

BLACKWATER POND RESERVATION WEST TISBURY, MA



Approved by the West Tisbury Town Advisory Board (February 21, 2006)

Approved by the Martha's Vineyard Land Bank Commission (February 22, 2006)

Approved by the Secretary Stephen R. Pritchard, Executive Office of Environmental Affairs (April 27, 2006)

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Executive Summary

Blackwater Pond Reservation is a novelty among conserved lands on Martha's Vineyard. Formerly part of a cranberry operation, the three ponds – Duarte's, Blackwater and Homestead – are linked together by red maple swamps and earthen dams. They are the crown jewels of the reservation. Blackwater Pond, nestled between Duarte's Pond and the smaller Homestead Pond, is completely isolated from development by dense oak and pine woodlands. Duarte's Pond is home to the annual children's trout derby sponsored by the Rod and Gun Club.

Blackwater Brook or "weechpoquasit" is the backbone of Duarte's Pond, Blackwater Pond, and Homestead Pond. The brook originates from a spring named Ponkquatesse (Banks 1966). Blackwater Brook and Pond are important features that divided the two sachemships of Nunnepog and Takemmy during pre-European settlement (Banks 1966).

The reservation comprises six natural communities: mixed-oak woodland with scattered pockets of pitch pine woodland; red-maple swamp; shrub swamp; ponds and vernal pools; freshwater marsh; and mowed grassland. No state-listed plant and animal species was observed on the reservation.

The 106 acres of Blackwater Pond Reservation are located along Lambert's Cove Road in West Tisbury. Conservation land near Blackwater Pond Reservation includes The Hoft Farm (The Nature Conservancy, TNC), Ripley's Field Preserve (MVLBC), Horatio Norton Farm and Wompesket Preserve (MVLBC), Tisbury Meadow Preserve (MVLBC) and Cranberry Acres (Vineyard Open Land Foundation, VOLF). The land bank purchased 18.77 acres from Douglas Fitts and John Henry Patterson for \$1,200,000 in 1999, 9.5 acres from David Duarte for \$30,000 in 2000 and 76.6 acres from Robert Williams et al. (via the Trust for Public Land) for \$3,800,000 in 2001. The land bank also received 1.65 acres from John Howland as a gift in 1999.

Main plans for Blackwater Pond Reservation include creating 612' of universal access (UA) trail and 2.6 miles of multiple-use trail; replacing the dock on Duarte's Pond with a universally-accessible fishing pier; installing a toilet; creating additional parking for two universally-accessible vehicles; maintaining existing 10-vehicle trailhead; maintaining earthen dams, sluiceways, culverts and causeways; controlling invasive species; pursuing the possibility of dredging ponds and vegetation removal to maintain a diverse and healthy habitat community; pursuing the removal of any and all overhead wires; and creating trail connections to Horatio Norton Farm, Ripley's Field Preserve and elsewhere.

Blackwater Pond Reservation will provide public access for fishing, skating, non-motorized boating, birding, hiking, non-motorized bicycling and other uses. Category "B" hunting will be permitted on 76.6 acres of the reservation. No hunting will be allowed on or around Duarte's Pond. The existing 10-vehicle and additional 2-vehicle UA trailhead adjacent to Duarte's Pond will be utilized for vehicular access to Blackwater Pond Reservation. No property attendant will be posted on this property.

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 West Tisbury town advisory board, the Martha's Vineyard land bank commission and the commonwealth executive office of energy and environmental affairs.

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. She holds a Master of Science in zoology from 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 of 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 natural history and local geography. Jeffrey Komarinetz began as a conservation land assistant in March 2000, Vernon Welch began as a conservation land assistant in March 2002 and James Dropick began as a conservation land assistant in February 2006.

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I. Natural Resource Inventory

A. Physical Characteristics

1. Locus

Blackwater Pond Reservation is located at roughly 41°27' 00" N latitude and 70° 39' 00" W longitude. The reservation comprises 106 acres and is located south of Lambert's Cove Road in West Tisbury. The land bank property is shown as tax parcel nos. 2-9.1 and 3-81 in West Tisbury assessor's book. The land bank has a 1.5-acre building restriction and a 10' wide trail easement over tax parcel no. 8-39 owned by Alison Van Dyk. The **Locus Map** (page 7) is a section of the U.S.G.S. Vineyard Haven quadrangle topographical map (U.S.G.S. 1972). An **Aerial Photograph** (page 8), taken in 2003, follows this map (Massachusetts Geographic Information System 2003).

2. Base Map

The **Base Map** (page 9) shows the location of basic elements of Blackwater Pond Reservation, such as boundaries, roads and the like. It is composed from surveys, photographs and direct observations.

3. Survey Maps

Two surveys compose tax parcel no. 3-81. One was prepared by Smith and Dowling in 1989 for Douglas K. Fitts and is shown on page 10 as **Survey Map 1** and the other was prepared by Schofield, Barbini and Hoehn, Inc for John A. Howland and the Martha's Vineyard Land Bank in 1999 and is shown on page 11 as **Survey Map 2**. The survey for tax parcel no. 2-9.1 was prepared by Vineyard Land Surveying, Inc. in 2000 for the Martha's Vineyard Land Bank Commission and is shown on page 12 as **Survey Map 3**. In 2001, the survey of the building restriction and trail easement over tax parcel no. 8-39 was prepared by Vineyard Land Surveying, Inc. for the Martha's Vineyard Land Bank Commission and is shown on page 13 as **Survey Map 4**. Larger copies of these surveys are on file at the land bank office and are available for inspection by appointment (Appendix A, p. 75).

4. Geology and Soils

The **General Soils Map** (page 14) depicts general classes of soil across Martha's Vineyard. An arrow indicates the location of Blackwater Pond Reservation. The reservation lies in soils generally identified as soils formed in reworked glacial outwash, ice-thrusted coastal plain sediment, or glacial till on moraines. The general topography of the soils is nearly level to steep and the sandy and loamy soils are very deep, excessively-drained and well-drained soils. 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 soil conservation service (SCS) (1986) mapped seven types of soil at Blackwater Pond Reservation. These are depicted on the **Soils Map** on page 15. Soils present on the reservation range from sandy loam to muck.

Eastchop loamy sand (EcC, EcD, EdB, EdC and EdD) dominates the reservation and is very deep, gently sloping too moderately steep and excessively drained. They typically occur in woodlands and are poorly suited to cultivated crops and hay and pasture due to slope, erosion and low available water capacity. Of the five Eastchop loamy sand soils three (EdB, EdC and EdD) are categorized as Eastchop loamy sandy, very stony soils. Stones and boulders cover 1-3% of the surface area of Eastchop Loamy sand, very stony (SCS 1986).

Freetown and Swansea muck (FsA) with a 0-1% slope is very deep, level, and very poorly drained. They commonly occur in depressions, near streams and open bodies of water and are often areas of former cranberry bogs. FsA is not suitable to cultivated crops except for cranberries (SCS 1986). FsA occurs in six irregular pockets on the reservation, one of which was a former cranberry bog.

Chilmark sandy loam with 8-15% slope, very stony soil is deep strongly sloping and well drained with stones and boulders coving 1-3% of surface area. The soil is poorly suitable to cultivated crops due to the slope and boulders but is suited to pasture using proper stocking rates and restricting grazing during rainy seasons (SCS 1986). This soil occurs in only one location on the reservation.

5. Topography and Hydrology

The land of Blackwater Pond Reservation climbs steeply west from the banks of Blackwater and Duarte's Pond. The reservation's steep slopes and hilly terrain create a landscape that leaves one with impressions of true isolation amidst an otherwise developed landscape. The contours of the property are illustrated on the **Topography Map** on page 16. Elevation ranges from approximately 100 to 200 feet above sea level.

Blackwater Brook flows through Blackwater Pond Reservation. The creation of Duarte's Pond, Blackwater Pond and a smaller Homestead Pond are the result of three earthen dams installed along Blackwater Brook for cranberry cultivation in Duarte's Pond. An earthen causeway divides Duarte's Pond into Northern Duarte's Pond and Southern Duarte's Pond, both former cranberry bogs. Another earthen dam elsewhere on the reservation resulted in the creation of Turtle Pond and Ben Chase Swamp to the northeast of Turtle Pond. Two small vernal pools occur in depressions on the reservation and two intermittent streams run through red maple swamp habitat. Blackwater Pond Reservation is in the Blackwater Brook watershed.

The largest pond on the reservation is Blackwater Pond and it comprises 10.6 acres. It is approximately 4 feet deep. Homestead Pond is 1.02 acres and Turtle Pond is 1.36 acres. Ben Chase Swamp is 3.95 acres. A portion (0.1 acres) of Angelina's Pond occurs along the eastern boundary of the reservation. Northern Duarte's Pond is 6.9 acres and Southern Duarte's Pond is 4.3 acres. Northern Duarte's Pond is approximately 3 feet at its deepest and an average of 2.33 feet deep overall. Southern Duarte's Pond is not as deep with a maximum depth of 1.4 feet and an average depth of 1.2 feet.

A study performed by Saunders Associates of Duarte's Pond in 1995 indicates that it has a clay bottom with sandy substrate below approximately 36 inches. Soft organic deposits range from a thickness of 3 feet to exceeding 6 feet in various locations (Saunders 1995). Metal analysis revealed low levels of chromium (6.1 ppm), copper (8.9 ppm), and lead (4.7 ppm) and elevated levels of oil

and grease (1,100 ppm) and volatile solids (21%) (Saunders 1995). Krista Lee and Jon Budreski of the National Park Service performed a one-time water quality analysis on Northern Duarte's Pond on October 03, 2002 (Table 1.) Duarte's Pond is comparable to other freshwater ponds in the area sampled at the same time (Table 1). The data suggest a mesotrophic pond. The 1:18 ratio of total nitrogen to phosphorous indicates that phosphorous is the limiting nutrient. A secchi disk reading of 0.5 in 0.9 meters of water indicates that Duarte's Pond has poor water clarity. The pond is nearly neutral with a pH of 6. Dissolved oxygen concentrations at the time of sampling were adequate to support a fish population. At times, the pond may support a fish population but the pond's ability to sustain fish populations throughout the seasons and from year to year is unknown. Dissolved oxygen fluctuates with the time of day and season. Additionally, the low water depth may result in summer temperatures that fish can not tolerate and the potential for a winter freeze-out.

Table 1. One-day water analysis of several freshwater ponds in West Tisbury on Martha's Vineyard during fall of 2002.

Pond	Sample Date	Chlorophyll A (µg/L)	Total Nitrogen (ppb)	Total Phosphorous (ppb)	Dissolved Oxygen % at 0.1m	pH at 0.1m	Alkalinity (mg/L) at 0.1m	Temp (C) at 0.1m	Max Depth (ft)
Duarte's Pond	10/03/02	6.9±0.6	678±3	36±4	71	6±	0.15	20.9±	3
Ice House Pond	10/03/02	3±0.8	226±22	8±0	94	5.89	no data	21.7	26
Seth's Pond	10/03/02	21±2.2	244±1	6±2	95.5	6.39	no data	21.4	15.4
Gray's Pond	10/03/02	18±3.5	899±4	31±1	112	6.02	no data	22.57	no data

6. Ecological Processes

Ecological succession is occurring in the wetlands at Blackwater Pond Reservation. It is defined as the progression overtime of one species structure to another in an ecological community resulting from a natural or induced change in environmental conditions. The cranberry industry was the major driving force behind ecological succession on the reservation. Commercial cranberry operations are typically built on acidic, peat bogs. Woody vegetation is removed from the bogs; a layer of sand is applied to the peat before the creeping cranberry vines are planted. Cranberry cultivation requires a network of communities such as fields, woodlands, streams and ponds to be successful. The bogs depend on a wetland support system for a fresh water supply that is used to both flood the bogs in the winter to avoid damaging frost and during the fall for harvesting. During the summer growing season water levels are lowered in cranberry bogs to provide well-drained soil for good root function and growth. Earthen dams and sluiceways are means for controlling water levels in cranberry bogs. It is quite feasible that Blackwater Brook once flowed through swampland either dominated by red maple and beetlebung or ericaceous shrubs. An earthen dam was constructed on Blackwater Brook in 1902 to create Blackwater Pond. Blackwater Pond at one time was used as a reservoir for the cranberry bog that is now Duarte's Pond. A second earthen dam and sluiceway were constructed north of Duarte's Pond in 1921 on Blackwater Brook to control the flow of water in Duarte's Pond. According to the former owner of the land, the area was excavated out and peat was added to create the cranberry bog that is now Duarte's Pond (Duarte 2005). It is not

clear whether the 1921 dam was the first dam in that location, suggesting that the cranberry operation did not begin until 1921, or whether the 1921 dam replaced an earlier dam suggesting that cranberries were cultivated in Duarte's Pond as far back as 1902, the date on the Blackwater sluiceway, or prior to 1902. Regardless of the start date, Duarte's Pond at one point succeeded from a wetland likely dominated by woody vegetation to a peat bog dominated by cultivated cranberries to a shallow pond, less than three feet deep. The shallowness of Duarte's Pond may be a result from the layering of sand on peat over time in the cranberry bog.

The cranberry bog operation at Duarte's Pond was abandoned in the mid 1950's (Duarte 2005). Duarte's Pond is slowly reverting to its former self and without intervention will succeed into a shrub swamp and ultimately a wooded swamp. The shallowness of Duarte's Pond provides habitat for rooted aquatic plants to thrive. A dense colony of white water lilies (*Nymphaea odorata*) covers Southern Duarte's Pond and large patches of water-willow encroach into the pond from the shoreline. Water lilies are not as extensive in Northern Duarte's Pond and are established in three independent areas. Water-willow grows in a 4-6-foot-wide band along the shoreline of Northern Duarte's Pond and has not begun to move into the pond.

Water lilies grow in shallow water less than 6 feet deep, reproduce by seed and rhizomes and are relatively slow-spreading (Eastman 1995). Dense patches of water lilies consume large amounts of oxygen during the night and deplete oxygen levels underneath the floating mats, thereby preventing other plants, fish, and other aquatic wildlife from living in the pond. The oxygen depletion causes other living organisms to die and decompose. Southern Duarte's Pond suffers from an imbalance between microbial decomposition and accumulation of dead plant and animal matter. The bacteria cannot keep up with the amount of matter being deposited resulting in an increase in sediment and a shallow pond. The increase in sediment speeds up succession of an open body of water to a freshwater marsh as evidenced by the encroaching water-willow stands. Water lilies in moderation do benefit ponds by providing cover and breeding habitat for fish and amphibians (Eastman 1995). It is the monocultures of aquatic vegetation that limit the biotic diversity of and health of a pond. According to the Washington State Department of Ecology's Water Quality website, water lilies can be controlled by cutting, harvesting, and using aquatic herbicides (<http://www.ecy.wa.gov/programs/wq/plants/weeds/lily.html>).

Ben Chase Swamp, to the northeast of Turtle Pond, is another wetland in succession. The old dike and sluice in Ben Chase Swamp may have been used to create Turtle Pond and control the water levels in it. Turtle Pond is not visible on the 1938 aerial photographs of the island. It was created by the Williams family who used oxen to excavate out the shallow depression (E. Cooperrider 2006). The bog is dominated by woody shrubs and is in the shrub swamp phase of succession. Shrub swamps are a relatively short transitional stage between open wetland and wooded swamp. Eventually the scattered red maples will shade out the shrub layer (Jorgensen 1978). Berry-producing plants such as shadbush, blueberry, winterberry and chokeberry dominate the shrub swamp and at this successional stage offer an important food source to wildlife during the fall and winter.

Locus Map

Blackwater Pond Reservation, West Tisbury, Massachusetts
Portion of U.S.G.S. Vineyard Haven Quadrangle, 1972

Locus Map
Blackwater Pond Reservation, West Tisbury, Massachusetts
U.S.G.S. Vineyard Haven Quadrangle, 1972
scale = 1:25,000



Arial Photograph

Blackwater Pond Reservation, West Tisbury, Massachusetts

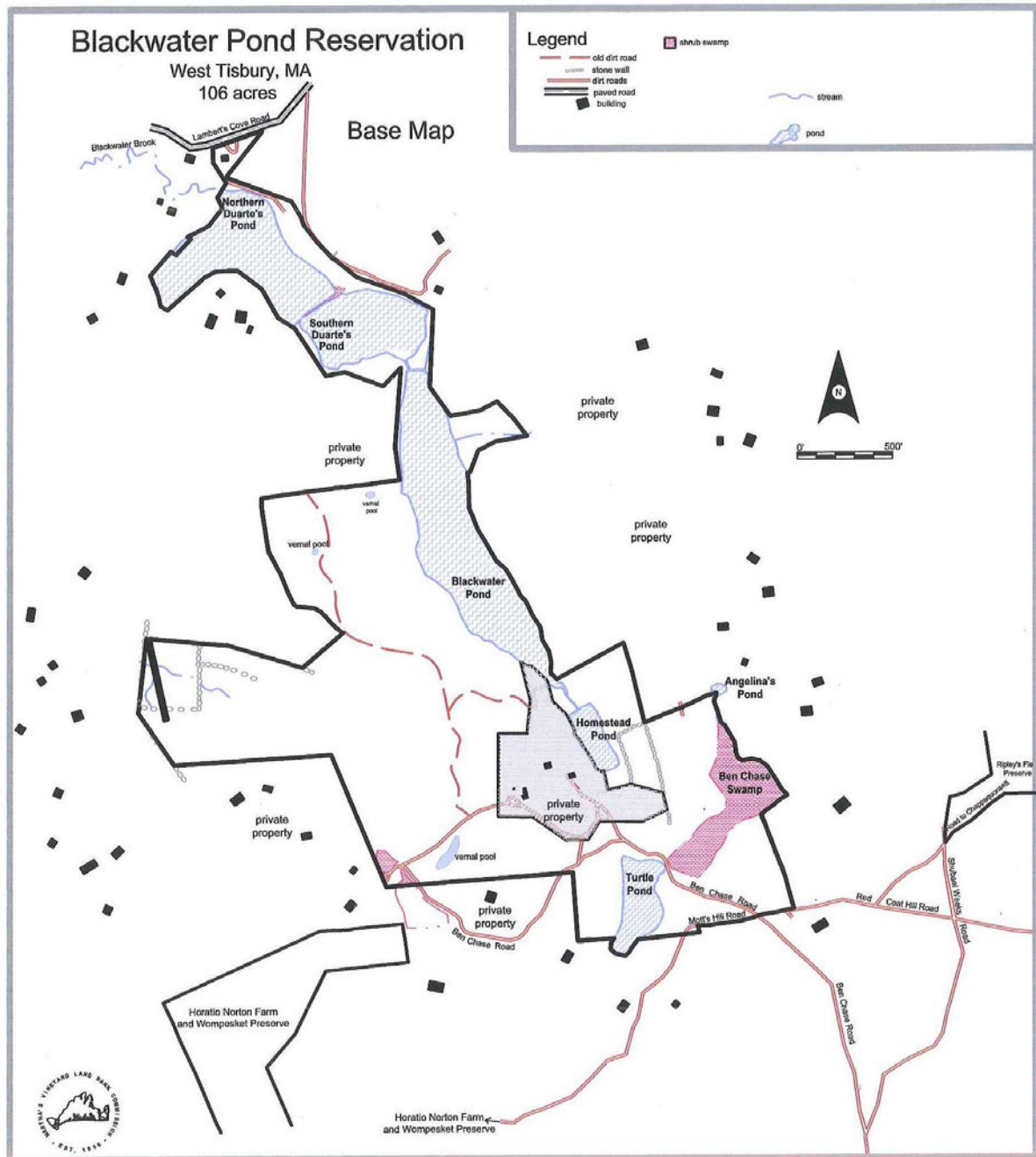
Aerial photograph taken in 1999

Aerial Photograph
Blackwater Pond Reservation, West Tisbury, Massachusetts
MassGIS color orthophoto 2003



