophyllaceae																			
87	*Arenaria lateriflora*	grove sandwort	ON	x							Sp				Sp					
	Arenaria serpyllifolia	thyme-leaved sandwort	UI							x							S			
88	*Cerastium vulgatum*	mouse-ear chickweed	AI	x							Sp		Sp							
89	*Dianthus armeria*	deptford pink	OI	x							Sp									
90	*Honkenya peploides var. robusta*	seabeach sandwort	FN							x			Sp							
91	*Stellaria graminea*	common stitchwort	UI	x							Sp									
	Chenopodiaceae																			
92	*Bassia hirsuta*	downy seablite	UI							x							S			
93	*Salsola kali*	seabeach saltwort	FN							x							S			
94	**Clusiaceae**																			
	Hypericum canadense	Canadian St. Jonswort	ON						x										S	
95	*Hypericum perforatum*	common St. Johnswort	FI	x		U						S								
96	*Triadenum virginicum*	marsh St. Johnswort	FN						x		F				S	F				S
	Ericaceae																			
97	*Gaultheria procumbens*	wintergreen	AN	x															Sp	
	Euphorbiaceae																			
98	*Euphorbia polygonifolia*	seaside spurge	FN							x							S		Sp	
	Fabaceae																			
99	*Lathyrus maritimus*	beach pea	AN							x			Sp				S	Sp	Sp	
100	*Lespedeza capitata*	round-headed bush clover	FN	x							S,F				S,F					
101	*Medicago lupulina*	black medick	RI	x								s								

102	*Trifolium campestre*	low hop clover	UI	x							Sp									
103	*Trifolium pratense*	red clover	FI	x	U						S,F				S					
104	*Trifolium repens*	white clover	FI	x								S								
105	*Vicia cracca*	cow vetch	O/FI	x		U					S,F				S					S
106	*Vicia lathyroides*	spring vetch	?	x							Sp									
	Haloragaceae																			
107	*Prosperpinaca palustris*	mermaid weed	UN						x					Sp						
	Iridaceae																			
108	*Iris prismatica*	slender blue flag iris	FN						x				Sp	Sp						
109	*Iris versicolor*	larger blue flag iris	AN						x		Y		Sp		S, Sp	S	S	Sp	Sp	
110	*Sisyrinchium atlanticum*	eastern blue-eyed grass	ON	x							Sp									
111	*Sisyrinchium angustifollium*	stout blue-eyed grass	UN	x							Sp									
112	[redacted]	[redacted]	ON-SC	x							Sp									
	Lamiaceae																			
113	*Lycopus americanus*	water horehound	UN						x					Sp			S		S	
114	*Lycopus uniflorus*	northern bugleweed	UN						x							F	S	S		
115	*Pycnanthemum incanum*	hoary mountain mint	RN	x			U				S,F									
116	*Pycnanthemum muticum*	short-toothed mountain mint	ON	x					x		F	S				S				
117	*Scutellaria galericulata*	marsh skullcap	RN						x								S			
118	*Teucrium canadensis*	American germander	FN						x				Sp				S		S	
	Liliaceae																			
119	*Allium canadense*	wild garlic	?	x		U										S				
120	*Hypoxis hirsuta*	yellow stargrass	FN	x							Sp									
121	*Lilium philadelphicum*	wood lily	FN	x		U					S,F									
122	*Veratrum viride*	false hellebore	?						x										Sp	
	Limnanthaceae																			
123	*Floerkea proserpinacoides*	false mermaid	?						x		Sp									
	Lythraceae																			
124	*Decodon verticillatus*	water-willow	FN						x		F				S				Sp	S
125	*Lythrum salicaria*	purple loosestrife	OI						x			S								
	Malvaceae																			

126	*Hibiscus moscheutos*	swamp rose mallow	ON						x				Sp			S			Sp	
	Molluginaceae																			
127	*Mollugo verticillata*	carpetweed	UI							x							S			
	Monotropaceae																			
128	*Monotropa uniflora*	indian pipe	U					x											Sp	
	Onagraceae																			
129	*Ludwigia palustris*	common water purslane	ON						x		F			Sp						
130	*Oenothera biennis*	common evening-primrose	FN	x					x	x			Sp				S	S		
131	*Oenothera cf. perennis*	small sundrops	UN	x								S				S				
	Phytolaccaceae																			
132	*Phytolacca americana*	pokeweed	FN						x				Sp							
	Plantaginaceae																			
133	*Plantago lanceolata*	english plantain	AI	x							S,F	S	Sp							
134	*Plantago maritima ssp juncoides*	seaside plantain	UN	x						x	S,F							S		
	Polygalaceae																			
135	*Polygala polygama*	bitter milkwort	U	x							S							S		
	Polygonaceae																			
136	*Polygonum arifolium*	halberd-leaved tearthumb	UN						x										S	
137	*Polygonum coccineum*	swamp smartweed	?						x							F				
138	*Polygonum convolvulus*	black bindweed	UI	x																S
139	[redacted]	[redacted]	O/N-SC							x							S			
140	*Polygonum hydropiperoides var. hydropiperoides*	mild water-pepper	UN						x								S			
141	*Polygonum lapathifolium*	nodding smartweed	UN						x							F				
142	*Rumex acetosella*	field sorrel	AI	x	U		U				F	S	Sp					Sp	Sp	
143	*Rumex crispus*	sour dock	FI	x					x	x	S,F		Sp				S		Sp	
144	*Rumex orbiculatus*	great water-dock	RN						x					Sp					Sp	
	Primulaceae																			
145	*Glaux maritima*	sea milkwort	UN							x							S			
146	*Lysimachia quadrifolia*	whorled loosestrife	O/FN	x		U	U	x			S,F				S			S	Sp	S
147	*Lysimachia terrestris*	swamp candles	ON						x		S,F					F			Sp	
	Rosaceae																			

148	*Fragaria virginiana*	wood strawberry	ON	x			U				F							Sp		
149	*Geum laciniatum*	rough avens	?	x	U	U										S				
150	*Potentilla canadensis*	dwarf cinquefoil	FN	x				x			F	S			Sp			Sp,S		
151	*Potentilla norvegica*	rough cinquefoil	UN	x	U		U				F									
152	*Potentilla simplex*	common cinquefoil	FN	x	U					x	Y		Sp					S		
	Ranunculaceae																			
153	*Anemone quinquefolia*	wood anemone	FN	x					x		Sp				Sp					
	Rubiaceae																			
154	*Galium aparine*	cleavers	UN						x		Sp									
155	*Galium asprellum*	rough bedstraw	UN						x										S	
156	*Galium palustre*	marsh bedstraw	UN	x		U														
157	*Galium trifidum var. trifidum*	tricleft bedstraw	UN						x					Sp						
	Scrophulariaceae																			
158	*Gratiola aurea*	golden hedge-hyssop	ON						x							F				
159	*Linaria canadensis*	blue toadflax	FN	x						x			Sp					Sp	Sp	
160	*Verbascum thapsus*	common mullein	FI	x								S			S					S
	Sparganiaceae																			
161	*Sparganium androcladum*	shining bur-reed	UN						x								S			
162	*Sparganium eurycarpum*	giant bur-reed	RN						x					Sp					Sp	
	Typhaceae																			
163	*Typha angustifolia*	narrow-leaved cattail	ON						u		S,F				S					S
	Violaceae																			
164	*Viola lanceolata*	lanceleaf violet	FN						x							F				
165	*Viola sagittata f. fimbriatula*	ovate-leaved violet	ON	x			U				F									
	SHRUB																			
	Anacardiaceae																			
166	*Rhus copallinum*	shinning sumac	FN	x	C	C	A	x	x		S,F	S	Sp		Sp,S			S	Sp	S
167	*Rhus glabra*	smooth sumac	ON	x			U		x		Sp,F									S
168	*Rhus typhina*	staghorn sumac	FN	x																F
169	*Rhus vernix*	poison sumac	ON						x											S
	Aquifoliaceae																			

170	*Ilex verticillata*	winterberry	FN	x					x		S,F	S								S
	Caprifoliaceae																			
171	*Sambucus canadensis*	common elderberry	FN	x		U			x	x						S			S	
172	*Viburnum dentatum*	southern arrowwood	UN	x			U	x	x		S,F	S	Sp		S			S	Sp	S
173	*Viburnum recognitum*	northern arrowwood	AN	x					x		S,F	S								
	Celastraceae																			
174	*Euonymus alata*	burning bush	?I	x														Sp		
	Clethraceae																			
175	*Clethra alnifolia*	sweet pepperbush	AN						x		Y	S							Sp	
	Cupressaceae																			
176	*Juniperus virginiana*	red cedar	AN	x					x		S,F	S								
	Elaeagnaceae																			
177	*Elaeagnus angustifolia*	Russian olive	UI	x							Sp,S				S					
178	*Elaeagnus commutata*	silverberry	N	x							F									
	Ericaceae																			
179	*Epigaea repens*	trailing arbutus	AN	x							S									
180	*Gaylussacia baccata*	black huckleberry	AN	x		U	U				F	S								
181	*Gaylussacia frondosa*	dangleberry	FN	x		U	U				F									
182	*Lyonia ligustrina*	maleberry	FN	x		U	U				S,F	S								
183	*Vaccinium corymbosum*	highbush blueberry	FN	x			U	x	x		S,F							S		
184	*Vacciunium macrocarpon*	cranberry	ON						x							F		Sp,S	Sp	
185	*Vaccinium pallidum*	late lowbush blueberry	FN	x								S								
	Grossulariaceae																			
186	*Ribes cynosbati*	pasture gooseberry	RI	x												S				
187	*Ribes hirtellum*	swamp gooseberry	ON	x					x		Sp,F							Sp		S
	Myricaceae																			
188	*Myrica pensylvanica*	bayberry	AN	x	U	U	C	x	x	x	S,F	S	Sp	Sp	W	S	S	S	Sp,S	S
	Oleaceae																			
189	*Ligustrum vulgare*	hedge privet	UI	x																F
	Rosaceae																			
190	*Amelanchier laevis*	smooth shadbush	UN	x			U				Sp,F									