Base Map

Blackwater Pond Reservation, West Tisbury, Massachusetts

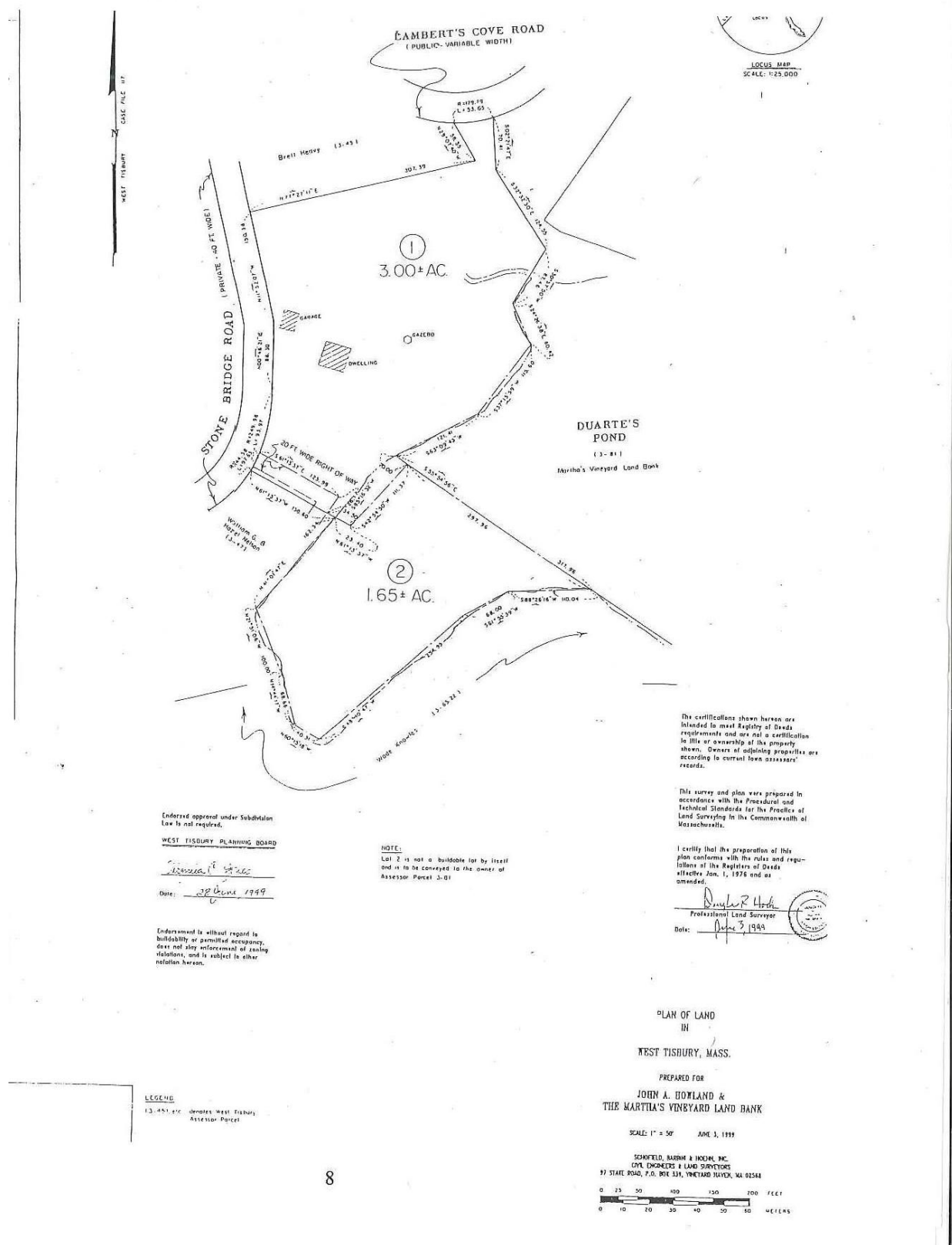




BLACKWATER POND RESERVATION MANAGEMENT PLAN

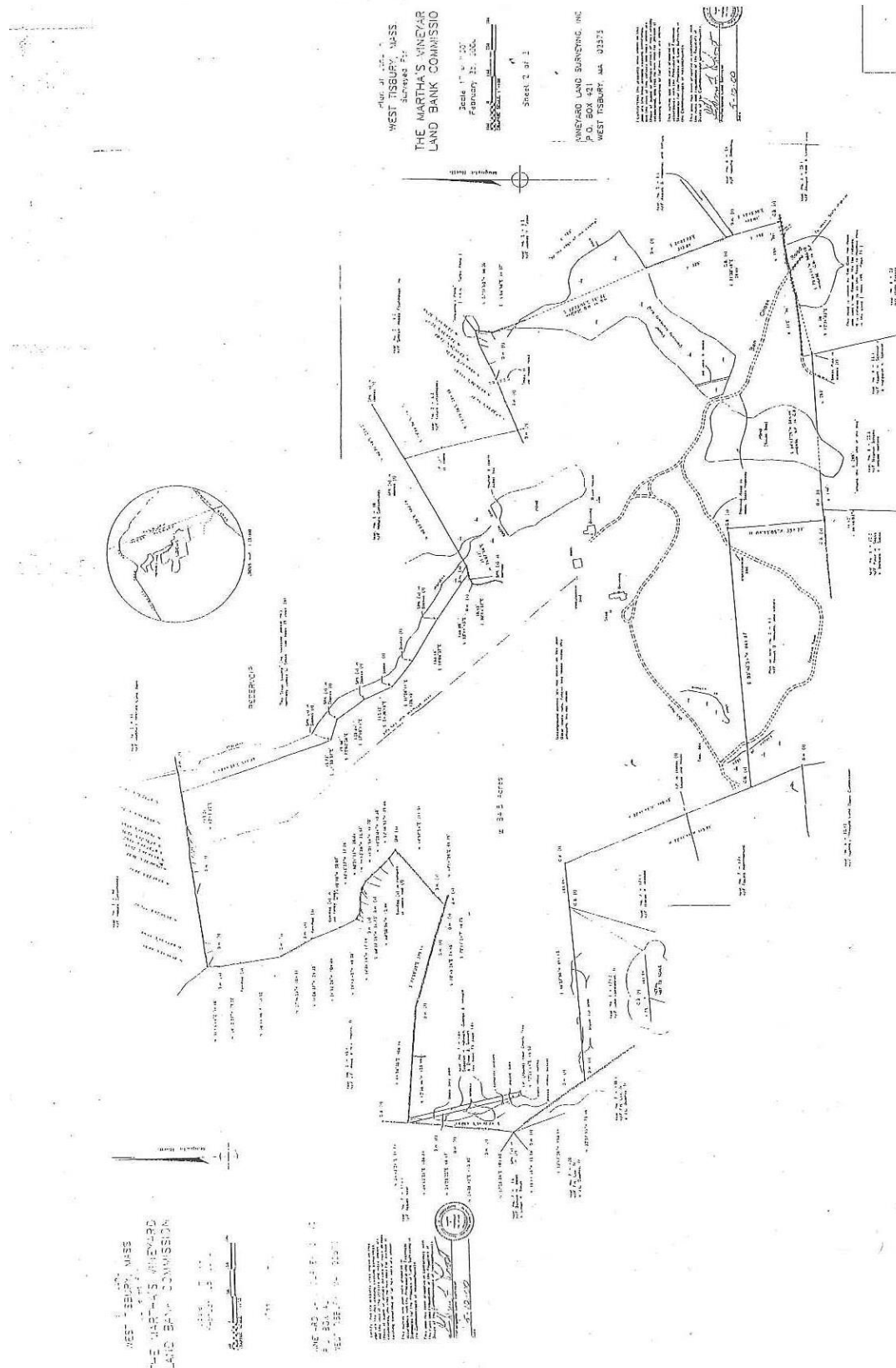
Survey Map 2

Blackwater Pond Reservation, West Tisbury, Massachusetts



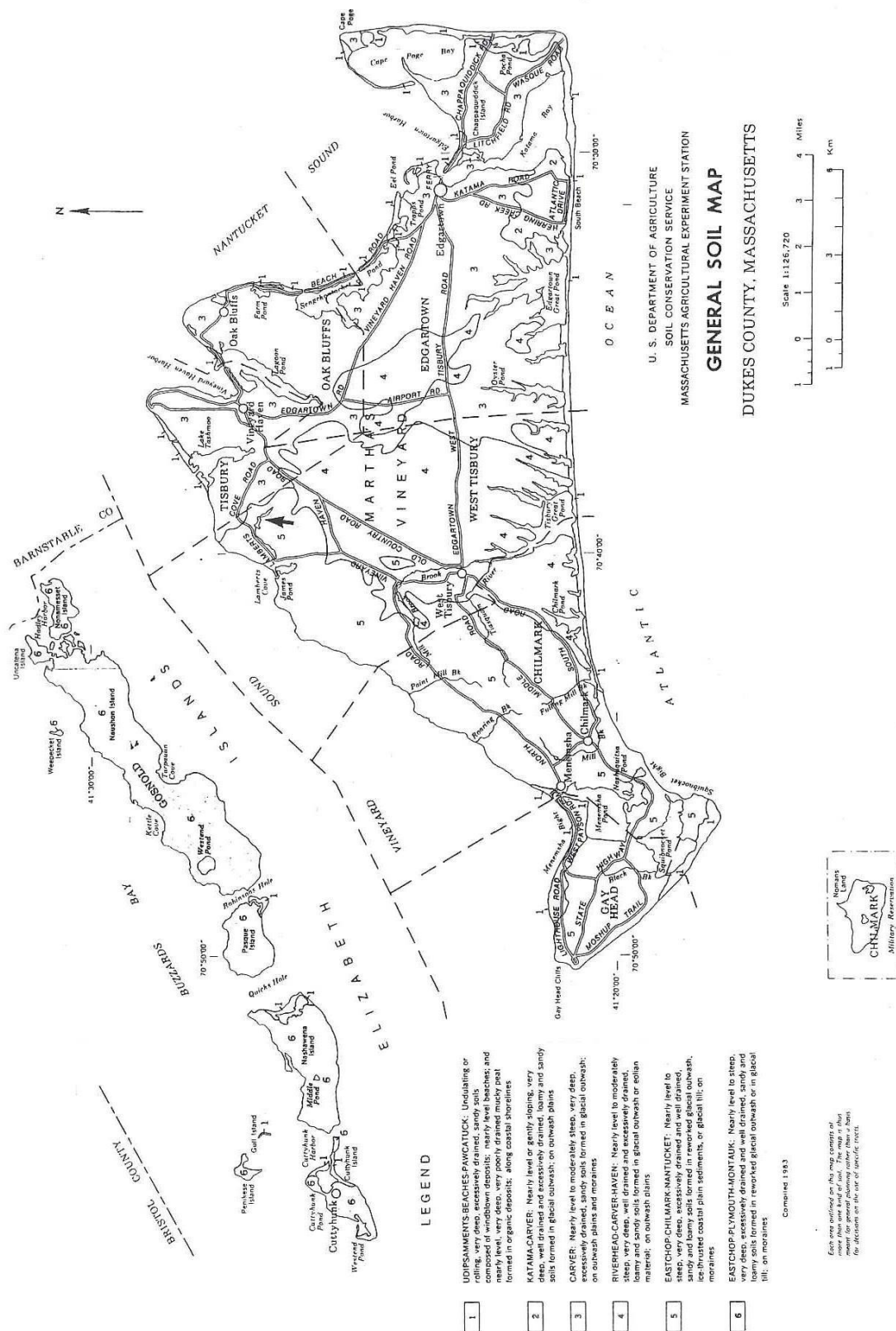
Survey Map 3

Blackwater Pond Reservation, West Tisbury, Massachusetts



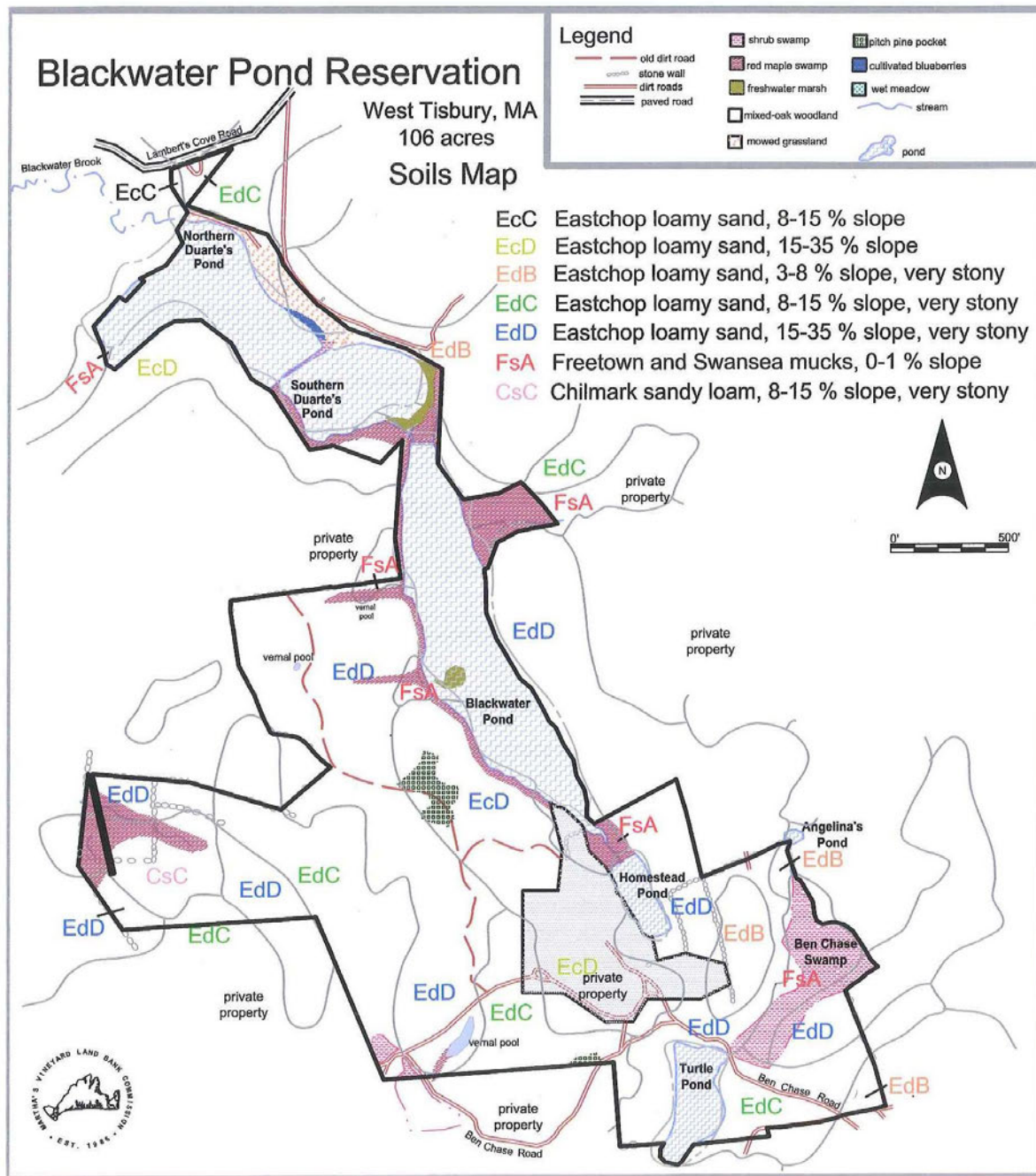


General Soils Map of Martha's Vineyard (Soil Conservation Service 1986) Blackwater Pond Reservation, West Tisbury, Massachusetts