191	*Prunus maritima*	beach plum	F/AN	x				x			Y		Sp		S			S	Sp	S
192	*Prunus serotina*	black cherry	AN	x			U	x			S,F	S					S	Sp,S	Sp	
193	*Rosa carolina*	pasture rose	FN	x		C	C	x	x		S,F	S						Sp,S		
194	*Rosa rugosa*	beach rose	AI	x					x	x	S,F		Sp		S		S	Sp,S	Sp	
195	*Rosa virginiana*	virginia rose	FN	x	A	A	A	x			S,F					F		S	Sp,S	S
196	*Spiraea alba var. latifolia*	meadowsweet	ON						x		S,F									
	Rubiaceae																			
197	*Cephalanthus occidentalis*	buttonbush	UN						x		F									
	TREE																			
	Aceraceae																			
198	*Acer pseudoplatanus*	sycamore maple	RI						x		F									
199	*Acer rubrum*	red maple	AN						x		F									
	Cupressaceae																			
200	*Juniperus virginiana*	eastern red cedar	AN	x													S	S		
	Fagaceae																			
201	*Quercus alba*	white oak	AN					x												S
202	*Quercus coccinea*	scarlet oak	AN					x										S		
203	*Quercus ilicifolia*	scrub oak	AN					x										S		
204	*Quercus velutina*	black oak	AN	x		U		x			F	S			S			S	Sp	
	Lauraceae																			
205	*Sassafras albidum*	sassafras	F/AN	x		U	U		x		S,F	S			S					
	Pinaceae																			
206	*Pinus rigida*	pitch pine	AN	x				x										Sp,S		
207	*Pinus thunbergiana*	Japanese black pine	I	x															Sp	
	Rosaceae																			
208	*Amelanchier laevis*	shadbush	U	x							Sp,F									
	VINE																			
	Caprifoliaceae																			
209	*Lonicera japonica*	Japanese honeysuckle	AI	x		U	U				S,F									S
	Celastraceae																			
210	*Celastrus orbiculatus*	Asian bittersweet	AI	x	C	U					S,F							S		S

	Convolvulaceae																			
211	*Calystegia sepium*	wild morning-glory	ON	x																S
	Cuscutaceae																			
212	*Cuscuta gronovii*	common dodder	UN	x																S
	Fabaceae																			
213	*Apios americana*	groundnut	ON	x					x		S,F									
	Polygonaceae																			
214	*Polygonum scandens*	climbing false buckwheat	UN	x			U		x		F									
	Rosaceae																			
215	*Rubus allegheniensis*	common blackberry	FN	x	C	U	U		x	x	S,F							S		S
216	*Rubus flagellaris*	prickly dewberry	FN	x	C	C	C	x	x	x	S,F	S						Sp,S		
217	*Rubus hispidus*	bristly dewberry	AN	x			U				F									
218	*Rubus idaeus*	wild red raspberry	FN	x		U			x		S,F									
	Rubiaceae																			
219	*Galium asprellum*	rough bedstraw	UN						x											
	Smilacaceae																			
220	*Smilax bona-nox*	bona-nox greenbrier	?	x			U				S,F									
221	*Smilax glauca*	sawbrier	O/FN	x			U				S,F									
222	*Smilax herbacea*	carrion flower	ON						x		F									
223	*Smilax rotundifolia*	common greenbrier	AN	x		U	U	x	x		F	S						S	Sp	S
	Solanaceae																			
224	*Solanum dulcamara*	bittersweet nightshade	OI	x												S				
	Vitaceae																			
225	*Ampelopsis brevipedunculata*	procelainberry	OI						x		S,F									
226	*Parthenocissus quinquefolia*	virginia creeper	AN	x	C	U	U	x	x	x	S,F		Sp					S	Sp	S
227	*Visits aestivalis*	summer grape	FN	x		U	U	x			F				S			S	Sp	S
228	*Vitis labrusca*	fox grape	ON	x					x		S,F	S			S			Sp		S

[a]Rarity of plants on Martha's Vineyard: U= unknown, A=abundant (almost always occur in typical habitat), F = frequent (often occur in typical habitat), O = occasional (occur in more than 10 sites but are not expected to occur in typical habitat), R = rare (occur in 10 or fewer sites, H = historic (recorded but not sighted in past 40 years), N = native, I = introduced,

WL = watch listed by MA, SC = special concern by MA, E = endangered, T = threatened.
[b] Survey results: A = abundant (percent occurrence ≥ 50%), C = common (percent occurrence >21% and <50%), U = uncommon (percent occurrence ≤20%), X = present on the Preserve but not detected during survey; Xp = present along path
[c] Sp=spring (April, May, June); S=summer (July and August); F=fall (September and October); Y=spring, summer and fall
Sources: Swanson and Knapp 1999, Gleason and Cronquist 1991, Hale 1979 and Newcomb 1977.
State-listed species are highlighted.

Appendix E. Wildlife

The coastal shrubland/grassland community of Aquinnah Headlands Preserve is diverse with grassy areas, open low growing shrubs and dense thickets. The perched wetlands are either surrounded by a dense ring of wetland berry-producing shrubs or a low-growing ring of rose, sedges, ferns, rushes and nectar-producing wetland herbs. The dune and beach are sandy by nature with areas covered in beach grass and various beach herbs. The costal woodland is dominated by oaks with a dense understory of berry-producing shrubs and vines.

Aquinnah Headlands Preserve is diverse in its vegetation communities and provides opportunities for nesting, roosting, and foraging wildlife species; fruiting shrubs and vines (i.e., huckleberry, shadbush, blueberry, greenbrier, and bayberry) provide for summer and fall foraging; grassy areas provide hunting grounds for birds of prey; shrubby areas provide cover for ground-nesting birds and small mammals; taller dense thickets of shrubs provide cover for wildlife species from the ever-present winds; perched wetlands provide water for mammals and forage and nesting habitat for other wildlife species such as invertebrates, amphibians and reptiles.

Various moth species use the shrubs, grasses, herbs and wetland and dune plants for at least a portion of their life cycle (Table 2). The nectar-producing flowing plants and cedar trees growing in and around the shrubland/grassland complex and wetlands are a superb food source for invertebrates such as butterflies and others in the Lepidoptera order.

Although small in area, the woodland community serves as an important habitat to various wildlife species. Oak acorns are a vital food source to many wildlife species in the fall and winter when other nutritional foods are unavailable. Pines provide forage to several songbirds and upland game birds (Martin et al. 1951).

The beaches provide nesting habitat for rare shorebirds such as piping plovers – however, that depends entirely on how quickly the beach recovers from the winter and new deposits of sand are made as these birds begin nesting in early spring. The beach can also be narrow at times with the high tide cutting into the foot of the dune. This would wash out any shorebirds' attempt at a nest on the beach. Even if nesting is not a success, the wrackline and sand invertebrates provide forage for a variety of shorebirds. Beetles such as the northeastern beach tiger beetle may occur on this beach. However, the complete washover of the beach at times and the stony quality of the beach during the winter may discourage them from moving in or staying in the area.

Wildlife species were observed on the preserve through general property surveys, UV black-light surveys and diurnal butterfly and moth surveys. Wildlife species seen or heard and evidence of wildlife species such as tracks and scat were recorded during vegetation surveys and avian bird counts from 1993 through summer of 2009. Diurnal butterfly and moth surveys were conducted during all the 2003 and 2004 avian surveys in the fall, summer, and spring. Nocturnal moth species were surveyed using a stainless-steel rigid vein 18-24 inch "leptrap" with a 32–40-Watt quantum black light. Traps were set using a photoelectric switch from dusk to dawn on 5 trap nights in June and July in 2004 on North Head and on 2 trap nights in June and July in 2008 on South Head. Species were

collected, packaged, and sent to Mark Mello, a local entomologist with The Lloyd Center for the Environment, in Dartmouth, MA, for positive identification.

A complete list of moth species trapped during nocturnal and diurnal Lepidoptera surveys and a table of the wildlife species known to occur on the preserve follows.

Table 2. Lepidoptera species trapped at Aquinnah Headlands Preserve, Aquinnah, MA in 2004 and 2008 using a portable quantum ultraviolet light trap equipped with a photoelectric switch and charged with ethyl acetate on seven trap-nights.