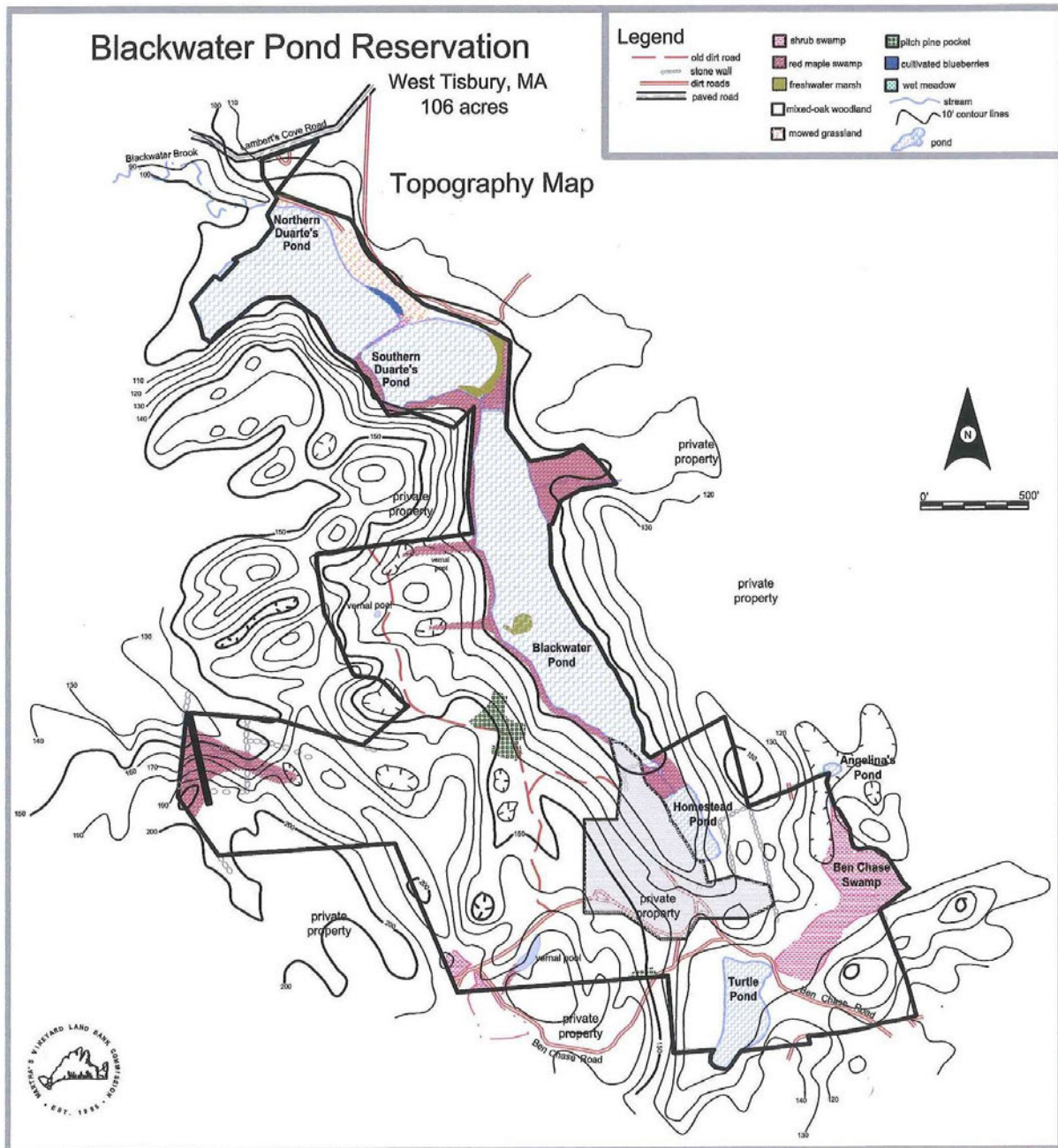
Soils Map

Blackwater Pond Reservation, West Tisbury, Massachusetts



Topography Map

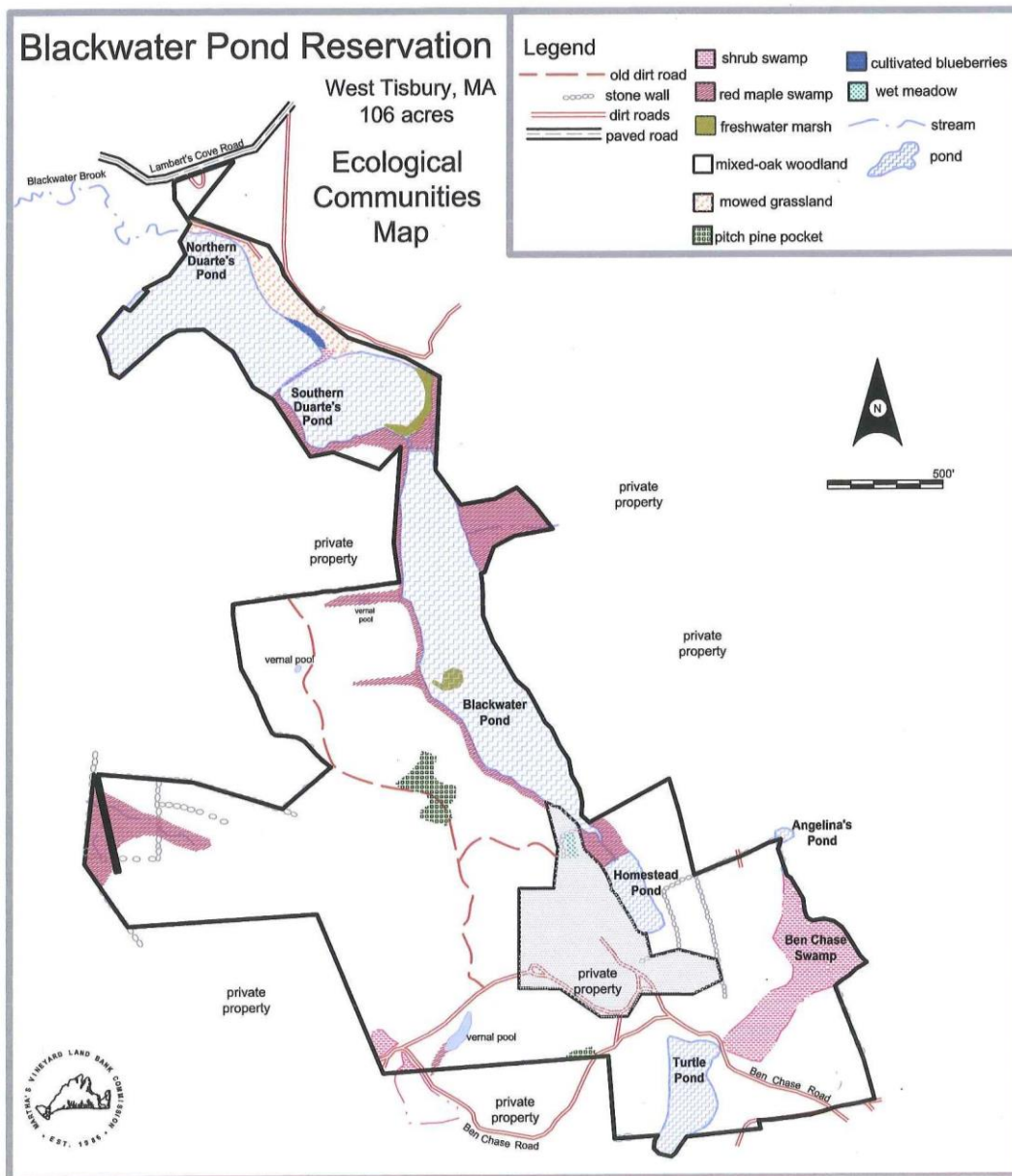
Blackwater Pond Reservation, West Tisbury, Massachusetts



B. Biological Characteristics

1. Vegetation

Nine cover types compose Blackwater Pond Reservation, as shown on the **Ecological Communities Map** (Page 17). These nine cover types are dispersed between two general vegetation communities: upland and wetland. The mixed-oak woodland (67.4 acres), pitch pine woodland (2.5 acres) and mowed grassland (1.4 acres) compose the upland vegetation community. The red maple swamp (6.4 acres), shrub swamp (3.95 acres), freshwater marsh, 0.24 acres), vernal pools (0.16 acres), cultivated blueberry patch (0.1 acres) and pond/pond shore (24.3 acres) compose the wetland community of Blackwater Pond Reservation.



A total of 238 plant species are known to occur on Blackwater Pond Reservation and they account for 25% of all known plants occurring on Martha's Vineyard (Table 2, p. 22, Appendix B, p. 76). The pond and pond shore cover type contributes the greatest to the floristic richness of plants occurring on the reservation and is represented by 51% of the total number of plant species known to occur on the reservation (Table 2). Species richness is the number of species present in a community (Begon et al. 1990). The freshwater marsh cover type is the least rich in plant species, contributing only 15% of the total species known to occur on the reservation.

Blackwater Pond Reservation supports a variety of invasive plants, both native and exotic. The only native invasive plant is the white water lily; the exotic invasive plants are porcelainberry, oriental bittersweet, Russian olive, English ivy, Japanese honeysuckle, purple loosestrife, Japanese knotweed, black locust and multiflora rose.

No state-listed plant species are known to occur on the reservation. Nine plants considered regionally rare on Martha's Vineyard, but not uncommon within the rest of the commonwealth, are known to occur on Blackwater Pond Reservation. Fancy fern, Virginia chain fern, jack-in-the-pulpit, small white aster, spotted joe-pye-weed, partridgeberry, meadow-beauty, and twisted yellow-eyed grass occur on the reservation and are eight of the nine regionally rare plants that are known to occur in ten or fewer sites on the Vineyard. Bebb's broom sedge also present on the reservation is known to occur on the Vineyard at one time but has not been sighted in the past 40 years (Swanson and Knapp 1999).

Between 2000 and 2001 vegetation surveys were conducted of Blackwater Pond Reservation. The point sampling method as described by Avery and Burkhart (1994) was used to inventory the trees of the upland and wetland woodlands. Seventeen points were inventoried in the mixed-oak and pitch pine woodlands and five points were inventoried in the red maple swamp. Three-meter squared circular plots were used to inventory the understory at each woodland point. Density and percent cover of understory vegetation was recorded for all plots. The shrub swamp was inventoried following methods described by Dunwiddie (1986). Species diversity and density were recorded within ten 2-m² circular plots located at random locations along two transects within the shrub swamp to the northeast of Turtle Pond determined using random numbers table. A line transect was used to inventory the plants on the open shoreline of Duarte's Pond. Plant species at Blackwater Pond Reservation are listed in Appendix B, p. 76 with proper nomenclature according to Gleason and Cronquist (1991). A description or qualitative summary of each cover type follows:

a. Upland

Upland vegetation constitutes 67% of the total acreage of Blackwater Pond Reservation. The mixed-oak and pitch pine woodland and mowed grassland compose the upland vegetation community. Approximately half of plants known to occur on the reservation occur within the upland community.

Mixed-Oak and Pitch Pine Woodland

Woodland trees are, on average, 41 feet high and 9 inches in diameter at breast height. The estimated basal area per acre is 102 square feet. There are an estimated 58.8 trees per acre in the

dbh class of 10 inches and greater. The woodland exhibits the greatest diversity of the upland vegetation community and is habitat to 34 % of the total species known to occur on the reservation (Table 2).

The mixed-oak woodland comprises a dominant mixture of deciduous trees, two sizable islands of coniferous pitch pine trees and scattered beech groves. Black and white oaks are the dominant species within the mixed-oak woodland. Black oak dominates the overstory and was sampled in 100% of plots inventoried in the mixed-oak woodland. White oak is also dominant and was sampled in 94% of plots inventoried. Other trees sampled in order of decreasing frequency include red maple (41%), scarlet oak (29%), sassafras (29%), beetlebung (23%), American beech (5%), white pine (5%) and pignut hickory (5%).

The mixed-oak woodland is an important habitat to many wildlife species. The American beech and pignut hickory provide much sought-after nuts to squirrels, chipmunks and other wildlife species (Martin et al. 1951), as do oak acorns. Turkeys will eat acorns whole, regardless of size. The white oak provides cover to wintering wildlife by retaining its dried dead leaves for longer than other deciduous trees (Martin et al. 1951). The sassafras berries are a food source to kingbirds, crested flycatchers and phoebes (Martin et al. 1951).

The next generation of canopy trees growing under the shade of the overstory trees at Blackwater Pond Reservation consists of oaks, sassafras, pitch pine and red maple. Low understory vegetation in the mixed-oak woodland is dense and dominated by plants of the Ericaceae family. Black huckleberry and late lowbush blueberry are the most dominant plants in the understory of the mixed-oak woodland and have importance values of 62.7 and 32.5, respectively. They occurred in greater than 41% of plots sampled. Relative dominance, relative density and relative frequency are combined to achieve the importance value. Other less dominant understory shrubs of the mixed oak woodland occurring in 20-40% of survey plots include sheep laurel, dangleberry, sweet pepperbush, common greenbrier and common lowbush blueberry. A diverse array of herbaceous and graminoid species ranging from <1-4 feet tall dot the woodland floor in areas where light penetrates the wooded canopy cover and are ubiquitously along old roads and trails that meander and cut through the mixed-oak woodland. Wintergreen provides a green canvas against the stark white flowers of sweet white violet, starflower, Canada mayflower and trailing arbutus. Virginia creeper and prickly dewberry wind their way along the forest floor. Pennsylvania sedge, little blue stem, deer tongue grass, poverty grass, yarrow and whorled loosestrife grow on the banks and center rise of the old roads in the mixed-oak woodland.

Two pitch pine pockets covering 2.5 acres occur within the mixed-oak woodland. Pitch pines dominate the overstory of the pitch pine pockets leaving the understory well-shaded and sparse with herbaceous vegetation. Young pitch pines and white pines dominate the dark understory created by the dense canopy of pines. Very few ground cover species are observed in this woodland. Most occur along trails meandering through the woodland. Pitch pine woodlands are fire-dependent (Jorgensen 1978). Without fire or mechanical clearing of understory species to reduce regeneration competition between pine and other species, the pitch pine pockets eventually will evolve into the surrounding mixed-oak woodland. Oaks are shade-tolerant and can grow under the shade-intolerant pines, resulting in the next generation of overstory species.

Mowed Grassland

Mowed grassland is present on 1.4 acres of level land abutting Duarte's Pond to the north. A portion of the grassland was a former house site. It was tilled and seeded with stabilizing grasses such as annual rye, perennial rye and creeping red fescue. Other grass species observed within the mowed grassland are sweet vernal grass, velvet grass and switchgrass. A general species observation indicates that most of the herbaceous plants occur along the border of the grassland. Edge species include asters, ox-eye daisy, goldenrods, Queen Anne's lace, cow parsnip, spotted joe-pye-weed, winged sumac, blackberry, poison ivy and black-eyed susan. Several exotic invasive plant species occur along the border of the mowed grassland and include Japanese knotweed, Japanese honeysuckle, Russian olive and oriental bittersweet. Scattered black locust, pitch pine, Siberian elm, American holly, red cedar, tulip tree, white pine, apple, pear and black cherry provide a bit of shade over the mowed grassland.

b. Wetland

Wetland vegetation constitutes 33% of the total acreage of Blackwater Pond Reservation. The pond/pond shore, red maple swamp, shrub swamp, fresh water marsh, vernal pools and cultivated blueberries compose the wetland vegetation community. Seventy-one percent of plants known to occur on the reservation occur within the wetland community.

Pond/Pond shore

The pond/pond shore is the dominant component of the wetland vegetation community and comprises 24.3 acres. There are four freshwater ponds on the reservation: Duarte's Pond, Blackwater Pond, Homestead Pond and Turtle Pond. Blackwater Pond is the largest and deepest pond on the reservation. It is approximately 4 feet deep on average and has little aquatic vegetation. Near the center of the pond is a stand of waterwillow. Duarte's Pond is the second largest pond on the reservation and is divided by an earthen causeway into two ponds, Northern Duarte's Pond (6.8 acres) and Southern Duarte's Pond (4 acres). Northern Duarte's Pond is deeper than Southern Duarte's Pond and has fewer emergent aquatic plants such as water lilies and water willow. Turtle Pond is the third largest pond on the reservation at 1.36 acres and is the shallowest pond. During a droughty summer, the pond will dry up completely exposing a muddy bottom with little evidence of aquatic plant life. According to the USGS topography map it is a cranberry bog. Perhaps at one point an attempt was made to cultivate cranberries in that location. The pond's name was derived from the abundance of painted turtles that bask in the sun on exposed logs and rocks in the pond. Homestead Pond is the smallest pond on the reservation and is just over an acre. It was created as a fishpond and was stocked some time ago (Duarte 2005).

The pond shore has the greatest diversity of plant species on the reservation and hosts 54% of plant species known to occur on the reservation. There are two types of pond shore – an open pond shore dominated by herbaceous and graminoid species and a woody pond shore dominated by overhanging trees and shrubs. The woody pond shore is dominant and extends along approximately 2.1 miles of the pond shoreline. The bank is steep, covered in moss, primarily sphagnum, and shaded by overstory trees and shrubs such as red maple, willow, sweet pepperbush, swamp azalea and highbush blueberry. The open pond shore totals a mere 0.39 miles and is focused on the northeast shore of Duarte's Pond. Although the open pond shore is sparse, plant diversity is

greatest along it. There is less overstory vegetation resulting in abundant light along the shoreline. Based on percent frequency and relative percent cover, slender-leaved goldenrod dominates the open pond shore followed by marsh fern, switch grass, New York aster and waterwillow. Other plants that occur along the bank include sundew, steeplebush, sweet pepperbush, freshwater cordgrass, soft rush, small white aster, rough-stemmed goldenrod, poison ivy, New York fern, marsh fern, marsh St. John's wart, Japanese knotweed, highbush blueberry, common dodder, chairmaker's rush and three willow species. The buds and twigs of willow species are favorite treats of grouse, deer, and rabbits (Martin et al. 1951). Emergent aquatic vegetation along the pond shore and in the pond includes buttonbush, blue flag iris, common cattail, water willow and white water lily.

Red Maple Swamp

The red maple swamp comprises 6.4 acres of wetland habitat on Blackwater pond Reservation. An overstory of red maple trees with an understory of blueberry, azalea, pepperbush, and ferns generally dominate red maple swamps (Swain and Kearsley 2000). The red maple swamp at Blackwater Pond Reservation receives water through pond overflow, groundwater inputs and surface runoff. The red maple swamp also occurs in areas where intermittent streams are present and around some of the earthen dams. Woodland trees in the red maple swamp are, on average, 32 feet high and 5 inches in diameter at breast height. The estimated basal area per acre is 50 square feet. There are an estimated 11 trees per acre in the dbh class of 10 inches and greater. The red maple swamp exhibits moderate diversity within the wetland vegetation community and is habitat to 25 % of the total species known to occur on the reservation (Table 2).

The dominant overstory tree in the red maple swamp is the red maple followed by poison sumac. The red maple was observed in 60% of plots sampled and poison sumac was observed in 40% of plots sampled. The black oak was the only other tree sampled within the red maple swamp. Sweet pepperbush, winterberry, and highbush blueberry dominate the shrub layer in the red maple swamp. Cinnamon fern is the most dominant understory plant in the red maple swamp with an importance value of 54 and frequency of 40%. Sensitive fern, poison ivy and marsh fern also occur and are nearly as dominate in the understory as the cinnamon fern. Of the 10 ferns known to occur on the reservation six are associated with the red maple swamp.

Shrub Swamp

Shrub swamps comprises nearly four acres of the reservation and are formed in basin depressions that are seasonally flooded. The primary shrub swamp is named Ben Chase Swamp and is located to the northeast of Turtle Pond. An old dike and sluice once controlled water flow into this swamp from Turtle Pond. A dense thicket of water willow dominates the shrub swamp. Bindweed interlocks the individual stems of water willow together to form an almost impenetrable wall. Red maples spot the overstory and pockets of sweet pepperbush, winterberry, buttonbush and highbush blueberry create areas of higher ground for sphagnum, switchgrass and sedge species to take hold and grow.

Freshwater Marsh

Freshwater marsh occurs along the shore in areas on both Duarte's Pond and Blackwater Pond where the bank is nondescript and the water is shallow. Water willow dominates the freshwater marshes. Other species that occur within the freshwater marsh are ferns, sphagnum, swamp

milkweed, swamp beggar tick, sedges, rushes, round leaved sundew, smartweed and oriental bittersweet.

Vernal Pools

Three depressions within the woodland of Blackwater Pond Reservation are subject to seasonal flooding and are considered vernal pool habitat. Two are west of Blackwater Pond in the mixed-oak woodland. A 0.02-acre pool occurs near the shore of Blackwater Pond and a smaller 0.01-acre vernal pool occurs to the west of the old road. A third vernal pool is located near Ben Chase Road and is the largest vernal pool at 0.15 acres. Highbush blueberry, swamp azalea and grey birch occur along the edge of the vernal pools. Decaying leaves compose the base of the vernal pools.

Cultivated Blueberry Patch

A cultivated blueberry patch of 0.1-acres occurs along Duarte's Pond. Currently the blueberry bushes are being used as lattices by multiflora rose and Virginia creeper.

Table 2. Flora of Blackwater Pond Reservation, West Tisbury, MA.

#	scientific name	common name	Status ^a	morphology	pond/pond bank ^b	freshwater marsh	shrub swamp	red maple swamp	mixed-oak woodland	mowed grassland	Survey ^c				
1	<i>Acer rubrum</i>	red maple	AN	tree	x		C	A	C		1	2	3	4	5
2	<i>Achillea millefolium</i>	yarrow	AI	herb	x				x(path)	x	1		3	4	
3	<i>Aemone quinquefolia</i>	wood anemone	FN	herb				U	x		1				
4	<i>Amelanchier sp.</i>	shadbush	U	tree				x	U		1		3	4	
5	<i>Ampelopsis brevipedunculata</i>	porcelainberry	FI	vine					x					4	
6	<i>Andropogon virginicus</i>	broomsedge	FN	graminoid	x								3		
7	<i>Anomodon attenuatus</i>	tree moss	U	moss					x				3		
8	<i>Anthoxanthum odoratum</i>	sweet vernal grass	FI	graminoid					x	x	1		3		
9	<i>Aralia nudicaulis</i>	wild sarsaparilla	FN	herb					x		1		3	4	
10	<i>Arctostaphylos uva-ursi</i>	bearberry	AN	shrub						x	1				
11	<i>Arisaema triphyllum</i>	jack-in-the-pulpit	RN	herb				C			1				
12	<i>Aronia arbutifolia</i>	red chokeberry	ON	shrub	x			x					3	4	
13	<i>Aronia cf. melanocarpa</i>	black chokeberry	ON	shrub			x	x	x		1		3		
14	<i>Asclepias incarnata</i>	downy swamp milkweed	FN	herb	U	x					1			4	5
15	<i>Aster divaricatus</i>	white wood aster	FN	herb					x				3		
16	<i>Aster dumosus</i>	bushy aster	FN	herb	U								3		5
17	<i>Aster novi-belgii</i>	New York aster	FN	herb	C	x				x			3	4	5
18	<i>Aster paternus</i>	narrow-leaved white-topped aster	AN	herb	x									4	5
19	<i>Aster racemosus</i>	small white	RN	herb	U					x		2	3		5

BLACKWATER POND RESERVATION MANAGEMENT PLAN

#	scientific name	common name	Status ^a	morphology	pond/pond bank ^b	freshwater marsh	shrub swamp	red maple swamp	mixed-oak woodland	mowed grassland	Survey ^c				
		aster													
20	<i>Aster spectabilis</i>	showy aster	FN	herb	x							3			
21	<i>Aster undulatus</i>	wavyleaf aster	FN	herb	x					x		3		5	
22	<i>Betula populifolia</i>	grey birch	ON	tree	x		x	x	x		1	2	3	4	5
23	<i>Biddens frondosa</i>	beggarticks	U	herb	x							3			
24	<i>Bidens connata</i>	swamp beggar ticks	UN	herb	U	x								4	5
25	<i>Cardamine pensylvanica</i>	common bittercress	UN	herb						x		2			
26	<i>Carex atlantica</i> var. <i>capillacea</i>	thredstern	UN	graminoid			x	x			1				
27	<i>Carex bebbii</i>	bebb's broom sedge	HN	graminoid			x						3		
28	<i>Carex brunnescens</i>	sedge species	U	graminoid		x	U					2			
29	<i>Carex hystericina</i>	sedge species	U	graminoid		x								4	
30	<i>Carex intumescens</i>	swamp sedge	UN	graminoid				x			1				
31	<i>Carex longii</i>	Long's sedge	UN	graminoid	x							2			
32	<i>Carex lurida</i>	sallow sedge	FN	graminoid				x			1		3		
33	<i>Carex pensylvanica</i>	Pennsylvania sedge	AN	graminoid					x(path)		1		3	4	5
34	<i>Carex stricta</i>	tussock sedge	FN	graminoid			x	x			1				
35	<i>Carex swanii</i>	swan's sedge	FN	graminoid					x		1				
36	<i>Carya glabra</i>	pignut hickory	ON	tree					U				3	4	
37	<i>Celastrus orbiculatus</i>	oriental bittersweet	AI	vine	U	x	x	x	x	x	1			4	5
38	<i>Cephalanthus occidentalis</i>	buttonbush	UN	shrub	x		C						3	4	5
39	<i>Cephalozia lunulifolia</i>	liverwort	U	liverwort										4	
40	<i>Cerastium fontanum</i>	mouse-ear chickweed	AI	herb	x				x	x	1		3		
41	<i>Chimaphila maculata</i>	striped wintergreen	FN	herb					x		1		3	4	5
42	<i>Chrysanthemum leucanthemum</i>	ox-eye daisy	AI	herb	x					x	1			4	
43	<i>Cichorium intybus</i>	chicory	OI	herb						x				4	
44	<i>Cirsium vulgare</i>	bull thistle	UI	herb	x					x				4	5
45	<i>Clethra alnifolia</i>	sweetpepper bush	AN	shrub	U		C	A	C		1	2	3	4	5
46	<i>Convallaria majalis</i>	lily-of-the-valley	OI	herb						x		2	3	4	5
47	<i>Conyza canadensis</i>	horseweed	FN	herb						x	1			4	
48	<i>Cornus amomum</i>	silky dogwood	U	shrub	x					x				4	
49	<i>Corylus americana</i>	American hazelnut	FN	shrub					U				3		
50	<i>Cuscuta sp.</i>	dodder	U	vine	x		x						3		
51	<i>Cyperus esculentus</i>	yellow flatsedge	UN	graminoid	x							2			

BLACKWATER POND RESERVATION MANAGEMENT PLAN

#	scientific name	common name	Status ^a	morphology	pond/pond bank ^b	freshwater marsh	shrub swamp	red maple swamp	mixed-oak woodland	mowed grassland	Survey ^c				
52	<i>Cyperus strigosus</i>	straw-colored flatsedge	UN	graminoid	U								4	5	
53	<i>Cypripedium acule</i>	pink lady's slipper	FN	herb					x		1		3		
54	<i>Dactylis glomerata</i>	orchard grass	FI	graminoid	x					x	1				
55	<i>Danthonia spicata</i>	poverty grass	AN	graminoid					x(path)				3		
56	<i>Daucus carota</i>	Queen anne's lace	FI	herb	x					x				4	
57	<i>Decodon verticillatus</i>	water-willow	FN	herb	C	x	A				1		3	4	5
58	<i>Dennstaedtia punctilobula</i>	hay-scented fern	AN	fern				x	x		1				
59	<i>Deschampsia flexuosa</i>	hair grass	FN	graminoid					U				3		5
60	<i>Dianthus armeria</i>	deptford pink	OI	herb						x				4	
61	<i>Dichanthelium columbianum</i>	deer tongue grass	FN	graminoid	U			x	x(path)	x				4	5
62	<i>Dicranum scoparium</i>	acrocarp	U	moss										4	5
63	<i>Drosera rotundifolia</i>	round-leaved sundew	ON	herb		x							3	4	
64	<i>Dryopteris intermedia</i>	fancy fern	RN	fern				x				2			
65	<i>Dulichium arundinaceum</i>	threeway sedge	UN	graminoid	x	x					1	2			
66	<i>Elaeagnus angustifolia</i>	Russian olive	UI	shrub			x			x	1			4	5
67	<i>Eleocharis obtusa</i>	Blunt spikesedge	UN	graminoid	x							2			
68	<i>Entodon sp.</i>	tree moss	U	moss					x				3		
69	<i>Epigaea repens</i>	trailing arbutus	AN	vine					U		1	2	3	4	5
70	<i>Epilobium ciliatum</i>	glandular willow-herb	UN	herb	x							2			
71	<i>Erigeron strigosus</i>	lesser daisy fleabane	ON	herb	x							2			
72	<i>Eupatorium dubium</i>	joe-pye-weed	FN	herb	x	x					1			4	
73	<i>Eupatorium hyssopifolium</i>	hyssop-leaved boneset	FN	herb	U					x				4	5
74	<i>Eupatorium maculatum</i>	spotted joe-pye-weed	RN	herb	x							2			5
75	<i>Euthamia graminifolia</i>	grass-leaf goldenrod	AN	herb	U					x				4	5
76	<i>Euthamia tenuifolia</i>	slender-leaved goldenrod	AN	herb	A				x	x				4	5
77	<i>Fagus grandifolia</i>	American beech	FN	tree					U		1		3	4	
78	<i>Forsythia suspensa</i>	forsythia	U	shrub						x				4	
79	<i>Fragaria vesca</i>	woodland strawberry	OI	herb					x		1				
80	<i>Galium sp.</i>	a bedstraw	U	herb			C						3		
81	<i>Gaultheria procumbens</i>	wintergreen	AN	herb					C		1		3	4	5
82	<i>Gaylussacia baccata</i>	black huckleberry	AN	shrub	x				A			2	3	4	5
83	<i>Gaylussacia frondosa</i>	dangleberry	FN	shrub				U	C				3	4	

BLACKWATER POND RESERVATION MANAGEMENT PLAN

#	scientific name	common name	Status ^a	morphology	pond/pond bank ^b	freshwater marsh	shrub swamp	red maple swamp	mixed-oak woodland	mowed grassland	Survey ^c				
84	<i>Geum laciniatum</i>	rough avens	U	herb	x						2				
85	<i>Glyceria obtusa</i>	coastal mannagrass	UN	graminoid	x	x	x	x			1	2		4	
86	<i>Gnaphalium obtusifolium</i>	sweet everlasting	AN	herb	x				x	x			3	4	
87	<i>Gratiola aurea</i>	golden hedge-hyssop	ON	herb	U						2				5
88	<i>Hedera helix</i>	English ivy	OI	vine						x				4	5
89	<i>Helianthemum propinquum</i>	creeping rockrose	UN	heb					x				3		
90	<i>Heracleum lanatum</i>	cow parsnip	ON	herb						x	1				
91	<i>Holcus lanatus</i>	velvet grass	AI	graminoid	U					x	1				5
92	<i>Hypericum mutilum</i>	dwarf St. John's-wort	ON	herb	x						2			4	
93	<i>Hypericum perforatum</i>	common St. John's-wort	FI	herb	U					x	1			4	5
94	<i>Hypochaeris radicata</i>	cat's ear	FI	herb	x						2				
95	<i>Hypoxis hirsuta</i>	yellow star grass	FN	herb	x								3		
96	<i>Ilex opaca</i>	American holly	FN	tree					x	x	1		3		
97	<i>Ilex verticillata</i>	winterberry	FN	shrub			A	C	U		1	2	3	4	5
98	<i>Impatiens capensis</i>	spotted touch-me-not	FN	herb	U	x	x				1			4	5
99	<i>Iris versicolor</i>	blue flag iris	AN	herb	x	x					1		3	4	5
100	<i>Juncus effusus</i>	soft rush	AN	graminoid	x	x	x	x			1	2		4	
101	<i>Juncus marginatus</i>	rush sp	U	graminoid	U							2			
102	<i>Juncus tenuis</i>	path rush	AN	graminoid	x							2			5
103	<i>Juniperus virginiana</i>	red cedar	AN	tree					x	x		2	3		5
104	<i>Kalmia angustifolia</i>	sheep laurel	AN	shrub	x			U	C		1	2	3	4	5
105	<i>Leersia oryzoides</i>	blunt mannagrass	FN	graminoid	U										
106	<i>Lemna minor</i>	duckweed	UN	herb	x		C						3	4	5
107	<i>Lindera benzoin</i>	spicebush	FN	shrub	x			x					3		5
108	<i>Liriodendron tulipifera</i>	Tulip tree	U	tree	x					x				4	
109	<i>Lonicera cf. morrowii</i>	Morrow's honeysuckle	FI	shrub						x	1			4	5
110	<i>Lonicera japonica</i>	Japanese honeysuckle	AI	vine						x	1				
111	<i>Lotos corniculatus</i>	birds-foot trefoil	OI	herb	x							2			
112	<i>Luzula sp.</i>	woodrush	U	graminoid					x		1				
113	<i>Lycopodium sp.</i>	lycopodium sp.	U	herb					x				3		
114	<i>Lycopus uniflorus</i>	common water-horehound	UN	herb	U							2		4	
115	<i>Lyonia ligustrina</i>	maleberry	FN	shrub			x	U			1		3		5
116	<i>Lysimachia quadrifolia</i>	whorled loosestrife	FN	herb				x	x(path)		1		3		

BLACKWATER POND RESERVATION MANAGEMENT PLAN

#	scientific name	common name	Status ^a	morphology	pond/pond bank ^b	freshwater marsh	shrub swamp	red maple swamp	mixed-oak woodland	mowed grassland	Survey ^c				
117	<i>Lysimachia terrestris</i>	swamp candles	ON	herb	x						2		4		
118	<i>Lythrum salicaria</i>	purple loosestrife	OI	herb	U					1					
119	<i>Maianthemum canadensis</i>	Canada mayflower	AN	herb				x	U	1		3	4	5	
120	<i>Medeola virginiana</i>	Indian Cucumber-root	FN	herb	x				x		2		4	5	
121	<i>Melampyrum lineare</i>	cow-wheat	UN	herb					x	1		3			
122	<i>Mitchella repens</i>	partridgeberry	RN	herb											
123	<i>Monotropa uniflora</i>	Indian pipe	FN	herb					x			3	4		
124	<i>Myrica pennsylvanica</i>	bayberry	AN	shrub	x	x	x	x	x	1		3	4	5	
125	<i>Nymphaea odorata</i>	white waterlily	ON	herb	x					1	2	3	4	5	
126	<i>Nyssa sylvatica</i>	beetlebung	AN	tree	x			x	C	1	2		4	5	
127	<i>Odontoschisma prostratum</i>	liverwort	U	liverwort				x					4	5	
128	<i>Oenothera biennis</i>	common evening primrose	FN	herb	x					x	1		4	5	
129	<i>Onoclea sensibilis</i>	sensitive fern	AN	fern	U	x		C		1			4	5	
130	<i>Osmunda cinnamomea</i>	cinnamon fern	AN	fern	U	x	x	C		1		3	4	5	
131	<i>Osmunda regalis</i>	royal fern	ON	fern			x					3			
132	<i>Ostrya virginiana</i>	hop hornbeam	ON	tree				x							
133	<i>Oxalis stricta</i>	yellow wood sorrel	FN	herb	x						2		4		
134	<i>Panicum virgatum</i>	switchgrass	FN	graminoid	C		A			x	1				
135	<i>Parthenocissus quinquefolia</i>	Virginia creeper	AN	vine	U	x		C	U	x	1		3	4	5
136	<i>Physostegia virginiana</i>	false dragonhead	RI	herb	x						2		4	5	
137	<i>Picea glauca</i>	white spruce	OI	tree	x				x						
138	<i>Pinus rigida</i>	pitch pine	AN	tree	x				U	x	1	2	3	4	
139	<i>Pinus strobus</i>	white pine	FI	tree	x				U	x	1	2	3	4	5
140	<i>Plantago lanceolata</i>	English plantain	AI	herb	U					x	1		4	5	
141	<i>Plantago major</i>	common plantain	UI	herb	x						2		4	5	
142	<i>Polygala cruciata</i>	crossleaf milkwort	ON	herb	x						2				
143	<i>Polygonum cuspidatum</i>	Japanese knotweed	FI	shrub	x					x	1	2	3		
144	<i>Polygonum punctatum</i>	duck smartweed	UN	herb		x							4		
145	<i>Polygonum scandens</i>	bindweed	FN	herb			A					3	4		
146	<i>Polytrichum juniperinum</i>	haircap moss	U	moss					x	1					
147	<i>Potentilla canadensis</i>	dwarf cinquefoil	FN	herb	x				x	x	1		3		
148	<i>Potentilla simplex</i>	common cinquefoil	FN	herb						x	1				

BLACKWATER POND RESERVATION MANAGEMENT PLAN

#	scientific name	common name	Status ^a	morphology	pond/pond bank ^b	freshwater marsh	shrub swamp	red maple swamp	mixed-oak woodland	mowed grassland	Survey ^c				
149	<i>Prenanthes trifoliata</i>	fall rattlesnake-root	ON	herb				x	U		1		3	4	
150	<i>Prunus maritima</i>	beach plum	AN	shrub	x							2			
151	<i>Prunus persica</i>	peach	I	tree						x	1	2	3		
152	<i>Prunus serotina</i>	black cherry	AN	tree	x		x		x	x	1		3	4	5
153	<i>Pteridium aquilinum</i>	bracken fern	AN	fern	x				U		1	2	3	4	5
154	<i>Pyrus communis</i>	pear	U	tree						x		2		4	5
155	<i>Pyrus malus</i>	apple	OI	tree					x	x		2		4	5
156	<i>Quercus alba</i>	white oak	AN	tree			x		A		1	2	3	4	5
157	<i>Quercus coccinea</i>	scarlet oak	AN	tree	U				C			2	3	4	5
158	<i>Quercus ilicifolia</i>	scrub oak	AN	tree	U										5
159	<i>Quercus velutina</i>	black oak	AN	tree	U			C	A		1	2			
160	<i>Ranunculus sp.</i>	a buttercup	U	herb						x	1				
161	<i>Rhexia virginica</i>	meadow-beauty	RN	herb	x							2			
162	<i>Rhododendron sp.</i>	rhododendron	U	shrub						x		2			
163	<i>Rhododendron viscosum</i>	swamp azalea	FN	shrub	x	x	x	U			1				5
164	<i>Rhus copallinum</i>	winged sumac	FN	shrub	x		x			x				4	5
165	<i>Rhynchospora capitellata</i>	brown beaksedge	UN	graminoid	U							2			5
166	<i>Rhynchospora glomerata</i>	clustered beaksedge	U	graminoid	x							2			
167	<i>Ribes sp.</i>	a gooseberry sp.	U	shrub				x			1				
168	<i>Robinia pseudo-acacia</i>	black locust	FI	tree					x	x	1			4	5
169	<i>Rosa multiflora</i>	multiflora rose	UI	shrub	U		x	x			1			4	5
170	<i>Rosa palustris</i>	swamp rose	ON	shrub	U		x						3		5
173	<i>Rubus allegheniensis</i>	common blackberry	FN	vine						x	1				
174	<i>Rubus cf. idaeus</i>	raspberry	FN	vine						x	1				
175	<i>Rubus flagellaris</i>	prickly dewberry	FN	vine	U			C	U		1			4	5
177	<i>Rubus hispidus</i>	bristly dewberry	AN	vine				x			1				
178	<i>Rudbeckia hirta var. pulcherrima</i>	black-eyed susan	OI	herb	x					x	1				
179	<i>Rumex acetostella</i>	field sorrel	AI	herb	U			x	x	x	1				5
180	<i>Rumex crispus</i>	curled dock	FI	herb	x					x	1			4	
181	<i>Salix babylonica</i>	weeping willow	U	tree	x									4	5
182	<i>Salix bebbiana</i>	Bebb willow	UN	tree	x			x			1	2	3	4	5
183	<i>Salix discolor</i>	pussy willow	UN	tree	U						1	2	3	4	5
184	<i>Sambucus canadensis</i>	elderberry	FN	shrub	x	x					1	2	3	4	5
185	<i>Sassafras albidum</i>	sassafras	AN	tree	U		x	x	C		1		3	4	5