		Gay Head Cliffs North					Moshup Trail		
		maritime grassland/shrubland					dune	stream	
ref #	Species	6/16/04	6/24/04	7/15/04	8/18/04	8/25/04	6/25/08	7/22/08	Total
	MICRO LEPIDOPTERA								
	COLEOPHORIDAE								
1387	*Coleophora sp. (near spissicornis)*		1						1
	TORTRICIDAE								
	Olethreutinae								
	Phaneta sp.		1						1
	PYRALIDAE								
	Pyraustinae								
5159	*Desmia funeralis*				2				2
5277	*Herpetogramma thestealis*				1				1
	Pyralinae								
5532	*Dolichomia infimbrialis*		1						1
5533	*Dolichomia (="Herculia") olinalis*		1						1
	Epipaschiinae								
5606	*Pococera sp. (probabaly asperatella)*	1							1
	LIMACODIDAE								
4697	*Euclea delphinii*		1						1
4665	*Lithacodes fasciola*			1					1
	MEGALOPYGIDAE								
4644	*Lagua crispata*	3		1					4
	MACRO LEPIDOPTERA								
	GEOMETRIDAE								
	Ennominae								
6272	*Eumacaria latiferrugata*						1	1	2
6598	*Protoboarmia porcelaria*		1						1
6640	*Biston betularia*		17						17
6667	*Lomographa vestaliata*	1							1
6724	*Euchlaena serrata*			1	1				2
6725	*Euchlaena muzaria*							1	1

6729	*Euchlaena johnsonaria*			1				1	2
6753	*Pero honestaria*		1			2			3
6754	*Pero ancetaria (="hubneraria")*				1				1
6755	*Pero morrisonaria*						1		1
6796	*Campaea periata*						1		1
6827	*Metarranthis refractaria*		1						1
6837	*Probole alienaria (in this complex)*		1						1
6941	*Eusarca confusaria*				2	3			5
6963	*Tetracis crocallata*			1					1
6982	*Prochoerodes transversata*				1	2			3
7009	*Nematocampa resistaria*							1	1
	Geometrinae								
7046	*Nemoria bistriana*							1	1
7053	*Dichorda iridaria*						1		1
	Sterrhinae								
7114	*Idaea demissaria*							1	1
7126	*Idaea dimidiata*							1	1
7139	*Cyclophora pendulinaria*							1	1
7159	*Scopula limboundata*							1	1
	Larentiinae								
7196	*Eulithis diversilineata*							1	1
7416	*Costaconvexa centrostrigaria*							1	1
	SATURNIIDAE								
	Ceratocampinae								
7761	*Anisota stigma*							1	1
	Hemileucinae								
7746	*Automeris io*						1		1
	Saturniinae								
7767	*Hyalophoa cecropia*						1		1
	NOTODONTIDAE								
	Phalerinae								
7904	*Datana drexelii*		1				1	1	3
	Notodontinae								
7915	*Nadata gibbosa*		1						1
7917	*Hyperaeschra georgica*	1							1
	Heterocampinae								
7990	*Heterocampa umbrata*		1			1			2
7995	*Heterocampa biundata*		1						1
8007	*Schizura unicornis*						1		1
	NOCTUIDAE								
	Eublemminae								
8490	*Pangrapta decoralis*		1				1	1	3
8491	*Ledaea perditalis*		1						1

	Herminiinae								
8360	*Macrochilo orciferalis*				1		1		2
8364	*Phalaenostola larentioides*								
8370	*Bleptina caradrinalis*		2	1			1	1	5
8384	*Renia flavipunctalis*					1		1	2
8387	*Renia sobrialis*			1					1
	Hypeninae								
8465	*Hypena scabra*						1	1	2
	Scolecocampinae								
9818	*Amolita fessa*			1					1
	Catocalinae								
8574	*Anticarsia gemmatalis*				1				1
8587	*Panopoda rufimargo*	1							1
8618	*Drasteria graphica*	1							1
8689	*Zale lunata*				1				1
8717	*Zale horrida*							1	1
8738	*Caenurgina crassiuscula*					1			1
8745	*Mocis texana*				3				3
8777	*Catocala badia*				2				2
8857	*Catocala ultronia*					1			1
	Euteliinae								
8955	*Marathyssa inficita*		1	2			1		4
8957	*Paectes oculatrix*		1					1	2
	Arctiinae								
8123	*Holomelina ferruginosa*							1	1
8129	*Pyrrharctia isabella*	1	1				1		3
8133	*Spilosoma latipennis*	1							1
8134	*Spilosoma congrua*	1							1
8137	*Spilosoma virginica*	1	1		1				3
8140	*Hyphantria cunea*		1	1			1		3
8146	*Ecpantheria scribonia*		1						1
8156	*Phragmatobia fuliginosa*							1	1
8171	*Apantesis nais*	1							1
8203	*Halysidota tessellaris*		1				1		2
8211	*Lophocampa caryae*	1	1				1		3
	Lymantriinae								
8302	*Dasyshira obliquata*					2			2
8316	*Orgyia leucostigma*				1				1
8169	*Apantesis phalerata*	9	1						10
	Eustrotiinae								
9046	*Deltote bellicula*		1						1
	Hadininae								

10288	*Polia detracta*						1	1	2
10291	*Morrisonia latex*		1						1
10300	*Spiramater grandis*	3	1				1		5
10301	*Spiramater lutra*		1	1					2
10438	*Mythimna unipuncta*				3		1	1	5
10439	*Leucania extincta*					1		1	2
10447	*Leucania commoides*		1	1					2
10397	*Lacinipolia renigera*		2				1		3
10405	*Lacinipolia lorea*						1		1
10585	*Orthodes crenulata*			1			1		2
10587	*Orthodes cynica*						1		1
	Noctuinae								
10903	*Anicla illapsa*		1						1
10674	*Feltia subgothica*				1	4			5
10676	*Feltia herilis*					3			3
10663	*Agrotis ipsilon*				1				1
10715	*Euxoa scandens*						4		4
10942	*Xestia dolosa*	3	1						4
11010	*Lycophotia phyllophora*						1		1
11012	*Noctua pronuba*						1	1	2
	Acronictinae								
9200	*Acronicta americana*		1	1					2
9211	*Acronicta tritona*	1							1
9258	*Acronicta sperata*	1							1
9259	*Acronicta noctivaga*	1							1
9272	*Acronicta oblinita*		1						1
9281	*Agriopodes fallax*		1						1
9285	*Polygrammate debraeicum*							1	1
10135	[redacted]			3			1		4
10200	*Cucullia asteroides*		1						1
11068	*Helicoverpa zea*				1				1
9696	*Condica vecors*				1				1
9065	*Leuconycta diphtheroides*			2					2
	Xyleninae								
9619	*Phosphila miseloides*	1							1
9650	*Anorthodes tarda*		1						1
9560	*Dypterygia rozmani*		1	1					2
9353	*Apamea inordinata*	1							1
9364	*Apamea sordens (=finitima)*		1						1
9479	*Papaipema lysimachiae*				1				1
9578	*Hyppa xylinoides*				1				1
9629	*Fagitana littera*		1						1

	Condicinae								
9690	*Condica videns*						1		1
	LASIOCAMPIDAE								
	Macromphalinae								
7663	*Apatelodes torrefacta*	1					1		2
7698	*Malacosoma disstria*	1	1						2
7701	*Malacosoma americanum*		2						2
	Lasiocampinae								
7687	*Phyllodesma americana*							1	1
	SATURNIIDAE								
	Hemileucinae								
7746	*Automeris io*	2	1						3
	SPHINGIDAE								
	Sphinginae								
7810	*Sphinx gordius/poecilla*	1	1				1		3
7812	*Sphinx drupiferarum*	1		1					2
7826	*Darapsa pholus*	2							2
	Smerinthinae								
7824	*Paonias excaecatus*							1	1
	Macroglossinae								
7853	*Hemaris thysbe*	Observed in rosa shrubs in August 1993							1
	Total # species:	26	46	18	20	11	31	28	

note: state-listed species are highlighted

Table 3. Wildlife at Aquinnah Headlands Preserve, Aquinnah, MA from general observations during property inventories in 1996, 1993, 2003, 2008, 2007 and 2009

Scientific name	Common name	Wetland[a]	Woodland
Kingdom Animalia			
Phylum Arthropoda			
Class Branchiopoda			
Order Anostraca			
Family Chirocephalidae: *Eubranchipus cf. vernalis*	eastern fairy shrimp	Sp	
Class Insecta			
Order Coleoptera			
Family Scarabaeidae: *Popillia japonica*	Japanese beetle		S
Order Mantodea			
Family Mantidae: *Mantis religiosa*	Praying mantis		S
Order Trichoptera			
Family unknown: species unknown	caddis fly larvae	Sp	
Order Hemiptera			
Family Nepidae: species unknown	water scorpion	Sp	
Order Hymenoptera			
Family Apidae*: Apis millifera*	Eastern honey bee		Sp
Family Apidae: *Bombus sp.*	bumblebee		Sp
Order Lepidoptera (butterflies and moths) [b]			
Family Lycaenidae: *Lycaena phlaeas*	American copper		S, F
Family Pieridae: *Pieris rapae*	cabbage white		S
Family Nymphalidae: *Cercyonis pegala*	common wood- nymph		S,F
Family Nymphalidae: *Nymphalis antiopa*	mourning cloak		S
Family Nymphalidae: *Danaus plexippus*	monarch		S,F
Family Nymphalidae: *Vanessa cardui*	painted lady		S
Family Nymphalidae: *Megisto cymela*	little wood satyr		S
Family Hesperiidae: *Epargyreus clarus*	silver spotted skipper		S
Order Diptera (flies)			
Family Culicidae: species unknown	mosquitoes	S	S
Family Tabanidae: *Chrysops sp.*	deer flies	S	S
Order Odonata			

Family Aeshnidae: *Anax junius*	common green darner		S,F
Class Arachnida			
Order Acarina			
Family Araneidae: *Argiope aurantia*	deer tick		Sp, F
Family Ixodidae: Dermacentor variabilis	wood tick		S, F
Phylum Chordata			
Class Mammalia			
Order Lagomorpha			
Family Leporidae: *Sylvilagus floridanus*	eastern cottontail		S,F
Order Rodentia			
Family Sciuridae: *Sciurus carolinensis*	grey squirrel		S
Family Sciuridae*: Tamias striattus*	eastern chipmunk		S
Family Cricetidae: *Peromyscus leucopus*	white-footed mouse		S
Family Cricetidae: *Microtus pennsylvanicus*	meadow vole		S
Family Cricetidae: *Ondata zibethicus*	muskrat	Sp	
Order Insectivora			
Family Talpidae: *Scalopus aquaticus*	eastern mole		S
Order Carnivora			
Family Procyonidae: *Procyon lotor*	raccoon	Sp,S	
Family Mustelidae: *Lontra canadensis*	river otter		S
Order Artiodactyla			
Family Cervidae: *Odocoileus virginianus*	white-tailed deer	Sp, S, F	Sp, S, F
Class Reptilia			
Order Testudines			
Family Chelydridae: *Chelydra serpentina*	common snapping turtle	S	
Order Squamata			
Family Colubridae: *Coluber constrictor*	northern black racer		S
Order Anura			
Family Colubridae: *Thamnophis sirtalis sirtalis*	spring peeper	Sp	
Family Ranidae: *Rana clamitans*	green frog	S	

[a]Season and frequency of occurrence: SP = spring, S = summer, F = fall, W = winter.
[b] complete list of avian species known to occur on the property is included in Appendix F.