BLACKWATER POND RESERVATION MANAGEMENT PLAN

#	scientific name	common name	Status ^a	morphology	pond/pond bank ^b	freshwater marsh	shrub swamp	red maple swamp	mixed-oak woodland	mowed grassland	Survey ^c				
186	<i>Schizachyrium scoparium</i>	little blue stem	FN	graminoid					x(path)				3	4	
187	<i>Scirpus cyperinus</i>	wool grass	FN	graminoid	U	x									5
188	<i>Scirpus pungens</i>	chairmaker's rush	FN	graminoid	U							2			5
189	<i>Scirpus validus</i>	a sedge	U	graminoid			x						3		
190	<i>Silene latifolia</i>	white campion	FI	herb	x					x				4	
191	<i>Sisyrinchium atlanticum</i>	eastern blue-eyed grass	FN	herb			x				1				
192	<i>Smilacina racemosa</i>	false solomon's seal	ON	herb				x	U				3		
193	<i>Smilax glauca</i>	glaucous greenbrier	FN	vine	U			x	x		1		3		5
194	<i>Smilax rotundifolia</i>	common greenbrier	AN	vine	U			U	C		1		3	4	5
195	<i>Solanum dulcamara</i>	bittersweet nightshade	OI	vine	U							2			5
196	<i>Solidago bicolor</i>	silverrod	ON	herb						x			3		
197	<i>Solidago elliotii</i>	Elliott's goldenrod	FN	herb	U										5
198	<i>Solidago juncea</i>	early goldenrod	ON	herb	x							2			
199	<i>Solidago nemoralis</i>	grey goldenrod	FN	herb					x					4	
200	<i>Solidago odora</i>	sweet goldenrod	AN	herb	x				x				3	4	
201	<i>Solidago rugosa</i>	rough-stemmed goldenrod	AN	herb	U				x	x	1		3	4	5
202	<i>Sonchos oleraceus</i>	common sow thistle	RI	herb	x							2		4	
203	<i>Sparganium androcladum</i>	shining bur-reed	UN	herb	x	x					1				
204	<i>Spartina pectinata</i>	freshwater cordgrass	AN	graminoid	x	x					1	2		4	
205	<i>Sphagnum centrale</i>	sphagnum sp	U	moss	x	x	A	C			1		3	4	5
206	<i>Spiraea tomentosa</i>	steepleshub	FN	herb	x	x	x				1		3	4	
207	<i>Spiranthes cernua</i>	nodding ladies' tresses	RN	herb	x							2			
208	<i>Taraxacum officinale</i>	common dandelion	AI	herb				x		x	1			4	
209	<i>Thelypteris noveboracensis</i>	New York fern	FN	fern	x							2			
210	<i>Thelypteris palustris</i>	marsh fern	AN	fern	C	x	x	U			1			4	5
211	<i>Thelypteris simulata</i>	Massachusetts fern	FN	fern		x		C						4	
212	<i>Thuidium recognitum</i>	fern moss	U	moss					x				3	4	5
213	<i>Toxicodendron vernix</i>	poison sumac	ON	shrub	x			C						4	
214	<i>Toxicodendron radicans</i>	poison ivy	AN	shrub	C	x	x	A	x		1		3	4	5
215	<i>Triadenum virginicum</i>	marsh St. John's-wort	FN	herb	U	x	x	x			1		3	4	5
216	<i>Trientalis borealis</i>	star flower	FN	herb				x	U		1		3	4	

BLACKWATER POND RESERVATION MANAGEMENT PLAN

#	scientific name	common name	Status ^a	morphology	pond/pond bank ^b	freshwater marsh	shrub swamp	red maple swamp	mixed-oak woodland	mowed grassland	Survey ^c				
217	<i>Typha cf. latifolia</i>	common cattail	FN	herb	x	x					1			4	5
218	<i>Ulmus pumila</i>	Siberian elm	UI	tree						x				4	
219	<i>Usnea strigosus</i>	tree lichen	U	lichen					x		1				5
220	<i>Vaccinium angustifolium</i>	late lowbush blueberry	AN	shrub					C				3	4	5
221	<i>Vaccinium corymbosum</i>	highbush blueberry	FN	shrub	x	x	U	U	U	x	1	2	3	4	5
223	<i>Vaccinium macrocarpon</i>	cranberry	ON	shrub	x	x								4	
224	<i>Vaccinium pallidum</i>	lowbush blueberry	FN	shrub	x										
225	<i>Verbascum thapsus</i>	common mullein	FI	herb						x	1	2			
226	<i>Veronica officinalis</i>	common speedwell	OI	herb						x	1				
227	<i>Viburnum dentatum</i>	southern arrowwood	UN	shrub	U		x	x	U		1		3	4	5
228	<i>Vinca minor</i>	periwinkle	FI	vine						x				4	
229	<i>Viola blanda</i>	sweet white violet	FN	herb				x	U		1				
230	<i>Viola macloskeyi</i>	northern white violet	ON	herb				x					3		
231	<i>Viola sagittata</i>	arrow-leaved violet	ON	herb						x	1				
232	<i>Viola sororia</i>	LeConte's violet	UN	herb					x				3		
233	<i>Vitis aestivalis</i>	silverleaf grape	FN	vine				x	x		1			4	
234	<i>Vitis labrusca</i>	fox grape	FN	vine	U							2		4	5
235	<i>Weigela florida</i>	shrub	U	shrub						x		2			
236	<i>Woodwardia virginica</i>	Virginia chain fern	RN	fern		x						2	3		
237	<i>Xyris torta</i>	twisted yellow-eyed grass	RN	herb	x							2			
238	<i>Yucca filamentosa</i>	Yucca	RI	shrub						x				4	
	Total # of abundant species				1	0	5	2	3	0					
	Total # of common species				4	0	6	10	11	0					
	Total # of uncommon species				40	0	2	8	19	0					
	Total # of species present outside of survey				34	29	38	47	67						
	Total # of species				128	34	42	58	80	67					
	% of total species				54	14	17	24	33	28					

^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 ten 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 *A = abundant (percent occurrence greater than 50%), C = common (percent occurrence greater than 20% but less than or equal to 50%), U = uncommon (percent occurrence less than or equal to 20%), x = present on the preserve but not detected in a survey plot.*

^c *Survey: 1 = 1999 spring and summer ongoing MVLBC vegetation inventory (Wendy Culbert - WC); 2 = 2000 vegetation survey and ongoing MVLBC vegetation +inventory (Julie Russell - JR); 3 = 2001 vegetation survey (JR); 4 = 2003 summer ongoing MVLBC vegetation inventory; and 5 = 2005 late summer ongoing MVLBC vegetation inventory (JR).*

2. Wildlife Habitat

Quality of wildlife habitat on Blackwater Pond Reservation depends on the characteristics of the vegetation communities. Formal avian, amphibian call, amphibian cover-board and invertebrate dip-net surveys were the primary tools used for analysis of wildlife habitat. Additional direct observations of wildlife occurrences and signs throughout the year contribute to the understanding of habitat value at Blackwater Pond Reservation.

a. Habitat Features

The upland vegetation community of Blackwater Pond Reservation has a closed canopy in the mixed-oak and pitch pine woodlands and an open canopy in the mowed grassland. Berry-producing shrubs in the understory of the mixed-oak woodland and along the edge of the mowed grassland provide forage for wildlife. Dense understory vegetation of the woodland provides cover and nesting material for birds and small mammals. There are tall trees for nesting, roosting, and foraging wildlife species; mast-bearing trees (i.e. oak and beech) for fall foraging; fruiting shrubs and vines (i.e. huckleberry, shadbush, blueberry, greenbrier, and bayberry) for summer and fall foraging; and understory cover for foraging and ground nesting insects (i.e. beetles, ants and spiders), amphibians (i.e. red-backed salamander), reptiles (i.e. snakes and turtles), birds (i.e. towhee), and mammals (i.e. mice, shrews, raccoons and skunks). The nectar-producing flowering plants and cedar trees growing in and around the mowed grassland are a superb food source for invertebrates, namely, species in the Lepidoptera order.

The wetland vegetation community of Blackwater Pond Reservation is a mixture of red maple woodland with a closed canopy of red maples and a dense understory of berry-producing shrubs, shrub swamp with a dense cover of berry-producing shrubs, freshwater marsh, pond and pond edge, vernal pool and cultivated blueberry bushes. The berry-producing shrubs provide forage and cover for wildlife species. Herbaceous vegetation in the freshwater marsh and shrub swamp provide forage and breeding cover for invertebrates, waterfowl and other wildlife species. The dense water lilies in the pond provide forage for predatory fish where breeding aquatic species seek cover while nesting. Wetlands also provide excellent forage during the summer and fall migration for birds. Various birds of prey hunt in the open pond for fish and frogs. Emergent aquatic vegetation provides important perching habitat for Odonata species and breeding habitat for stem-boring Lepidoptera species. Vernal pools on the reservation provide a fish free breeding habitat for amphibians that is so vital to some amphibian species survival.

b. Invertebrates

i. Observed Invertebrates

A variety of invertebrates inhabit Blackwater Pond Reservation. Sixty species of invertebrates are known to occur in wetlands on Blackwater Pond Reservation. A dip-net survey in the vernal pools revealed several facultative aquatic invertebrates including springtails, isopods, predacious diving beetle, and caddis worms and one obligate aquatic invertebrate, the fairy shrimp (Appendix C, p.86). Whirligig beetles were observed on all pond surfaces.

Odonata is the most widely represented order of invertebrates observed in wetlands on Blackwater Pond Reservation. The order Odonata includes damselflies and dragonflies. Most Odonata species were observed on the reservation during the spring and summer. Matthew Pelikan, a local naturalist, visited Duarte's Pond on several occasions during the summer of 2003 and 2004. He identified approximately 28 odonata species along the shores and surrounding uplands of Duarte's and Blackwater Ponds (Appendix D, p.91). His recordings provide a glimpse into the variety of odonates that occur on the reservation and are by no means a complete list of Odonata species that may occur at Blackwater Pond Reservation. No Odonata species that Mr. Pelikan observed were state-listed, however, the turquoise and slender bluet are not commonly observed on the vineyard (Pelikan 2005). Dragonflies tend not to migrate but have flight seasons, such as spring and summer, instead during when they are most active (Dunkle 2000). Odonata species reproduce and feed in wetlands (Dunkle 2000).

Direct observation of invertebrates in the upland vegetation communities revealed a total of eighteen species (Appendix C, p. 86). The order Lepidoptera is the most widely represented order in uplands at Blackwater Pond Reservation. Lepidoptera are butterflies and moths. Most Lepidoptera were observed during the spring and summer migrations. However, the light green caterpillar of the nocturnal luna moth was observed during the fall. Lepidoptera larvae and adults find cover and forage in the abundance of cedars and nectar-producing shrubs such as honeysuckle, roses, asters, sumac and milkweeds. Other invertebrates observed in the upland habitats included various wasp species, bumble bees, deer flies, deer ticks, mosquitoes, crickets, ladybird beetles, daddy-long-legs and black-and-yellow argiope spider (Appendix C, p. 86).

ii. Potential Invertebrates

Several invertebrates potentially live in the dry upland soils and vegetation of the Blackwater Pond Reservation but were not observed on the property. Two plants, waterwillow and cow parsnip, exist on the reservation and provide essential breeding habitat to one listed and one formally protected Lepidoptera species. The water willow borer (*Papaipema sulphuata*) is listed as a threatened species in the commonwealth and breeds in water-willow stems (MANHESP 1990a). Water willow is an abundant plant in the marshes and shrub swamp of Blackwater Pond Reservation. The heracleum stem borer (*Papaipema harrisii*) was a species of special concern in Massachusetts but is no longer on the species of special concern list. Heracleum stem borer uses cow parsnip as a host plant for breeding. Cow parsnip occurs along the shore of Duarte's Pond and is an uncommon plant on land bank properties. Future studies using light traps and pit falls would provide further insight into the diversity of invertebrate fauna at Blackwater Pond Reservation.

c. Amphibians and Reptiles

i. Observed Amphibians and Reptiles

Land bank staff conducted two amphibian calling surveys following methods described by Scott and Woodward (1994) to survey breeding frog species in Duarte's Pond and Blackwater Pond. There are four known frog species that occur on the Reservation (Appendix C. p. 86). The deafening chorus of spring peppers, individual creaking of pickerel frogs, and the trill of grey tree frogs were observed on

the ponds during the survey. The banjo string call of the green frog was heard in Turtle Pond outside of the survey period.

Land bank staff conducted an amphibian cover board survey following methods described by Fellers and Drost (1994) within the red maple swamp along Duarte's Pond to survey terrestrial salamanders. Thirty cover boards were checked four times during the spring of 2000. Red-backed salamanders were observed under cover boards 75% of the time. No other salamander was observed on the Reservation.

Four additional species of the class Reptilia were observed on the reservation through direct observation during other formal surveys. Eastern garter snake and eastern ribbon snake were observed sunning themselves near the pond edge during the fall. An abundance of eastern painted turtles is present most of the time on logs in Turtle Pond. They also occur in Blackwater Pond and Duarte's Pond. Painted turtles prefer quiet, shallow water of ponds, marshes, streams and bogs with an abundant supply of submerged vegetation and logs or rocks for basking (Hunter et al. 1999). A snapping turtle nest was observed also near Turtle Pond.

ii. Potential Amphibians and Reptiles

The wetlands and abutting uplands of Blackwater Pond provide excellent breeding habitat to many amphibian and reptile species. The woodland and mowed grassland of Blackwater Pond Reservation provides non-breeding habitat to a variety of amphibians and reptile species (Table 3, p.33). Many amphibian species depend on wetlands for the larval stage of their life cycle and upland woods and fields for adult life. Most adult amphibians have lungs, but all species absorb water and oxygen through their skin. The skin must remain moist for this exchange to take place; thus they secrete a mucus-like substance to coat their skin and inhabit moist environments (Jorgensen 1978). Vernal pools provide breeding habitat that is free of fish, an amphibian predator (Hunter et al. 1999). Amphibian and reptile species depend on wetland vegetation communities for foraging habitat. Salamanders, except for the redback, and certain frog species are rare on the island after heavy pesticide spraying wiped out whole populations of amphibians several decades ago (Lazell and Michener 1976). Some isolated populations of rare salamanders and frogs do exist on the island and therefore it is still possible for them to be using Blackwater Pond Reservation as breeding and non-breeding habitat.

Table 3. Suitable amphibian and reptile habitat at Blackwater Pond Reservation, West Tisbury, MA.

Amphibian species	Scientific name	Upland ^a	Wetlands ^b	Pond ^c
redback salamander	<i>Plethodon cinereus</i>	BR,NB,F ^d		
red-spotted newt	<i>Notophthalmus v. viridescens</i>	NB, F	NB, F	BR, F
spotted salamander	<i>Ambystoma maculatum</i>	NB, F	BR, F	
four-toed salamander	<i>Hemidactylium scutatum</i>	NB, F	BR, F	
eastern American toad	<i>Bufo americanus</i>		NB, BR, F	BR, F

Amphibian species	Scientific name	Upland ^a	Wetlands ^b	Pond ^c
green frog	<i>Rana clamitans melanota</i>		NB, BR, F	NB, BR,
spring pepper	<i>Pseudocaris crucifer</i>		NB, BR, F	BR, F
fowler's toad	<i>Bufo woodhousii fowleri</i>		NB, F	BR, F
pickerel frog	<i>Rana palustris</i>		NB, F	BR, F

Reptile Species	Scientific name	Upland	Wetlands	Pond
common snapping turtle	<i>Chelydra s. serpentina</i>	BR, F	BR, F	NB,F
eastern painted turtle	<i>Cheysemys picta picta</i>		NB, BR, F	NB, F
spotted turtle	<i>Clemmys guttata</i>		NB, BR, F	NB,F
eastern box turtle	<i>Terrapene c. carolina</i>	BR, F	NB, F	NB, F
eastern garter snake	<i>Thamnophis s. sirtalis</i>	BR, NB,	BR,NB,F	
eastern ribbon snake	<i>Thamnophis s. sauritus</i>		NB, BR, F	NB,F
northern ringneck snake	<i>Diadophis punctatus edwardsii</i>	NB, BR,	BR,NB,F	
northern redbellied	<i>Storeria o. occipitomaculata</i>	BR, NB,	BR, NB, F	
eastern milk snake	<i>Lampropeltis t. triangulum</i>	BR, NB,	BR,NB,F	
northern black racer	<i>Coluber c. constrictor</i>	BR, NB,	BR,NB,F	

^a Uplands include mixed-oak woodland and mowed grassland.

^b Wetlands include shrub swamps, red maple swamps, and vernal pools

^c Pond habitat includes in and outflow streams.

^d NB = non-breeding, BR = breeding, F = feeding.

Species in bold were observed on Blackwater Pond Reservation.

Source: Lazell and Michener 1976, DeGraaf and Rudis 1986.

d. Birds

Land bank staff conducted surveys of birds on Blackwater Pond Reservation from April 1999 to October 2001. The presence of occasional migrant and resident birds throughout the fall migration, winter, spring migration and breeding season were recorded during a total of twenty visits (five visits per season) of each sampling point. Birds were sampled from eleven-point count survey locations. Five points were in the red maple swamp; three points were in freshwater marshes along the pond shoreline; two points were in mixed-oak woodland; and one point count was in the mowed grassland. All birds seen or heard during a five-minute period were recorded. Birds seen or heard outside of the count period were noted as present on the property but were not included in quantitative analyses.

Bird species in the various habitats are seasonally dependent (Table 4). 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 fall and spring migration seasons host the greatest number of bird species on Blackwater Pond Reservation. The variety and abundance of wetlands on the reservation provide desirable forage habitat for hungry new arrivals in the spring and fall.

Table 4. Seasonal change in number of bird species at Blackwater Pond Reservation, West Tisbury, MA.

Season	red maple swamp	marsh/ pond	mixed-oak woodland	mowed grassland	Total ^a
Spring	33	27	22	20	50
Summer	34	25	16	19	39
Fall	29	24	11	22	53
Winter	22	17	10	12	30
Total ^b	57	53	29	42	76
Seasonal specific species ^c	40%	47%	34%	55%	

^a Total number of species per season.

^b Total number of species per habitat type.

^c Percent of species specific to one season in a given habitat type.

A total of 76 bird species were observed at Blackwater Pond Reservation during the fall, winter, spring and breeding seasons (Appendix E, p. 95). The wetland habitats support a greater diversity of

birds than the upland habitats (Table 4). Bird diversity in the red maple swamp, marsh and pond is greatest during the spring and summer (Table 4). The dense understory of sweet pepperbush in the red maple swamp provides cover for foraging birds during the spring and nesting habitat for summer breeders. The marsh and pond habitat also are great breeding grounds for invertebrates that many birds feed on.

i. Breeding Season

Thirty-nine bird species were accounted for in the wetland and uplands of Blackwater Pond Reservation during the breeding season. The majority of bird species observed during the summer were year-round residents (Table 5). The greatest diversity of bird species was observed in the red maple swamp (Table 4). There is greater cover from predatory birds in the understory of the swamp due to the thickness of the shrubs. There is also an abundance of highbush blueberry that provides food to many different bird species including thrushes, bluebirds, tanagers and other songbirds (Martin et al. 1951). Three waterfowl species were observed during the summer breeding season on the ponds. They are the Canada goose, mallard and wood duck.

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, 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 39 bird species observed during the summer, five were confirmed breeders (Table 5). A Canada goose was observed with several goslings along the pond shore and in Duarte's Pond. Canada geese nest on the ground along shores of ponds and lakes and in swamps, marshes and grassy fields (Harrison 1975). An adult Carolina wren was observed along the pond shore with a hatch-year fledgling. Carolina wrens nest in natural cavities in a variety of habitats from brushy forests to suburban gardens (Harrison 1975). A yellow warbler was observed carrying food along the pond shore. Yellow warblers build nests that are neat and compact cups of grass and plant matter in thickets along side wetlands (Baicich and Harrison 1997). A grey catbird nest was observed in the thick understory of the red maple swamp along the edge of Blackwater Pond. Grey catbirds build nests that are well-concealed in dense thickets, brambles and vines (Harrison 1975). A blue jay was observed with a hatch-year fledgling in the red maple swamp as well (Table 4). Blue jays are breeding generalists, nesting in forests, farms, parks and the city. Nests of twigs, bark and leaves are built by blue jays in crotch of deciduous or coniferous trees (Harrison 1975). Twenty-three bird species were probable breeders and nine were possible breeders in the wetlands and uplands (Table 5). Two species were considered non-breeding bird species (Table 5). Barn swallows were observed flying overhead of non-breeding habitat. Mourning doves were observed in breeding habitat but not often enough to consider them breeding.

Table 5. Birds observed during the breeding season at Blackwater Pond Reservation.

Summer Bird Species ^a	red maple swamp ^b	marsh/ pond	mixed-oak woodland	mowed grassland	Breeding status ^c
Year-round Residents					
American crow	O	U	O		PR
American goldfinch	O	U		C	PR
American robin	O	U	O	U	PR
black-capped chickadee	O	O	C	U	PR
blue jay	O	U	O	U	CO (CF)
Canada goose ^P		U		C	CO (HY)
Carolina wren	O	O	U	U	CO (HY)
cedar waxwing			P		PO
common grackle	O	U		C	PR
cooper's hawk	P				PO
downy woodpecker	P		O		PR
eastern towhee	C	O	O		PR
gray catbird	C	C		O	CO (N)
great blue heron ^P	U				PO
hairy woodpecker			U		PO
house finch				U	PO
mallard ^P		U			PO
mourning dove	U	U		U	NB
northern cardinal	U	U	U	O	PR
northern mockingbird	U	U			PR
pine warbler	U	U	O	U	PR
red-bellied woodpecker	P		U		PO
red-tailed hawk ^{OH}	U				PR
red-winged blackbird	O	O		C	PR
song sparrow	O	U		C	PR
white-breasted nuthatch	U	U	O	U	PR
wood duck ^P	U			U	PR
Spring/Fall Migrants					
eastern pewee	U	U	O		PR
great-crested flycatcher	O				PR
Ovenbird	U	U	C		PR
red-eyed vireo	O				PR
summer tanager	P				PO
tree swallow ^{OH}	U	O			PR
Summer					
barn swallow ^{OH}	U				NB
common yellowthroat	U	O	U	U	PR

Summer Bird Species ^a	red maple swamp ^b	marsh/ pond	mixed-oak woodland	mowed grassland	Breeding status ^c
eastern kingbird	U	U		U	PR
eastern phoebe	U	U		U	PR
osprey ^{OH}	U	U			PO
yellow warbler		U			CO (CF)

^a P = birds observed on a pond, ^{OH} = birds observed flying overhead.

^b C= common (birds were detected in more than 50% of the survey visits)

O= occasional (birds were detected in 21-50% of the survey visits)

U= uncommon (birds were detected in 20% and fewer of the survey visits)

P= present (birds were not detected during a survey period but were observed on the property)

^c Breeding status: NB=nonbreeding, PO=possible breeding (species detected in suitable breeding habitat), PR=probable breeding (species heard singing on two occasions over one week apart in suitable breeding habitat). CO=confirmed breeding (species carrying food, CF; feeding young, FY; with begging hatch-year fledglings, HY; or a located nest, N).

ii. Fall

Fifty-three bird species were observed during the fall on Blackwater Pond Reservation (Table 6). Seventy-seven percent of the bird species observed on the reservation during the fall were year-round residents. Similar to the summer breeding season, the majority of birds was observed in the red maple swamp (Table 4). American crow, black-capped chickadee, and blue jay were the most common birds observed during the fall and were observed in 100% of points sampled. Fall neotropical migrants are common in wet areas such as the ponds, marshes and swamps of Blackwater Pond Reservation where food is plentiful. Fall migrants need to store up plenty of energy before flying to wintering grounds in the south. Five fall migrants were observed on the reservation and all were observed in or near a wetland. Eleven waterfowl and one shorebird species were observed on the ponds during the fall.

Table 6. Birds observed during the fall at Blackwater Pond Reservation.

Fall Bird Species ^a	red maple swamp ^b	marsh/ pond	mixed-oak woodland	mowed grassland
Year-round Residents				
American black duck ^P				P
American crow	C	C	C	O
American robin	U	U		
American wigeon ^P				U
belted kingfisher		U		
black-capped chickadee	O	O	C	C
black scoter ^P	U			
blue jay	C	C	O	O
brown creeper	U			

Fall Bird Species ^a	red maple swamp ^b	marsh/ pond	mixed-oak woodland	mowed grassland
brown-headed cowbird		U		
Canada goose ^P	U			P
Carolina wren	U	U		U
chipping sparrow		U		
common flicker	U	U	O	O
dark-eyed junco	P			
downy woodpecker				O
eastern screech owl		U		P
eastern towhee	U	O		
golden-crowned kinglet			U	P
gray catbird	O	U		O
great blue heron ^P		U		
green-winged teal ^P	U			
hairy woodpecker			U	
house sparrow		U		
killdeer				P
mallard ^P	U			
mourning dove		U		P
northern cardinal	U	U		O
northern mockingbird		U		U
pine warbler	U			
red-bellied woodpecker	U		U	
red-breasted nuthatch		U		
red-tailed hawk		O	U	
red-winged blackbird		U		
ruby-crowned kinglet	U	U		
song sparrow		U		
swamp sparrow		U		
white-breasted nuthatch	U		U	P
white-throated sparrow	U	U		U
wood duck ^P	U	O		
yellow-rumped warbler	U			
Spring/Fall Migrants				
black-and-white warbler				P
common pintail ^P		U		

Fall Bird Species ^a	red maple swamp ^b	marsh/ pond	mixed-oak woodland	mowed grassland
ovenbird				U
northern parula	P			
Summer				
common yellowthroat	U	U	U	
eastern kingbird				P
spotted sandpiper ^P		P		
tree swallow ^{OH}	U			U
Winter				
common merganser ^P	U			
merlin ^{OH}		U	U	
ruddy duck ^P	U			

^a P = birds observed on a pond, ^{OH} = birds observed flying overhead.

^b C = common (birds were detected in more than 50% of the survey visits)

O = occasional (birds were detected in 21-50% of the survey visits)

U = uncommon (birds were detected in 20% and fewer of the survey visits)

P = present (birds were not detected during a survey period but were observed on the property)

iii. Winter

Thirty bird species were observed during the winter on Blackwater Pond Reservation (Table 7). Four waterfowl species were observed in the ponds during the winter. Waterfowl migrate to more southern climates during the winter in search of food and open water. The black-capped chickadee and American crow were the most observed bird on the reservation during the winter. The eastern screech owl is the only known probable breeder on the reservation during the winter. Eastern screech owls nest in cavities during March, April and May (Baicich and Harrison 1997).

Table 7. Birds observed during the winter at Blackwater Pond Reservation.

Winter Bird Species ^a	red maple swamp ^b	marsh/ pond	mixed-oak woodland	mowed grassland
Year-round Residents				
American crow ^{OH}	O	O	O	O
American goldfinch	U			
black duck		U		
black-capped chickadee	C	O	O	C
blue jay	O	P	U	U
Canada goose ^P	O	U	U	C
Carolina wren	U	U		O
common flicker	U	U	U	U
common grackle		U		U

Winter Bird Species ^a	red maple swamp ^b	marsh/ pond	mixed-oak woodland	mowed grassland
double-crested cormorant	P			
downy woodpecker	U	U	U	
eastern towhee	U			
eastern screech owl			P	
golden-crowned kinglet	U		U	
great blue heron	U			
guinea fowl	U			
house finch		U		
mallard ^P		U		U
mourning dove		P	U	
northern cardinal	U			
northern mockingbird	P			
red-bellied woodpecker	U			
red-tailed hawk	U	U	U	U
red-winged blackbird				U
song sparrow		U		
white-breasted nuthatch	O	U	U	U
Summer				
osprey ^{OH}	U			
Virginia rail	P			
Winter				
bufflehead ^P		U		
hooded merganser ^P		U		U

^a P = birds observed on a pond, ^{OH} = birds observed flying overhead.

^bC= common (birds were detected in more than 50% of the survey visits)

O= occasional (birds were detected in 21-50% of the survey visits)

U= uncommon (birds were detected in 20% and fewer of the survey visits)

P= present (birds were not detected during a survey period but were observed on the property)

iv. Spring Migration

Fifty bird species were observed during the spring migration on Blackwater Pond Reservation (Table 8). The American crow, black-capped chickadee, common grackle, eastern towhee, northern cardinal and red-winged blackbird were occasionally observed in at least two habitats or commonly observed in at least one habitat on the reservation. Five bird species were observed flying overhead during the spring bird survey and five waterfowl species were observed on the ponds. The greatest diversity of birds observed during spring migration was observed in the red maple swamp. Similar to the fall migration, neotropical spring migrants are more likely to be observed in locations with plentiful forage, such as a wet habitats, than on dry uplands.

Table 8. Birds observed during the spring at Blackwater Pond Reservation.

Spring Bird Species ^a	red maple swamp ^b	marsh/ pond	mixed-oak woodland	mowed grassland
Year-round Residents				
American crow	O	O	U	P
American goldfinch	U	U	U	U
American robin		U	P	U
belted kingfisher				U
black-capped chickadee	O	O	O	
blue jay	U	U	O	P
brown-headed cowbird	U	U	P	
Canada geese ^P	U	C	U	C
Carolina wren	U	U	U	U
cedar waxwing	P			
chipping sparrow	U			
common flicker	U	U		
common grackle ^{OH}	O	U		C
double-crested cormorant ^P				U
downy woodpecker	P		U	
eastern bluebird	P			
eastern towhee	O	O	U	
golden-crowned kinglet			P	
gray catbird	O	U	U	
hairy woodpecker		U		
house finch	U			
mallard ^P	U	U		C
mourning dove	U		P	U
mute swan ^P		O		
northern cardinal	O	O	U	
northern mockingbird			P	
pine warbler	O	U	O	
red-bellied woodpecker	U	U	U	U
red-tailed hawk ^{OH}	U	U	U	
red-winged blackbird	O	O		C
ruby-crowned kinglet	P			U
song sparrow	O	U		U
white-breasted nuthatch	U	U	O	U
wood duck ^{OH}	U			P
yellow-rumped warbler		U	U	
Spring/Fall Migrants				
barn swallow				U
eastern pewee	U	O		

Spring Bird Species ^a	red maple swamp ^b	marsh/ pond	mixed-oak woodland	mowed grassland
great-crested flycatcher	U	U	U	
northern oriole				P
ovenbird	U	U	U	
tree swallow ^{OH}	U	U		
Summer				
common yellowthroat	U	U		
eastern kingbird		U		
eastern phoebe	U			
green heron ^P		U		
osprey ^{OH}		U		
turkey vulture		U		
yellow warbler	U	U		P
Winter				
hooded merganser ^P		U		

^a P=birds observed on a pond, ^{OH} = birds observed flying overhead.

^b C= common (birds were detected in more than 50% of the survey visits)

O= occasional (birds were detected in 21-50% of the survey visits)

U= uncommon (birds were detected in 20% and fewer of the survey visits)

P= present (birds were not detected during a survey period but were observed on the property)

e. Mammalian Fauna

i. Observed Mammals

Eight mammal species were observed on Blackwater Pond Reservation (Appendix C, p.86). The woodlands provide good forage and breeding habitat for gray squirrels and eastern chipmunks. The gray squirrel is a tree-nester and forages for nuts, such as acorns and hickory nuts (Sutton and Sutton 1923). The chipmunk is also a nut-eater. Unlike the squirrel, the chipmunk is a burrower not a tree-nester (Jorgensen 1978). White-tailed deer scat and tracks were observed along the old roads in the mixed-oak woodland. White-tailed deer forage and breed in the woodland and shrub swamp. Scat of eastern cottontail was observed in the mixed-oak woodland of the reservation. A muskrat was observed swimming in Homestead Pond. Muskrat prefers to eat the stems and leaves of marsh plants and does not eat much animal food (Martin et al. 1951). Muskrats live in dens that are either lodges made of vegetation and mud in open water or hollowed out areas in the bank of a water body (Stokes and Stokes 1986). River otter tracks were observed on the ice of partially frozen Blackwater Pond during the winter and scat was observed along the pond shoreline. Otters also live in dens hollowed out in the banks of ponds and streams. However, otters do not excavate their own dens. They use dens created by muskrats or beavers (Stokes and Stokes 1986). Striped skunk was observed in the mixed-oak woodlands during the fall and spring. A feral cat was observed near Duarte's Pond and the barking of domestic dogs was heard during the spring.

ii. Potential Mammals

Blackwater Pond Reservation is potential habitat for several mammal species observed in similar habitat types on Martha's Vineyard. Various rodent species may meet some of their habitat needs in the grasslands at Blackwater Pond Reservation. They include the shrew (*Sorex cinereus*), northern short-tailed shrew (*Blarina brevicauda*), little brown bat (*Myotis lucifugus*), red bat (*Lasiurus borealis*), hoary bat (*Lasiurus cinereus*), eastern pipistrellus (*Pipistrellus subflavus*), big brown bat (*Eptesicus fuscus*) and silver-haired bat (*Lasionycterus noctivagans*), eastern mole (*Scalopus aquaticus*), meadow vole (*Microtus pennsylvanicus*), house mouse (*Mus musculus*), meadow jumping mouse (*Zapus hudsonius*), white-footed mouse (*Peromyscus leucopus*) and woodland jumping mouse (*Napaeozapus insignis*). The raccoon (*Procyon lotor*) meets some if not all its habitat requirements in the woodlands of Blackwater pond Reservation.

f. Fish

The Blackwater Pond is predominantly a "pickerel pond", due to the shallow water depth of less than four feet and the dominance of weedy vegetation. Pickerel is a predatory fish that hunts among the grassy vegetation for smaller fish species.

Land bank staff and Gregory Skomal (Massachusetts Marine Fisheries biologist) conducted a fish survey at Blackwater Pond on June 8, 2001 using a gill net and beach seine. The gill net was set for one hour and laid between the peninsula of water-willow marsh and the opposite shoreline. The beach seine was used near a peninsula of ferns on the southern end of the pond and near the dam on the northern end of the pond. Adult and fry bluegill, redbfin shiner, chain pickerel and brown bullhead all were observed in Blackwater Pond (Appendix C, p. 86).