Appendix F: Avian Checklist and Seasonal Tables

Land bank staff conducted surveys of birds on Aquinnah Headlands Preserve in February-October 1993; February-October (except June) 2004; and February-October 2003. The presence of occasional migrant and resident birds throughout the fall migration, winter, spring migration and breeding season were recorded during a total of 40 visits in 1993 (10 visits per season) and 32-16 visits during 2003 and 2004 (8-4 visits per season) of each sampling point. Birds were sampled from three point count survey locations – grassland, woodland and shrubland – in 1993 on North Head; three point-count survey locations – shrubland, dune/beach and perched wetland – in 2004 on South Head; and three point-count survey locations – shrubland, woodland and grassland – in 2003 on North Head. All birds seen or heard during a five-minute period were recorded. Birds seen or heard by land bank staff outside of the count period were noted as present on the property but were not included in quantitative analyses. Birds seen or heard by local birding experts in the area of the Gay Head Cliffs including the preserve were included in Table 4 as observed species. Some of these species are simply uncommon to the Vineyard such as the little gull, and lesser black-backed gull and others are a birder's lucky fluke and are not likely to visit any time soon. The include birds such as the olive-sided flycatcher, willow flycatcher, lap longspur, western meadowlark, white-winged finch, lincoln's sparrow, dickeissell, northern shrike and orange crowned warbler (Table 4).

Bird species in the various habitats are seasonally dependent. Some bird species occur in more than one habitat type and during more than one season. Total species counts do not include multiple sightings of an individual species. The breeding season followed by the fall and then spring migration yielded the greatest richness of bird species (Tables 5, 6 and 7). The dense shrubs provide food and nesting habitat during the breeding season. Most of the birds that occur on the preserve during the breeding season are tree/shrub nesters compared to ground- and cavity-nesters. The dense shrubs and perched wetlands provide cover from the wind and food for new arrivals and last-minute calories prior to departure for warmer climates. The blackpole warbler, for example, travels well over 1000 miles over water in the autumn on a potentially non-stop flight lasting 88 hours (Ehrlich et al 1988). Ground-nesters may find ample cover in the vast coastal shrubland/grassland complex on the preserve. Cavity-nesters need look no further than the cliff; although a much closer look is necessary when a tree is the sought-after cavity.

The most common birds observed on the preserve are consistently the song sparrow, Carolina wren, swallow species, common yellowthroat, eastern towhee, grey catbird and American goldfinch throughout much of the year (Tables 5-8). The swallows and towhees which were common in the spring, summer and fall were not observed during the winter months as they migrate to warmer places for the winter (Table 8). These bird species have remained common since 1993; as they all utilize the dominant vegetation cover – coastal shrubland/grassland – and that cover type has remained dominant on the preserve.

Further comparisons between the 1993 avian survey data for North Head and the 2003 data suggest diversity of birds observed on the preserve remained constant during the

summer and winter in all habitats but the coastal shrubland component where fewer bird species were observed during 2003 compared to 1993 (Kruskal-Wallis one-way analysis of variance $p > 0.05$; summer shrubland Chi-square approximation=11.7 with 1 df, $p=0.001$). The diversity of birds observed in 2003 during the spring and fall migrations was nearly half to one-third the number of species observed in 1993 for most habitats (Kruskal-Wallis one-way analysis of variance $p<0.05$). It is possible that the number of times the property was visited during the survey periods influenced the diversity of species observed during the migrations. The North Head was visited twice as many times in 1993 as 2003. As birds are literally flying by on their journey south an increase in visits would increase the odds of observing birds that may only be there for a day or week.

Observations of behaviors associated with nesting or rearing of young such as adults carrying nesting material or food to a nest, carrying fecal sacs from a nest or attending hatch-year birds can confirm that a species is breeding on the property, as can locating an active nest. A species is probably breeding if singing territorial males are present on the property on two occasions at least a week apart. A species is possibly breeding if it is detected in suitable breeding habitat during the breeding season. Of the 50 bird species observed during the summer, three are confirmed breeders – the song sparrow, Bank swallow and common yellowthroat; thirteen bird species are probable breeders; and ten are possible breeders on the preserve (Table 6). Twelve species were observed during the breeding season but not in breeding habitat even though that habitat was present on the preserve and three species are considered non-breeding bird species on the preserve (Table 6). Six species were observed outside of the breeding season window; however, breeding habitat for these species does exist on the preserve.

Table 4. List of avian species known to occur on land and water on and around the Aquinnah Headlands Preserve, Aquinnah, MA.

Common Name[a]	Surveyed[b]	Observed	Year-round[c]	Seasonal breeding	Winter resident	Migrant
Loons						
[redacted]	X					X
Cormorants						
Double-Crested Cormorant	X					X
Bitterns, Herons and Egrets						
Black-Crowned Night Heron		X		X		
Great Blue Heron		X	X			
New World Vultures						
Turkey Vulture	X		X			
Geese and Ducks						
Common Eider	X			X		
American Black Duck	X		X			
Mallard	X		X			
Northern Shoveler		X				X
Green-winged Teal		X				X
Surf Scoter	X					X
Black Scoter	X					X
Common Goldeneye	X				X	
Osprey, Hawks and Eagles						
Osprey	X			X		
[redacted]	X			X		
[redacted]	X		X			
Cooper's Hawk	X		X			
Northern Goshawk		X			X	
Broad-winged Hawk	X			X		
Red-tailed Hawk	X		X			
Rough-legged Hawk		X			X	
Falcons						
American Kestrel	X		X			
Merlin	X					X
[redacted]	X				X	
Gallinaceous Birds						
Northern Bobwhite	X		X			
Plovers						
Black-bellied Plover		X			X	
Semi-palmated Plover		X				X

Common Name[a]	Surveyed[b]	Observed	Year-round[c]	Seasonal breeding	Winter resident	Migrant
Killdeer		X		X		
[redacted]	X	X		X		
Auks, Murres and Puffins						
Common Murre		X			X	
Razorbill		X			X	
Black Guillemot		X			X	
Oystercatchers						
American Oystercatcher		X		X		
Sandpipers and Phalaropes						
Solitary Sandpiper		X				X
Spotted Sandpiper	X			X		
Upland Sandpiper (E)		X		X		
Purple Sandpiper		X			X	
Ruddy Turnstone		X		X		
American Woodcock	X			X		
Gulls and Terns						
Lesser Black-Backed Gull		X			X	
Bonaparte's Gull		X				X
Ring-billed Gull		X			X	
Little Gull		X			X	
Laughing Gull		X		X		
Herring Gull	X			X		
Great Black-backed Gull	X		X			
[redacted]		X				X
[redacted]		X		X		
Black Tern		X				X
Pigeons and Doves						
Mourning Dove	X		X			
Rock Dove		X	X			
Cuckoos						
Black-billed Cuckoo	X			X		
Yellow-bellied Cuckoo		X		X		
Nightjars						
Common Nighthawk		X		X		
Swifts						
Chimney Swift		X		X		
Hummingbirds						

Common Name[a]	Surveyed[b]	Observed	Year-round[c]	Seasonal breeding	Winter resident	Migrant
Ruby-throated Hummingbird		X		X		
Kingfishers						
Belted Kingfisher		X	X			
Woodpeckers						
Yellow-bellied Sapsucker		X		X		
Downy Woodpecker		X	X			
Hairy Woodpecker		X	X			
Red-bellied Woodpecker		X	X			
Northern Flicker	X		X			
Red-headed woodpecker		X	X			
Tyrant Flycatchers						
Olive-sided Flycatcher		X		X		
Eastern Wood Peewee	X			X		
Willow Flycatcher		X		X		
Eastern Phoebe	X			X		
Great Crested Flycatcher		X		X		
Eastern Kingbird	X			X		
Western Kingbird		X				X
Shrikes						
Northern Shrike		X			X	
Vireos						
Warbling Vireo		X		X		
Philadelphia Vireo		X				X
Red-eyed Vireo		X		X		
Crows and Jays						
Blue Jay	X		X			
American Crow	X		X			
Larks						
Horned Lark		X	X			
Swallows						
Bank Swallow	X			X		
Northern Rough-Winged Swallow	X			X		
Purple Martin		X		X		
Cliff Swallow		X				X
Barn Swallow	X			X		
Chickadees						
Black-capped Chickadee	X		X			
Tufted Titmouse		X	X			