Clyde MacKenzie Jr. reports in the Dukes County Intelligencer that brown bullhead and brook trout are known to occur in Duarte's Pond (MacKenzie 1997). Fish sampled by rod and reel in Duarte's Pond during the children's fish derby include brown bullheads, pickerel, bluegill, brook trout and rainbow trout (Dix 2005). Fish sampled in Blackwater Brook by the Massachusetts Division of Fisheries and Wildlife in 1988 included brown bullhead, chain pickerel, American eel and brook trout (Hurley 1997).

g. Rare and Endangered Species

The Massachusetts Natural Heritage and Endangered Species Program (MA NHESP) designates that Blackwater Pond Reservation is not located within a priority or estimated habitat of rare wildlife species (NHESP 2003). However, Blackwater Pond Reservation is located adjacent to Priority habitat [REDACTED] which has been delineated for seven state-protected rare species.

i. Observed Rare and Endangered Species

There are no commonwealth-listed species known to occur on the reservation at this time as indicated by wildlife and plant survey and inventory results. However, habitat exists on the reservation for listed-species known to occur in similar habitat in proximity to the reservation.

ii. Potential Rare and Endangered Species

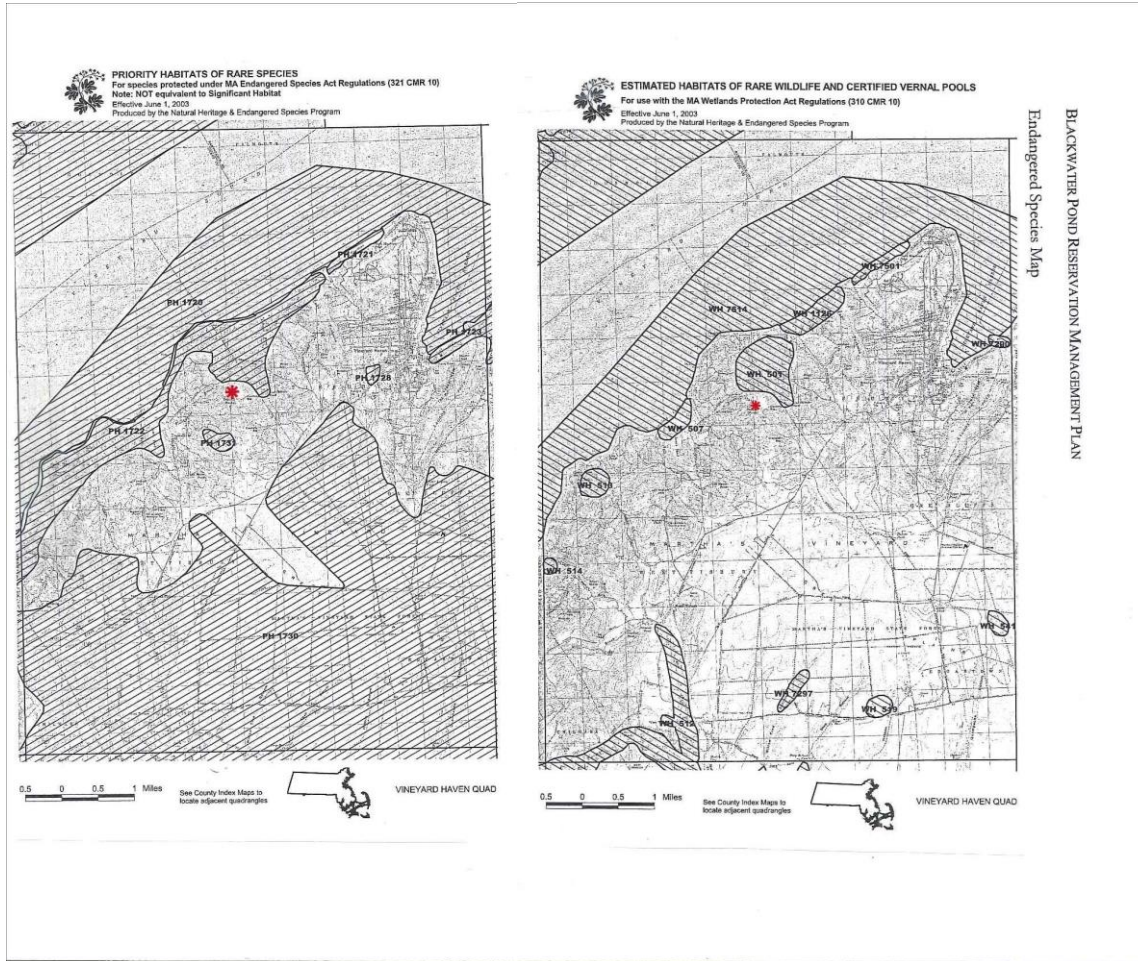
The commonwealth designates that Backwater Pond Reservation is adjacent to habitat of seven rare species (Table 9).

Table 9. State-Listed Rare Species – Estimated and Priority Habitats PH 1775

Common Name	Scientific Name	Status
<u>Vertebrates</u>		
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]

Potential habitat exists on Blackwater Pond Reservation for the [REDACTED] various wetland habitats such as vernal pools, marshes, ponds, and shrub swamps (Hunter et al. 1999). These wetland habitats are present on the reservation. [REDACTED] prefer scrub oak barrens but have been found in oak-pine woodlands (MA-NHESP 1990b). The [REDACTED] feeds on oaks which are plentiful on the reservation (Covell 1984). [REDACTED] is found in vernal pools, shallow marshes, ponds and swamps. The [REDACTED] lays eggs in the stems of water-willows that occur on the reservation (MA-NHESP 1990a). [REDACTED] is a sandplain grassland species that may grow in the mowed grassland area. The [REDACTED] typically occur in scrub oak barrens with overstory pitch pines (MA-NHESP 1992, 1994). The absence of such habitat on the reservation suggests the unlikelihood that these moth species occur on this property.

Endangered Species Maps



C. Cultural Characteristics

1. Land History

Blackwater Brook is an important landmark used by the Wampanoags to define the line between the two schemships of Nunnepaug to the east and Takymmy to the west. The line ran from Blackwater Brook to the ocean and from the spring that feeds Blackwater Brook to the middle of Watcha Pond (Banks 1966). This line is approximately the present town line between West Tisbury and Tisbury.

Lambert's Cove Road, the area of the island where Blackwater Pond Reservation is located, is known for the private cranberry bogs that were created in the 1800's. Vineyard cranberries were harvested and shipped to New York by the barrelful (Allen 2001). In New York, cranberries fetched \$10.50-\$11.00 a barrel during 1860; \$35.00 per barrel in 1940; and \$5 per barrel in 1965 (Vineyard Gazette 1860, Blake 1965). Cranberries are native to New England and grow well in areas with bogland near a fresh water supply, sand and long growing season without killing frosts (Atwood 1933). Native Americans used ripened berries for making jelly (Atwood 1933). Cranberries were not introduced to Europeans until 1677 when 10 barrels were sent to King Charles the Second of England (Atwood 1933). Cranberries grow in drained bogs during the summer and are harvested by hand or with mechanical pickers in September when the bogs are flooded (Blake 1965).

It is thought that Captain James L. Smith of Vineyard Haven began the cranberry bog that was part of Duarte's Pond in 1882 (Allen 2001). The dam that separates Blackwater and Duarte's Pond was erected in 1902. The cranberry bogs of Duarte's Pond transferred into the ownership of Manuel J. Sequeira who sold it to Manuel S. Duarte in 1945. Duarte's Pond is named after the Duarte family that emigrated from the Azores (Allen 2001). Manuel S. Duarte grew cranberries for a hobby. He also owned the bog at Cranberry Acres on Lambert's Cove Road. Mr. Duarte recalls one man who lived and worked at the bogs for 66 years (Blake 1965). The bogs transferred to Manuel S. Duarte's wife, Emelia Duarte, when he died. David Duarte, their son, owned the bogs prior to the land bank.

Perhaps the next generation knows the ponds more for the fish than the cranberries. A children's fishing derby has been held at Duarte's Pond for the past 31 years. The derby is sponsored by the local rod and gun club. The Division of Fisheries and Wildlife stocks Duarte's Pond, Uncle Seths Pond, Old Mill Pond in West Tisbury and Old Mill Pond at the Head of the Lagoon in Oak Bluffs twice in the spring with rainbow, tiger and brook trout. Duarte's Pond receives an additional stocking for the trout derby compliments of the Martha's Vineyard Rod and Gun Club. Due to the pond's shallowness it is unlikely that many of these trout survive from year to year.

2. Planning Concerns

The land bank must address a number of concerns when planning management actions at Blackwater Pond Reservation. Duarte's Pond, Blackwater Pond, Homestead Pond, Turtle Pond, Angelina's Pond, Ben Chase Swamp and Blackwater Brook are considered "wetland resource areas" under the Massachusetts wetlands protection act. The ponds and the brook are subject to the jurisdiction of the West Tisbury conservation commission. A 100-foot buffer zone around the

wetland resource areas and bordering vegetated wetland are also subject to the jurisdiction of the West Tisbury conservation commission. According to the West Tisbury by-laws the 100' buffer zone is considered a wetland resource area as well. The town-bylaws also protect vernal pools as wetland resource areas regardless of size providing they are ecologically and hydrologically functioning vernal pools. To undertake such activities as the construction of boardwalks and viewing platforms within the buffer zone the land bank must file a notice of intent with and obtain an order of conditions from the Town of West Tisbury conservation commission. The plan has the potential to traverse through ± 1600 linear ft of bordering vegetative wetland, 180 ft^2 of Duarte's Pond, 16 linear ft of pond bank, and ± 5750 linear ft of the 100 ft buffer zone around the wetland resource area. Duarte's Pond is a "special place" under the West Tisbury zoning bylaw. According to the bylaw, "land may be used, cleared or cultivated for conservation purposes and for outdoor recreation including the erection of livestock fences and other such structures not requiring a building permit." A special permit would be necessary for the installation, within 100 feet of the high-water mark of the pond, of a sanitary disposal system or any structure requiring a building permit.

Another planning concern is the existing loop drive access to the land bank maintenance shop. The drive is situated on a hilltop at a curve in the road. Visibility is poor and space is limited creating a safety hazard for trailers to back out or exit the shop area. In the future the shop may be downgraded to a satellite shop, reducing the need for relocating the drive.

3. Abutters

The following is a list of those owning property abutting or within 200 feet of Blackwater Pond Reservation (Table 10). **Abutters Map**, page 50.

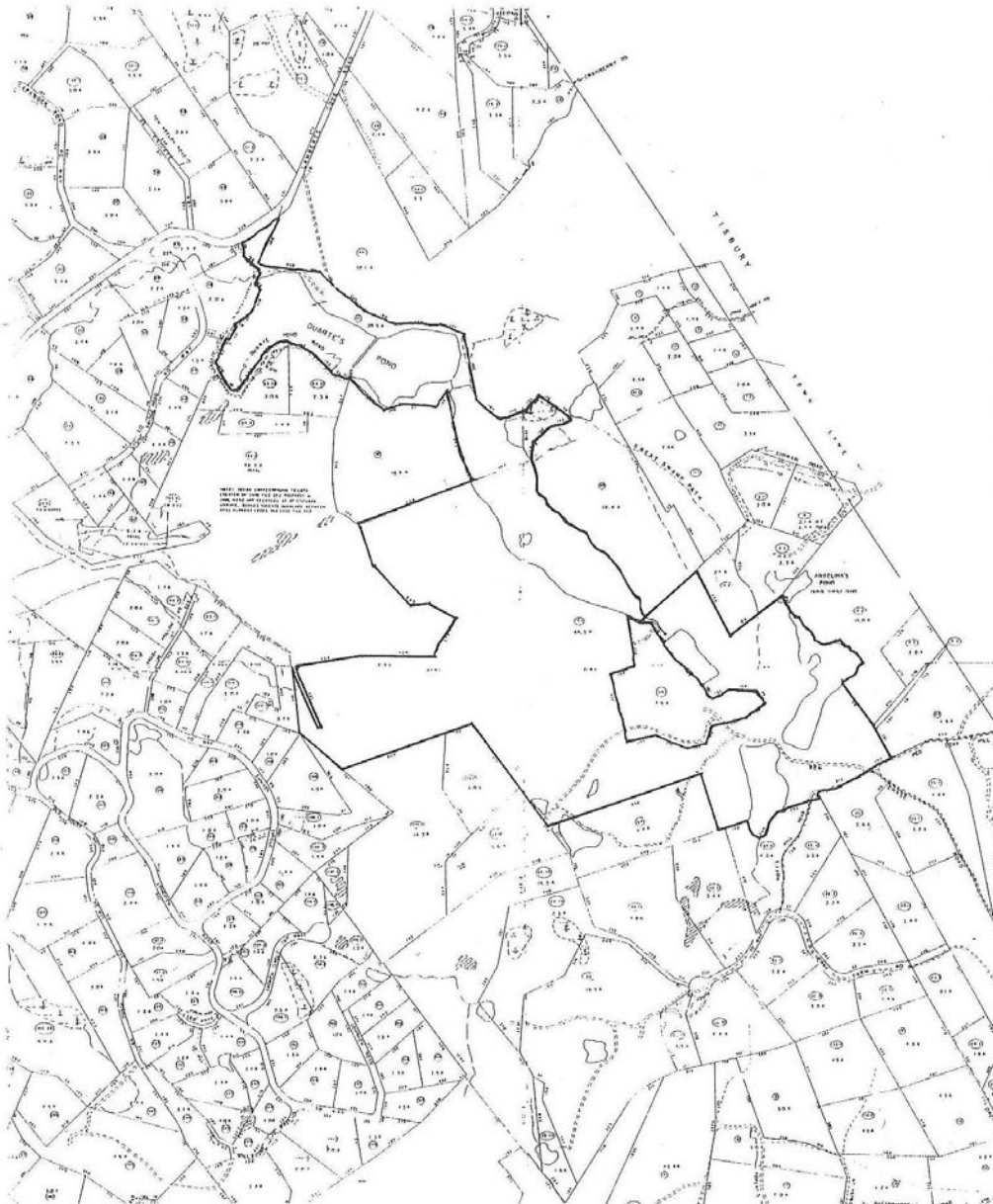
Table 10. Abutters to Blackwater Pond Reservation, West Tisbury, MA.

Map	Lot	Name	Address
8	24	JohnL. Donnelly III et al	307 Van Emburgh Ave., Ridgewood, NJ 07450
8	25.1	Douglas & Lesley Kent	P.O. Box 3037, West Tisbury, MA 02575
8	23.0	D.C. Chamberlain, S.B.	
	23.1	Schwartz, trustees Ben Chase Realty Trust, c/o Friedman, Suvalle Salomon	70 Wells Ave. Ste 200, Newton, MA 02459
8	22.4	Robert M. Schweir II et al.	RFD 589, Vineyard Haven, MA 02568
8	22.3	Stephen Strothe et al	4500 Verplanck Place NW, Washington D.C., 20016
8	22.2	Barbara Kassel	c/o/ Douglas Gale, 9 Bowser Rd., Lexington, MA 02420-2105
8	38	John Williams	P.O. Box 80, Mount Desert, ME 04660
8	39	Alison Van Dyk	651 Steamboat Road, Greenwich, CT 06830
8	174.1	Steven W. Atwood et al	P.O. Box 605, West Tisbury, MA 02575
8	174.2	Daniel W. Shepard, trustee	P.O. Box 308, West Tisbury, MA 02575
7	174	Maitland, Edey Jr.	P.O. Box 2681, Vineyard Haven, MA 02568
7	130.1	James L. Quarles III et al	4 Carvel Circle, Bethesda, MA 20816
7	130	Waterman L. Taft et al	12076 Leeds Chapel Road, Markham, VA 22643-1939
7	118	Marshall B. and Sally B. Segall	P.O. box 1023, West Tisbury, MA 02575
7	114	Robert & Lucille Alter "	10 Old Jackson Ave #80, Hastings on Hudson, 114.1 NY 10706
7	113	Allyson M. Reed	RR1 Box 401, Vineyard Haven, MA 02568
3	34	Susan M. McCoy	Bldg. A-4, 601 Ewing Street, Princeton, NJ 08340
3	41.2	Ward Just	RFD 342, Vineyard Haven, MA 02568
3	45	Brett Heavey	42 Lakeview Road, Cochranton, MA 01778
3	46	John & Melissa Howland	RFD 348 Lamberts Cove Road, Vineyard Haven, MA 02568
3	47	Hazel Nelson	1022 Regester Ave., Baltimore, MD 21239
3	65.1	Roy Wood, Jere Wood, Mary Harris trs. c/o Wood and Perry	1173 Canto, Roswell, GA 30075
3	65.2	Barbara Case-Senchak	100 Knollwood Road, Short Hills, NJ 07078
3	65.22	Wade & Jeanne Knowles	757 Eagle Rock Ave., West Orange, NJ 07052
3	44	The Nature Conservancy	RFD 319X, Vineyard Haven, MA 02568
3	80	"	

BLACKWATER POND RESERVATION MANAGEMENT PLAN

2	10	"	
2	11.1	"	
2	8.2	"	
2	9.2	J.V. Taylor; Z.K. Wiesner Trustees c/o Gelfand, Rennet Feldman	360 Hamilton Avenue Ste 100, White Plains, NY 10601

Abutters Map – produced from West Tisbury Tax Maps 2, 3, 7 and 8



4. Existing Use and Infrastructure

Blackwater Pond Reservation has moderate existing use and moderate infrastructure (**Existing Use Map**, pages 53-55).

1. *Land Bank Maintenance Shop and Drive* – A two-bay garage with a room above constitutes the land bank maintenance shop. A loop-drive off Lambert's Cove Road provides access to the shop.

2. *Land Bank trailhead* – There is an existing land bank trailhead for Duarte's Pond off Lambert's Cove Road. There is roadside parking for four vehicles and an area at the end of the access driveway for six vehicles. There is a sign station and a gate at the end of the access driveway. A portion of split-rail fence divides the access driveway from the bank of Duarte's Pond.

3. *Dock and boat storage rack* – an old wooden dock stretches from the shore of Duarte's Pond approximately 10 feet into the Pond. A metal storage rack for small boats exists on the bank of the Pond.

4. *Septic pump* – The remains of a functioning septic system for the former Duarte's Pond Apartments are situated within the mowed grassland.

5. *Fence* – A stockade fence borders the Hoft Farm Road and the land bank boundary.

6 & 12. *Power lines* – Electric poles with power lines and phone lines stretch across Duarte's Pond, enter Nature Conservancy property and continue onto the reservation ending at a transformer on private property. The power line is disconnected, a neutral wire is not disconnected and the function of the phone line has not been determined.

7. *Northern sluiceway and earthen dam* – a sluiceway controls water exiting Duarte's Pond through a dam into Blackwater Brook. The dam is an earthen embankment with stone masonry. A concrete sluiceway, 6 feet wide by 3 feet deep, with flashboards and a concrete spillway built over a 24-inch drawdown pipe outlet compose the sluiceway. The dam and sluiceway were built in 1921 and are classified as a small size dam. The Massachusetts Department of Conservation and Recreation (DCR) last inspected the dam in 2001. The condition of the dam is rated fair with hydraulic adequacy. The dam is considered a low hazard. The DCR recommended that the cracks in the concrete downstream walls at the control structure be repaired as necessary, the growth of brush be removed from the embankment of the dam and the debris accumulated in the downstream canal be removed. In a hydrologic analysis of the dams for a 100-year storm with a watershed of 200 acres the water flow would be 60 ft³/second. The existing spillway could manage such a storm. However, to maintain the dam and sluice Mr. Healy recommended removing all but the ground level brush on the dam and concrete spillway, repairing the cracks in the concrete and replacing the drop boards (Appendix G, p. 103).