Common Name[a]	Surveyed[b]	Observed	Year-round[c]	Seasonal breeding	Winter resident	Migrant
Nuthatches						
Red-breasted Nuthatch		X	X			
White-breasted Nuthatch	X		X			
Creepers						
Brown Creeper		X	X			
Wrens						
Winter Wren		X			X	
House Wren		X		X		
Carolina Wren	X		X			
Kinglets						
Golden-crowned Kinglet	X				X	
Ruby-crowned Kinglet		X			X	
Thrushes						
Eastern Bluebird		X	X			
Townsend's solitaire		X				X
Hermit Thrush		X		X		
Wood Thrush		X		X		
American Robin	X		X			
Thrashers and Mockingbirds						
Gray Catbird	X		X			
Northern Mockingbird		X	X			
Brown Thrasher		X		X		
Starlings						
European Starling	X		X			
Pipits						
American Pipit		X				X
Waxwings						
Bohemian Waxwing		X			X	
Cedar Waxwing	X		X			
Wood Warblers						
Tennessee Warbler		X				X
Nashville Warbler		X		X		
[redacted]		X				X
Yellow Warbler	X			X		
Blue-gray Gnatcatcher		X		X		
Magnolia Warbler	X					X
Cape May Warbler		X				X
Black-throated Blue Warbler		X				X

Common Name[a]	Surveyed[b]	Observed	Year-round[c]	Seasonal breeding	Winter resident	Migrant
Yellow-rumped Warbler	X				X	
Black-throated Green Warbler		X		X		
Blackburnian Warbler		X				X
Pine Warbler		X		X		
Palm Warbler		X				X
Prairie Warbler	X			X		
Bay-breasted Warbler		X				X
[redacted]	X					X
Black and White Warbler		X		X		
American Redstart		X		X		
Ovenbird		X		X		
Northern Waterthrush		X		X		
Common Yellowthroat	X			X		
Wilson's Warbler		X				X
Yellow-breasted Chat		X		X		
Blue-winged Warbler		X		X		
Orange-crowned Warbler		X				X
[redacted]		X				X
Tanagers						
Scarlet Tanager		X		X		
Western Tanager		X				X
Sparrows						
American Tree Sparrow	X				X	
Chipping Sparrow	X			X		
Clay-Colored Sparrow		X		X		
Field Sparrow	X		X			
Savannah Sparrow	X			X		
Fox Sparrow		X			X	
Song Sparrow	X		X			
[redacted]		X		X		
Lincoln's Sparrow		X				X
Swamp Sparrow		X	X			
White-throated Sparrow		X	X			
White-crowned Sparrow	X					X
[redacted]		X		X		
Dark-eyed Junco		X			X	
Lapland Longspur		X			X	
Eastern Towhee	X			X		

Common Name[a]	Surveyed[b]	Observed	Year-round[c]	Seasonal breeding	Winter resident	Migrant
Snow Bunting		X			X	
Cardinals, Grosbeaks and Allies						
Northern Cardinal	X		X			
Rose-breasted Grosbeak		X		X		
Blue Grosbeak		X		X		
Painted Bunting		X				X
Dickcissell		X		X		
Indigo Bunting	X			X		
Blackbirds and Orioles						
Red-winged Blackbird	X		X			
Eastern Meadowlark		X	X			
Western Meadowlark		X		X		
Rusty Blackbird		X			X	
Common Grackle	X		X			
Brown-headed Cowbird	X		X			
Yellow-headed Blackbird		X				X
Baltimore Oriole	X			X		
Finches						
House Finch	X		X			
Purple Finch		X	X			
White-winged Finch		X			X	
Common Redpoll		X			X	
Pine Siskin		X			X	
American Goldfinch	X		X			
Evening Grosbeak	X				X	
Old World Sparrows						
House Sparrow	X		X			

[a]Species rank: E=endangered, T=threatened, SC=special concern; highlighted species are designated as rare by the Commonwealth of Massachusetts.
[b]Surveyed: birds seen or heard during a 5-minute point count survey conducted by land bank staff; Observed: birds reported at the Gay Head Cliffs and in the ocean by various birding professionals on Martha's Vineyard in addition to surveyed birds that include uncommon and unusual observations.
sources: All about birds-Cornell Ornithology Laboratory, Allen Keith report of birds observed at the Gay Head Cliffs, Bird News column by Susan B. Whiting and Birds column by E. Vernon Laux.
Highlighted species denotes protected status as determined by NHESP

Table 5. Avian species observed during the spring on Aquinnah Headlands Preserve, Aqunnah, MA following 5-minute point count surveys.

Spring	Maritime Habitats				
Species	Shrubland N=22	Grassland N=18	Woodland N=18	Marsh N=4	Beach N=4
Year-Round Residents					
American crow	U	U	U		S
American goldfinch	O	U	O		N
American robin	U	U	O		
Black-capped chickadee	U		O		O
Blue jay	U	U	U		B
Brown headed cowbird	U	U	O		R
Carolina wren	C	U	C	U	S
Common grackle	O			O	R
European starling	U				
Grey catbird	U	O	C	U	
Herring gull	U	O	U		V
House finch	U		U		E
House sparrow	U				D
Mallard			U		
Mourning dove	U		U		
Northern bobwhite	U		U		I
Northern cardinal	U	U	O		D
Northern flicker	U		U		E
Red-winged blackbird	O	O	U	U	
Sharp-shinned hawk	U				
Song sparrow	C	C	C		
Summer Breeders					
Bank swallow	U	U			O
Barn swallow	U	U			
Blatimore oriole			U		
Chipping sparrow			U		
Common yellowthroat	U	O	O		B
Eastern kingbird	U		U		
Eastern phoebe	U				
Eastern towhee	O	O	O		
Indigo bunting			U		
Northern rough-winged swallow	U	U			
Prairie warbler	U				
Tree swallow	O	C	U	O	
Yellow warbler	U	U	U		
Migrant					
[redacted]	U		U		
White-crowned sparrow	U				

[a] Seasonal grouping organized according to Peterson Field Guides Eastern Birds (1980) and Felix Neck Bird Checklist (1992); OH = observed flying overhead and P = observed in pond.

[b] C=common birds (detected in more than 50% of the survey visits), O=occasional birds (detected in 26-50% of the survey visits), U=uncommon birds (detected in 25% and fewer of the survey visits) and P=present birds (not detected during a survey period but observed on the property).

Table 6. Avian species observed during the summer breeding season on Aquinnah Headlands Preserve, Aqunnah, MA following 5-minute point count surveys.

Summer	Nest Type [a]			Status [b]	Maritime Habitats [c]				
Species	Ground	Raised in tree/shrub	Cavity or burrow		Shrubland [d] N=16	Grassland N=12	Woodland N=12	Marsh N=4	Beach N=4
Year-Round Residents									
American black duck	X			OS-H					
American crow		X		PO	U	U	U		
American goldfinch		X		PR	O	O	C	O	
American kestrel			X	NB-P	P				
American robin		X		PR	U		U		
Black-capped chickadee			X	PR	U		U		
Blue jay		X		PO			U		
Brown headed cowbird		X		PR	U				
Carolina wren			X	PR	U	O	C		
Cedar waxwing		X		NB-P	U				
Common grackle		X		PR	U	U	O		
Cooper's hawk		X		OS-H					
European starling			X	NB-P	observed in spring				
Field sparrow	X			PO	U				
Great black-backed gull	X			NB-P		U			
Grey catbird		X		PR	O	U	C		
Herring gull	X			PO	O	U	U	U	U
House finch		X		PR	U	U			
House sparrow			X	NB-P	observed in spring				
Mourning dove		X		PO	U				
Northern bobwhite	X			PR	U	U			
Northern cardinal		X		NB	U				
Northern flicker			X	PO		U			
[redacted]	X			OS-H					
Red-tailed hawk		X		PO			U		
Red-winged blackbird		X		PR	U	U		O	
Song sparrow		X		CO-hy	C	C	C		
White-breasted nuthatch			X	NB-P	U				
Summer Breeders									
American woodcock	X			PO	P				
Baltimore oriole		X		NB-P	observed in spring				
Bank swallow			X	CO-fy	C	C	O		
Barn swallow		*		NB	U	U			
Black-billed cuckoo		X		PO	U		U		
Broad-winged hawk		X		OS					
Chipping sparrow		X		NB	observed in spring				

Common yellowthroat		X		CO -hy	C	C	O		
Eastern kingbird		X		PR	O	U	U		
Eastern phoebe		*		NB	observed in spring				
Eastern towhee	X			PR	O	O	C	U	
Eastern wood pewee		X		OS-H					
Indigo bunting		X		NB-P	observed in spring				
Osprey		X		OS					
Prairie warbler		X		NB-P	observed in spring				
Rough-winged swallow			X	NB-P	observed in spring				
Savannah sparrow	X			OS-H					
Spotted sandpiper	X			PO	P				
Tree swallow			X	NB-P	U	U		O	
Turkey vulture	X		X	OS-H					
Yellow warbler		X		PR	U	U	U		
Winter Migrant									
[redacted]		X		NB	P				

[a] seasonal and nest type data from Cornell ornithology lab range and species information data (www.allaboutbirds.org) and the Felix Neck Field Checklist of Martha's Vineyard Birds, December 1992; * = breeding in, under or on buildings

[b] Breeding status: NB= observed during spring or summer but breeding habitat does not occur on the property, NB-P= observed during the spring or summer but not in breeding habitat although breeding habitat exists on the property; PO= possible breeding (species detected in suitable breeding habitat during breeding period), PR=probable breeding (species heard singing on two occasions over one week apart in suitable breeding habitat during breeding period). CO=confirmed breeding (species carrying food, CF; feeding young, FY; with begging hatch-year fledglings, HY; or a located nest, N), OS= observed out of breeding season and without suitable habitat on the property, OS-H= observed out of breeding season but with suitable habitat on the property.

[c] frequency values used to determine common, occasional or uncommon frequency are based on average of each survey year relative to the number of visits for that year for example 2004 = 4 visits observed 3 times; 2003 = 4 visits observed once; 1993 = 10 visits observed 6 times : = (((3/4)+(1/4)+(6/10))/3)*100 answer is 53% which would be "C"

[d] C= common (birds were detected in more than 50% of the survey visits)
O= occasional (birds were detected in 26-50% of the survey visits)
U= uncommon (birds were detected in 25% and fewer of the survey visits)
P= present (birds were not detected during a survey period but were observed on the property)
Highlighted species are state-listed

Table 7. Avian species observed during the fall on Aquinnah Headlands Preserve, Aqunnah, MA following 5-minute point count surveys.

Fall	Maritime Habitats [b]				
Species [a]	Shrubland [c] N=18	Grassland N=14	Woodland N=14	Marsh N=4	Beach N=4
Year-round Resident					
American crow	U	U	U	B	
American goldfinch	U	O	O	N	
American robin			U	E	
Black-capped chickadee	U	U	U		
Blue jay	U	U	C	B	
Carolina wren	U	U	U	D	
Cedar waxwing	U	U	U		
Cooper's hawk		U	U		

European starling	U				
Grey catbird	U	U	C	S	
Herring gull	U		U	E	C
House finch		U		R	
Northern bobwhite	P			I	
Northern cardinal	U		U	R	
Northern flicker	U	U	U	S	
[redacted]	P	U	U		
Red-tailed hawk	U				
[redacted]		U	U		
Song sparrow	U	U	U	D	
White-breasted nuthatch		U			
Summer Breeders					
Bank swallow	O	O		O	U
Barn swallow	U	U	U		
Broad-winged hawk		P	P		
Chipping sparrow	U		U		
Common yellowthroat	U		U	O	
Eastern kingbird		U			
Eastern phoebe	U			V	
Eastern towhee	U	O	O		
Eastern wood pewee			U		
N. rough-winged swallow	U	U			
Osprey		U			
Prairie warbler			U		
Savannah sparrow	U	U			
Spotted sandpiper			U		
Tree swallow	U	U	U		
Turkey vulture	P				
Migrants					
[redacted]			U		
Magnolia warbler			U		
Merlin	U		U		
Winter Resident					
Golden-crowned kinglet	U				
[redacted]			P		
Yellow-rumped warbler	U	U	U		

[a] seasonal and nest type data from Cornell ornithology lab range and species information data (www.allaboutbirds.org) and the Felix Neck Field Checklist of Martha's Vineyard Birds, December 1992

[b] frequency values used to determine common, occasional or uncommon frequency are based on average of each survey year relative to the number of visits for that year for example 2004 = 4 visits observed 3 times; 2003 = 4 visits observed once; 1993 = 10 visits observed 6 times: = (((3/4)+(1/4)+(6/10))/3)*100 answer is 53% which would be "C"

[c] C= common (birds were detected in more than 50% of the survey visits)
O= occasional (birds were detected in 26-50% of the survey visits)
U= uncommon (birds were detected in 25% and fewer of the survey visits)
P= present (birds were not detected during a survey period but were observed on the property)

Highlighted species are state-listed

Table 8. Avian species observed during the winter on Aquinnah Headlands Preserve, Aqunnah, MA following 5-minute point count surveys.

Winter [a]	Maritime Habitats [b]				
Species	Shrubland [c] N=16	Grassland N=11	Woodland N=11	Marsh N=5	Beach N=4
Year-round Residents					
American crow	U	U	O	O	U
American goldfinch				U	
American robin			U		
Black-capped chickadee	U				
Blue jay	U				
Carolina wren	U	U	U		
Common grackle	U				
Great black-backed gull	U				
Herring gull	O	O			U
House finch	U		U		
House sparrow	U				
Mallard			U		
Mourning dove			U		
Northern cardinal	U				
[redacted]	U				
Red-winged blackbird	U			U	
[redacted]			U		
Song sparrow	C	C	O		
Summer Breeders					
Chipping sparrow	U				
Eastern kingbird	U				
Winter Resident					
American tree sparrow				U	
Yellow-rumped warbler	U	U			

[a] seasonal and nest type data from Cornell ornithology lab range and species information data (www.allaboutbirds.org) and the Felix Neck Field Checklist of Martha's Vineyard Birds, December 1992

[b] frequency values used to determine common, occasional or uncommon frequency are based on average of each survey year relative to the number of visits for that year for example 2004 = 4 visits observed 3 times; 2003 = 4 visits observed once; 1993 = 10 visits observed 6 times : = (((3/4)+(1/4)+(6/10))/3)*100 answer is 53% which would be "C"

[c] C= common (birds were detected in more than 50% of the survey visits)
O= occasional (birds were detected in 26-50% of the survey visits)
U= uncommon (birds were detected in 25% and fewer of the survey visits)
P= present (birds were not detected during a survey period but were observed on the property)

Highlighted species are state-listed

Appendix G. Endangered Species

The commonwealth designated the area in and around Aquinnah Headlands Preserve as habitat for seven state-listed species – [redacted]

Four of these seven species are known to occur on the preserve, one was observed in the area of the preserve and two have not been reported or observed on the preserve (Table 9).

The [redacted] was observed on two occasions in UV black-light traps set on 7-15-2004 at North Head and on 6-25-2008 at South Head.

The [redacted] was commonly observed in the fall and winter flying overhead the shrubland on the North Head of the preserve. Although no [redacted] have been recorded breeding in the shrubland of the preserve to date, adequate nesting and foraging habitat is available on the property.

The [redacted] has been reported on numerous years nesting on Moshup Beach near the foot of the dune south of the boardwalk entrance and stream [redacted] have hatched three successful nests, completed one unsuccessful nest and scraped on numerous occasions in a 15-year period from 1993-2009. The rocky nature of the beach during some spring and summer seasons appears to impact the presence of plovers on the beach.

The [redacted] occurs on the North Head of the preserve; however, attempts to locate it on the South Head have failed. Surveys for the plant were conducted on the South Head in September 2004 prior to mowing and July 2007, July 2008 and August 2009 after a one-time mowing of the shrubland in 2007; no [redacted] was observed. The [redacted] population on the North Head is vigorous and 2009 surveys of the North Head revealed 436 genets in three locations: west of the southern lookout trail, along the cliff edge near the northern lookout and southeast of the northern lookout near “fin rock”.

[redacted] was observed in the old road of North Head in June of 1993.

The least tern was observed and documented by a local birding expert, Allen Keith, and may have been observed flying overhead of the preserve, in the ocean off the preserve and on the Moshup Beach itself.

The [redacted] was not observed during mid-late July surveys in 2005, 2007, 2008 and 2009. The [redacted] was not observed during mid- to late-July UV-black light trap surveys in 2004 near hazel plants and 2008 near mallow plants.

An additional six state-listed species (four birds – [redacted] – and two plants – [redacted] – were observed on the preserve during various surveys and inventories (Table 9).

Six state-listed bird species were observed by local birding experts in the Gay Head Cliffs area and may have been observed on the preserve (Table 9). Two of these species – [redacted] – are summer breeders for which the preserve does not provide adequate breeding habitat. The [redacted] typically prefers open habitat with less than 35% cover in shrubs and upland sandpipers require large expanses of open fields for feeding, loafing and nesting (MA-NHESP fact sheets 2008). One species, the [redacted] is also a summer breeder for which breeding habitat in the form of open land with grass exists on the preserve. The sand and cobble Moshup Beach provide minimal breeding habitat for the [redacted] due to the shallowness of the beach resulting in the tides reaching the base of most of the dunes. The remaining two bird species – the mourning warbler and northern parula – are migrants for which the wetlands and shrublands of the preserve provide cover and forage during their last stop prior to their journey south.

Table 9. State-listed rare species known to occur in priority and estimated habitat (PH 1232/EH 821) on or near Aquinnah Headlands Preserve, Aquinnah, MA; shading denotes species known to occur on the property and bold denotes species listed by NHESP as occurring in priority and estimated habitat on or near the preserve.

Common Name	**Latin name**	**Habitat Requirement**	**Habitat Status[b]**	**Status[a]**	**Date Observed**
[redacted]	[redacted]	coastal dune, sandplain habitat	√	SC	7-15-04 (Cliffs-N) 6-25-08 (MB)
[redacted]	[redacted]	Woodland/shrubland with host plants from mallow and hazel families	√	SC	-------
[redacted]	[redacted]	Unvegetated sandy beaches	√	SC	NDA
[redacted]	[redacted]	Maritime shrubland and grassland	√	T	12-16-2003 (shrubland), 9-9-1993 (shrubland), 10-26-1993 (woodland)
[redacted]	[redacted]	coastal beach	√	T	1996 2n, 1997 3n, 1998 1n, 2007 0n, 2008 3n

[redacted]	[redacted]	Sandy beaches with scattered vegetation	√	SC	NDA
[redacted]	[redacted]	Salt water, bays and estuaries	√	SC	Observed in ocean, Feb and March 1993
[redacted]	[redacted]	Mixed woodlands with red spruce (*Picea rubens*)		SC	February-March 1993 (woodland), April and October 1993 (grassland)
[redacted]	[redacted]	Cliffs overlooking water and manmade structures		E	September 2006, shrubland South Head
[redacted]	[redacted]	Large grassy uplands, wet meadows, old fields and pastures		E	NDA
[redacted]	[redacted]	Mesic woodlands		T	NDA
[redacted]	[redacted]	Conifer woodlands (spruce, fir)		SC	May 1993 (shrubland) October 1993 (woodland) N. Head
[redacted]	[redacted]	Woodlands, thick understory	√	SC	NDA
[redacted]	[redacted]	Sandplain grassland,, pastures, hay fields, airports		T	NDA
[redacted]	[redacted]	Open habitat with grass	√	T	NDA
[redacted]	[redacted]	exposed coastal beach with fine sand	√	E	——
[redacted]	[redacted]	woods and thickets	√	E	7-93, 9-93, 10-93, 9-94, 7-95, 7-03, 7-04, 7-07, 8-08, 7-09 (grassland component)
[redacted]	[redacted]	Sadnplain grassland	√	SC	06-04-1993 (grassland)
[redacted]	[redacted]	Sandy beach and dune hollows	√	SC	08-31-2005 (beach)

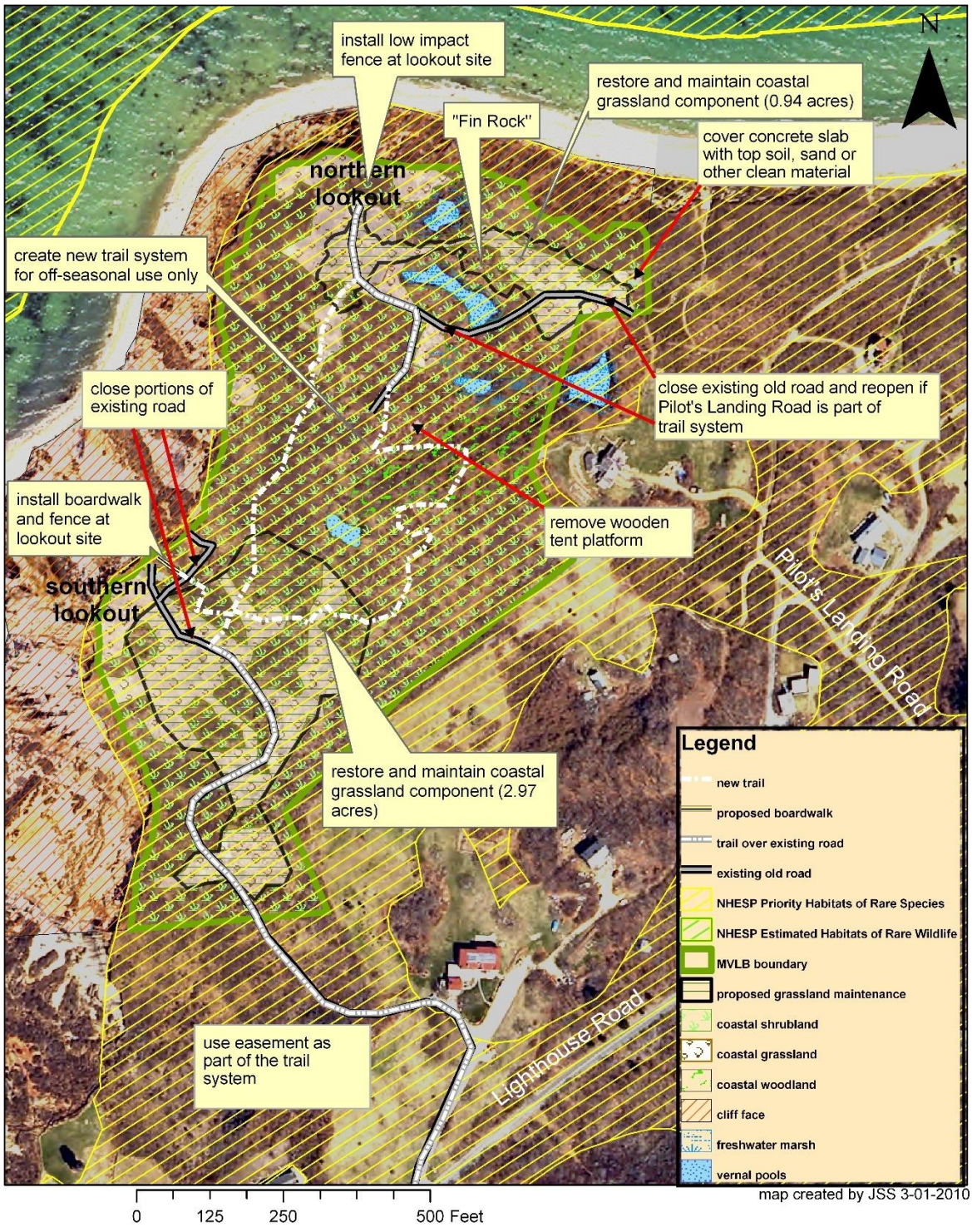
[a] E=endangered, T=threatened, SC=Special concern

[b] X = required habitat not present on the property, species not likely to occur on the property; √ = required habitat available on the property, species may occur on the property

"2n" = 2 chicks from a piping plover nest hatched and NDA = no data available, species observed by local birding experts

sources : MA NHESP fact sheets, www.allaboutbirds.org

Aquinnah Headlands Preserve, Aquinnah, MA
North Head Massachusetts Endangered Species Habitat Map



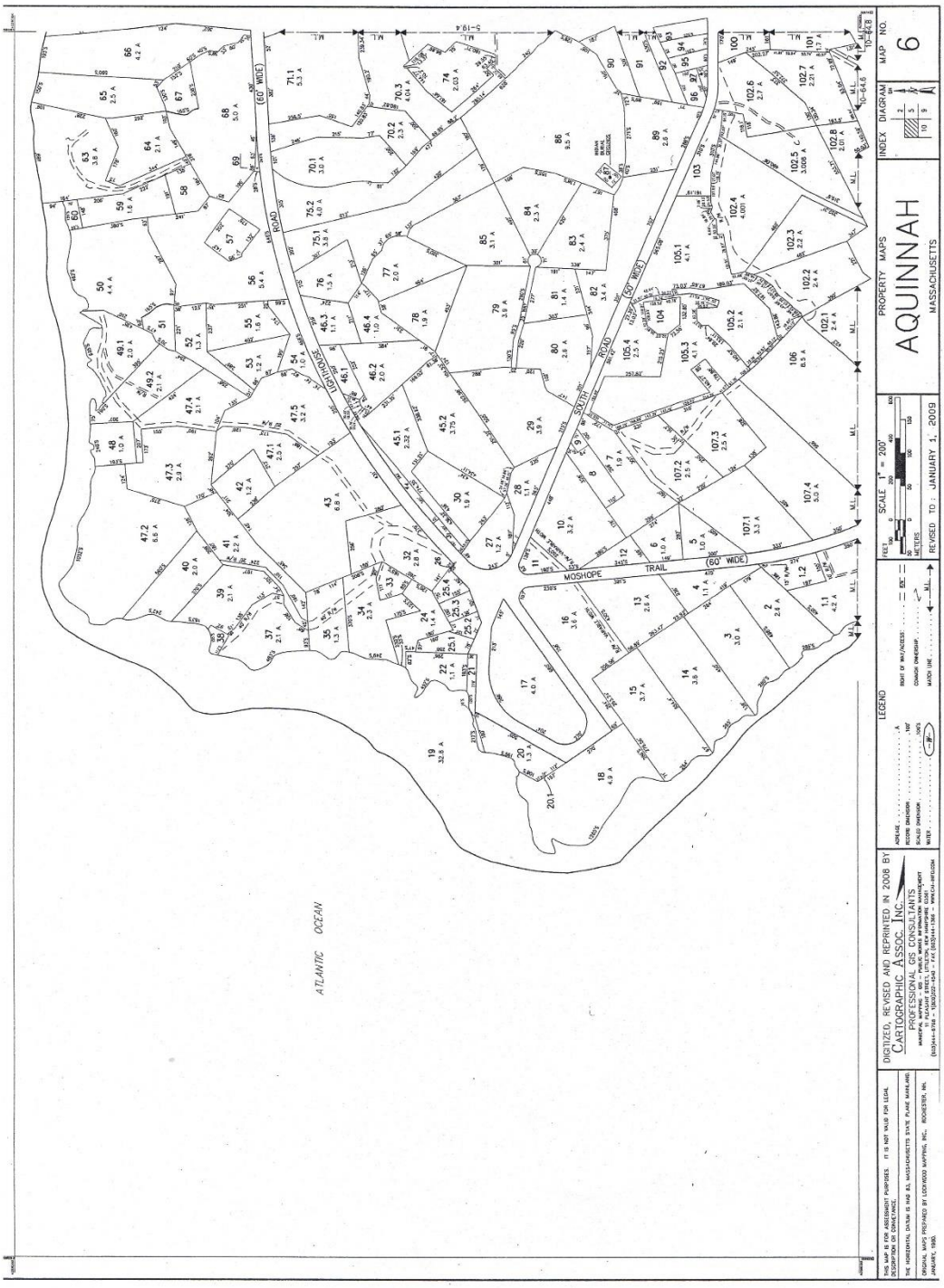
Aquinnah Headlands Preserve, Aquinnah, MA
South Head Massachusetts Endangered Species Habitat Map

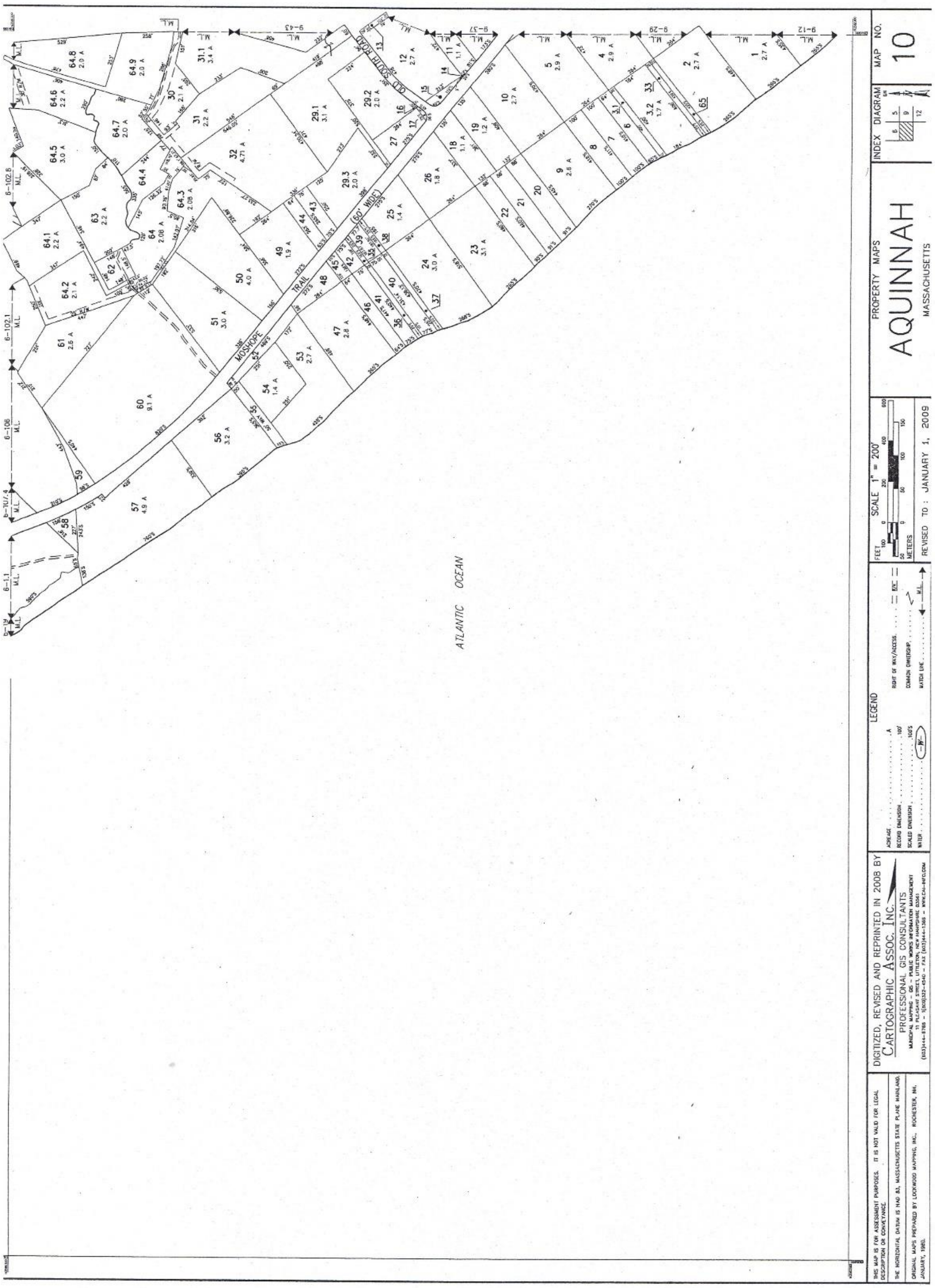
Appendix H. Abutters

Table 10. Abutters within 200 feet of Aquinnah Headlands Preserve as recorded in the 2009 Aquinnah assessors' book.

Map/Lot	Name	Address 1	Address 2
6/48	Vineyard Open Land Foundation	PO Box 4608	Vineyard Haven, MA 02568
6/49.1,49.2	Gloria Levitas Mitchell	170 West End Ave Apt. 24J	New York, NY 10023
6/47.3	FBE Trust	46 Bishopgate Road	Newton, MA 02459
6/34	Marc Hurwitz	PO Box 354	Barre, MA 01005
6/43	Taylor Family Trust	PO Box 269	Chilmark, MA 02535
6/42, 47.1	Katherine C. Taylor	PO Box 36	Chilmark, MA 02535
6/24	Charles Vanderhoop	306 Lake Ave	Newton, MA 02461
6/32	Taylor Realty Trust	81 Lighthouse Road	Aquinnah, MA 02535
6/33	Helen Murray Manning	PO Box 341	Chilmark, MA 02535
6/10	Allen M. Goorin	241 Perkins Street	Jamaica Plain, MA 02130
6/11,6/16,6/15, 6/1.1, 10/24, 6/19	Town of Aquinnah and Wampanoag Tribe of Gay Head Aquinnah	65 State Road	Aquinnah, MA 02535
6/18	David E. Vanderhoop	PO Box 267	Chilmark, MA 02535
6/2, 3	Sheriff's Meadow Foundation	PO Box 319X	Vineyard Haven, MA 02568
6/107.1, 107.2, 107.3	Erika H. O'Brien & James F. O'Brien	383 West Broadway #5	New York, NY 10012
6/7	Deer Path Realty Trust	PO Box 285	Chilmark, MA 02535
6/8	Todd J. Aruajo, trustee	PO Box 285	Chilmark, MA 02535
6/1.2	County of Dukes County	PO Box 190	Edgartown, MA 02539
10/60	Anne Tagge	37 Avon Road	Wellesley, MA 02482
10/58	Boynton Family Trust	105 The Preserve	Baiting Hollow, NY 11933
10/61	Berta Welch & Adriana Ignacio	10 Raymond's Hill Road	Aquinnah, MA 02535
10/52	Arnold Geiger etal	8A Clambelly Road	Chilmark, MA 02535

10/51	Bernice Dourmaskin	15 Park Ave	Ardsley, NY 10502
10/50	Adam D. Zoia	1965 Broadway PH3C	New York, NY 10023
10/64.3	Derrill Bazzy	6 Old Field Road	Aquinnah, MA 02535
10/32	Cold Fusion Realty Trust	PO Box 2540	Edgartown, MA 02539
10/29.3	Dan D. Levitt, trustee	PO box 1136	N. Falmouth, MA 02556
10/29.1	Robert Schiller	63 Fayerweather Street	Cambridge, MA 02138
10/35 & 36	South Limited Partnership	Moshup Trail	Aquinnah, MA 02535
10/39, 40	Robert G. Stange & Richard Kaltenbacher	69 Chestnut Street	Boston, MA 02108
10/37,38	Jan Tracy Houghton	1006 Wyndham Way	Safety Harbor, FL 34695-5414


PROPERTY MAPS
AQUINNAH
MASSACHUSETTS
INDEX DIAGRAM
MAP NO. 6
SCALE 1" = 200'
REVISED TO : JANUARY 1, 2009
LEGEND
DIGITIZED, REVISED AND REPRINTED IN 2008 BY
CARTOGRAPHIC ASSOC. INC.
PROFESSIONAL GIS CONSULTANTS
MOSHOPE TRAIL (60' WIDE)
LIGHTHOUSE ROAD (60' WIDE)
SOUTH ROAD (60' WIDE)
ATLANTIC OCEAN


ATLANTIC OCEAN
MOSHUP TRAIL
PROPERTY MAPS
AQUINNAH
MASSACHUSETTS
MAP NO.
10
INDEX DIAGRAM
LEGEND
SCALE 1" = 200'
REVISED TO: JANUARY 1, 2009
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Appendix I. Universal Access

The Recreational Opportunities Spectrum (ROS) classification for Aquinnah Headlands Preserve is “less developed”. The ROS is a model designed and used by the U.S.D.A. Forest Service to categorize conservation areas or universal access planning. The land bank framework for describing the accessibility of its properties is applied to Aquinnah Headlands Preserve as follows.

Property Name:	Aquinnah Headlands Preserve
Size:	48.4 acres
Primary Activities:	fishing, birding, hiking, picnicking and horseback-riding
Primary Elements:	three sign stations and one trailhead
Primary Spaces:	Gay Head Cliffs, Moshup Beach
Obstacles that Limit Accessibility:	archaeological significance, topography, and distance from a trailhead
Existing or Potential Alternatives:	Gay Head Moraine**,** Cliff Shops and paved Overlook
Proposed ROS Classification:	less-developed
Proposed Expectation of Accessibility:	possible

For all less-developed land bank conservation areas, the Universal Access Plan states the following (Potter 1997):

> Use outdoor recreation access routes to link primary elements and primary spaces within one-quarter mile of a trailhead or drop-off and use accessible recreation trails to connect other primary elements and primary spaces on all less-developed land bank conservation areas.

Universal access is proposed for the preserve on the South Head in a location that is feasible and appropriate for an approximate distance of 150’. The plan proposes to harden either an existing trail with ¾ inch dense mix or to place the hardener over the surface of a new trail. The proposed trailhead in an easement area off the Aquinnah Circle will include one space for a universal access vehicle. No other universal access trails are possibly on the preserve due to the topography and archaeological significance of the site.