8. *Southern sluiceway and earthen dam* – A stone sluiceway and 270 feet of earth and stone dam control water flowing from Blackwater pond to Duarte's Pond. The earthen dam with stone

masonry is 4 feet high with a 10 foot crest, a freeboard of 1 foot and a downstream slope of 1:4. A concrete flume with flashboards and a stone masonry spillway with a 2.5 foot drop down and an emergency spillway to the east of the concrete spillway that is a 1 foot deep by 10 feet wide depression in the dam crest control the water leaving Blackwater Pond. For a 100-year storm with a watershed of 130 acres, the flow through the spillway would be 39 ft³/second and would overflow the sluice outlet and use the emergency depression (Appendix G, p. 103). This dam was built in 1902 and was used as a reservoir to irrigate cranberry bogs. DCR last inspected the dam and sluiceway in 2001. The dam is rated poor with hydraulic inadequacy. The dam is considered a significant hazard due to the overgrowth of trees and brush on the earthen dam; presence of cracks in the headwall; the collapse of the stone masonry wingwall; evidence of overtopping; presence of sinkholes at the right and left sluiceway abuts; rotting stoplogs; and presence of debris in the channel. DCR recommended that the stonework be rebuilt and patched, the stoplogs be replaced, the trees and brush be removed from the earthen dam and the debris be removed from the channel. DCR estimated the repair costs to be approximately \$200,000.00. Mr. Healy also recommended removing all but the low brush on the dam for long term maintenance. Trees on dams may overtop and uproot during high winds which would degrade the dam and ultimately result in a loss of the ponds. In addition, Mr. Healy recommended repairing the concrete sluice (Appendix G, p. 103).

9. *Old dike and sluiceway* - An old dike and sluiceway occurs between Turtle Pond and Ben Chase Swamp and may have been used to control water for a former cranberry operation in Turtle Pond.

10. *Earthen dam and sluiceway* – An earthen dam and sluiceway created Homestead Pond sometime after 1938 and controls water flowing from Homestead Pond into Blackwater Pond. The watershed for this dam is approximately 20 acres. A 100-year storm would result in waterflow of 6 ft³/second and result in an overtopping of the dam by 1-2 inches. The velocity would be less than 2 ft/sec and would not debilitate the vegetated crest. Mr. Healy recommended removing all but the ground level brush from the dam to preserve its integrity.

11. *Old Roads* – A portion of the Ben Chase Road crosses the southern corner of the reservation. An old dirt path runs north-south through the reservation.

12. See #6

13. *Stonewalls* – Several boundaries are bordered by stonewalls. There are two sections of interior stonewalls on the reservation.

14. *Encroachments* – a small portion of an abutter's yard formerly encroached on a southern boundary.

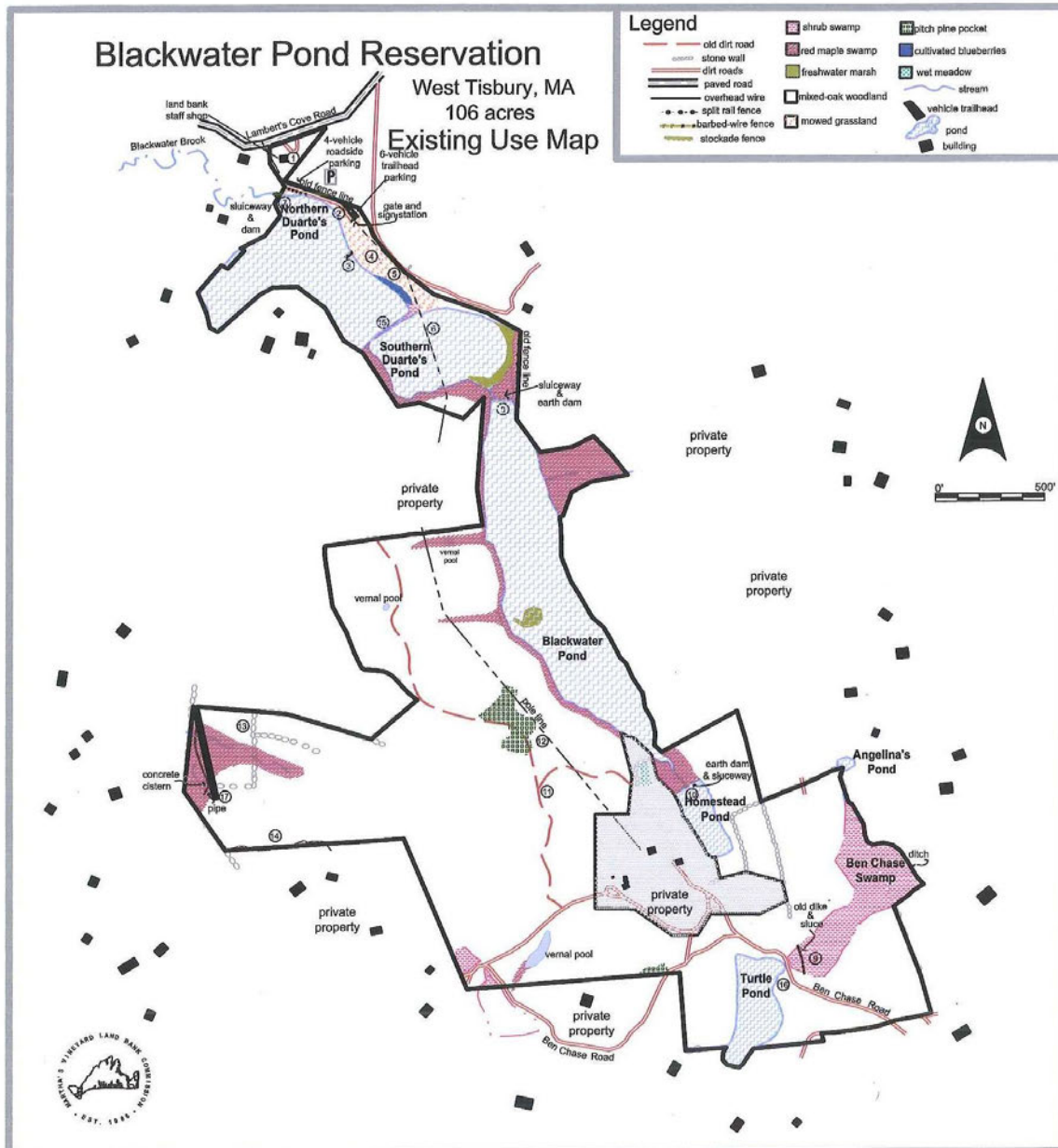
15. *Causeway* – A vegetated, earthen causeway divides Duarte's Pond into a Northern and Southern Duarte's Pond.

16. *Culvert* – A 10-inch steel culvert exists that replaced a 4 inch culvert under Ben Chase Road used to control flooding of the Road and maintain water flow between Turtle Pond and Ben Chase

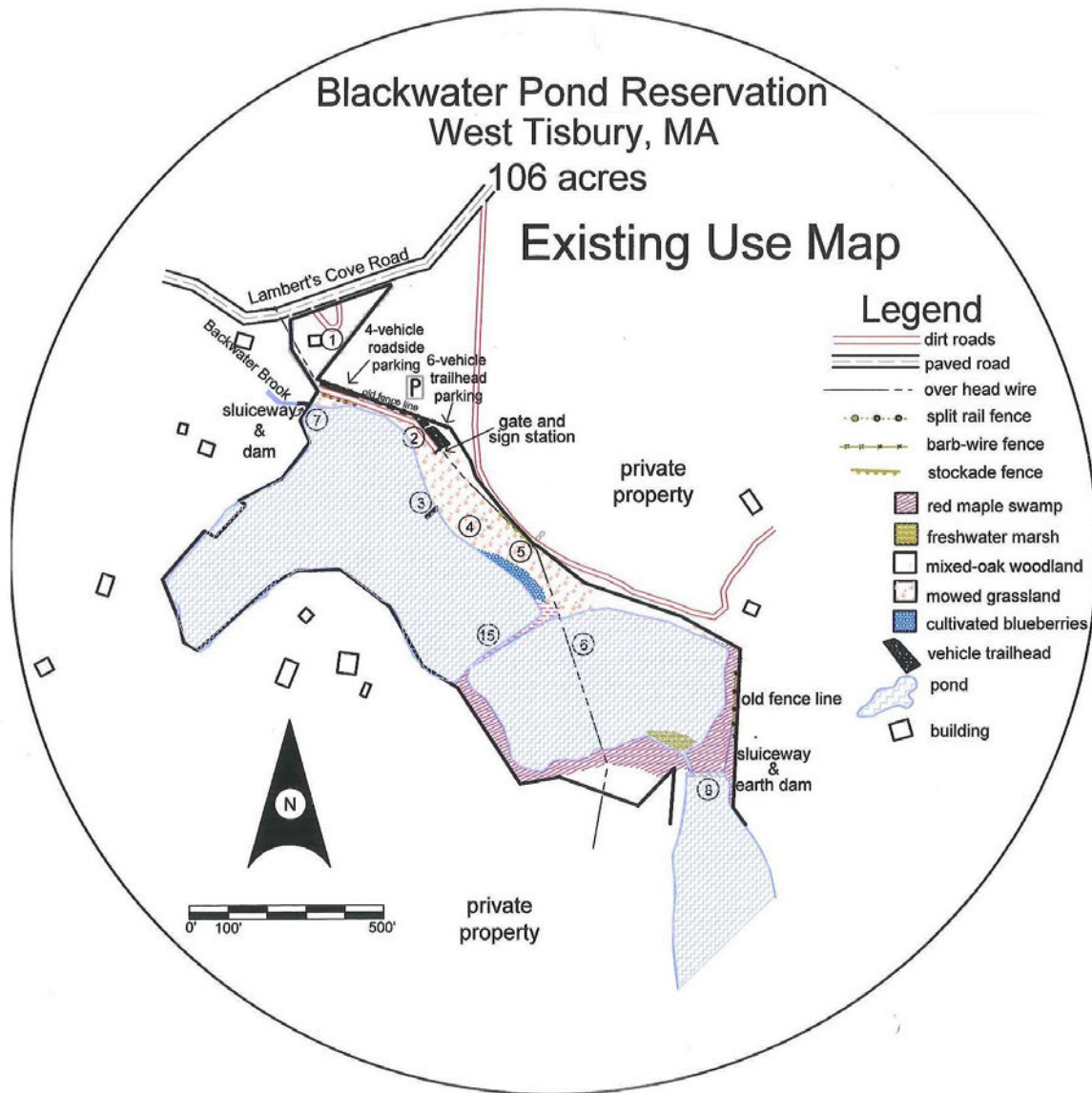
Swamp.

17. *Concrete cistern and pipe* – A concrete cistern and pipe exists through a portion of red maple swamp on the reservation to serve an off-premises property, per a pre-existing agreement.

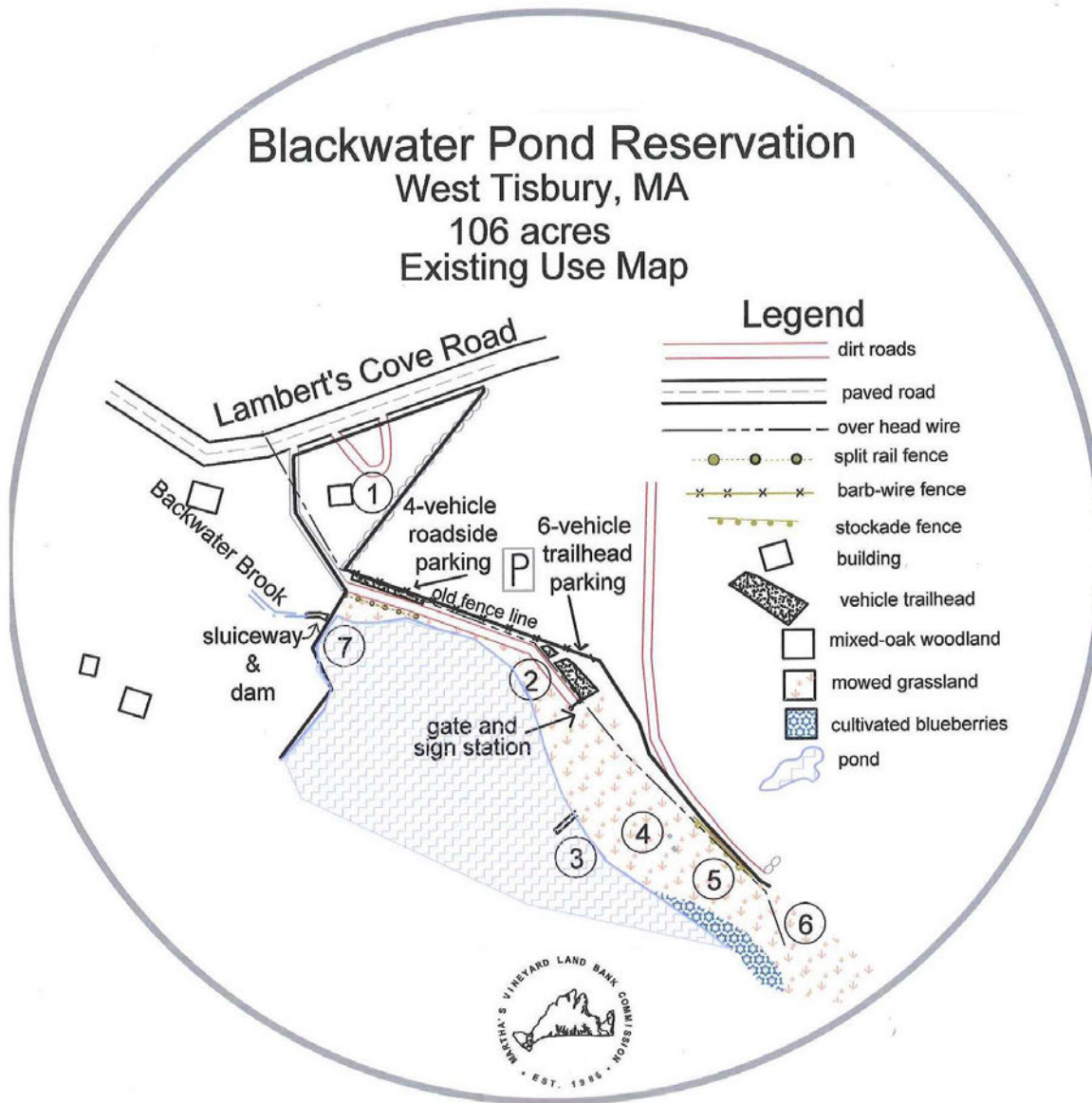
Existing Use Map



Existing Use Map Zoom +



Existing Use Map Zoom ++



III. Inventory Analysis

In this section, problems and opportunities that may arise in the management of Blackwater Pond Reservation are analyzed.

A. Constraints & Issues

1. Ecological Context

Blackwater Pond Reservation is a network of wetlands and ponds amidst a hilly topography of mixed-oak woodlands. The wetlands of Blackwater Pond Reservation are natural filters for underlying ground water storage areas. Blackwater Brook is the primary water source feeding the multitude of wetlands on the reservation. The ponds provide important breeding habitat for waterfowl and migratory shorebirds such as the wood duck, green-winged teal, green heron and black duck. The reservation provides both cover in the thick shrubs and emergent marsh vegetation that border the ponds. Submerged vegetation and invertebrates provide a food source for adult and young water birds. The wet swampy areas of the reservation provide breeding habitat for a variety of insects; these insects in turn feed a variety of migratory birds, various amphibian and reptiles and bat species. The sphagnum hummocks and permanent and seasonal water sources of the vernal pools, ponds, shrub swamp, red maple swamp, freshwater marsh and cultivated blueberry thicket provide forage, breeding and cover habitat for amphibians and reptile species. Otters and muskrats find refuge in stream and pondshores and among the dense emergent vegetation of the ponds. Dense understory in the mesic woodland provides forage and denning habitat for deer, skunks, raccoons, rabbits and other small mammals. The mixed-oak woodland provides nesting and perching habitat for wildlife species such as osprey, merlins and kingbirds and plenty of nuts for foraging wildlife on the reservation.

2. Natural Resource Concerns

Rare species

There are no commonwealth-listed plant and wildlife species known to occur on the reservation. However, listed species are recorded by NHESP in similar habitat that is adjacent to the reservation.

Waterfowl nesting

Blackwater Pond, Duarte's Pond, Homestead Pond and Turtle Pond provide valuable wildlife habitat for a variety of species. Several waterfowl species inhabit these ponds. Unwarranted intrusion by humans into the more remote reaches of the ponds and property may disturb and displace the wildlife that use the reservation, particularly the more secretive species that flee upon sight of a human. Trail development along these remote areas and use of power boats could degrade the quality of wildlife habitat on the reservation.

Invasive Species

There are ten known invasive species that occur on the reservation. Invasive species outcompete native species creating monocultures that are less valuable to wildlife species. Control and removal of invasive species is important to maintaining an ecological balance on the reservation.

Eutrophication

Eutrophication is a natural process and a fate of many ponds. It is the process in which ponds gradually fill in with water-borne silt, grow shallow, become vegetated and ultimately become wet meadows and wet woodlands. Controlling eutrophication to maintain the ponds as healthy bodies of water with a diversified flora and fauna is necessary to the survival of various wildlife and plant species rare and common. Blackwater Pond, Turtle Pond, Homestead Pond and the Northern Duarte's Pond are currently mesotrophic ponds that should remain mesotrophic ponds provided that the dams and spillways are maintained in good working order and water flow and depth are maintained at an adequate rate and level, respectively. Management actions such as dredging, erosion control and aquatic vegetation harvesting could control the process of eutrophication and assist in maintaining the ponds as functional open bodies of water. The Southern Duarte's Pond is a eutrophic pond with a monoculture of water lilies and exceptionally low levels of invertebrate diversity (Urbani 2000). Dredging a channel through the pond if it were to convert from open water to a shrub swamp would maintain waterflow from Blackwater Pond to Northern Duarte's Pond.

Bank Erosion

Fishing pressure in certain areas along the bank of Duarte's Pond resulted in bank erosion. Stabilizing the eroded banks is important to minimize erosion of sediment into the Pond.

Dam Safety

The integrity of the dams and spillways at Blackwater Pond Reservation affects several natural resources of the reservation. Failure of the dams if not properly maintained would result in the disappearance of Duarte's, Blackwater, and Homestead Ponds. The ponds would turn into vegetated wetlands or wet meadows with Blackwater Brook meandering through. Such an event would be disruptive to wildlife that depends on the pond and its wet, marshy surroundings. Conversion of the ponds to some other type of wetland would displace the fish, ducks and herons that find it such desirable foraging and breeding habitat.

3. Sociological Context

Blackwater Pond Reservation is near the town line between West Tisbury and Tisbury and is nestled among acres of conserved land. The reservation is situated off scenic Lambert's Cove Road. It is the location of the annual children's fishing derby. Many hundreds of children wake hours before the first light of day to stake out their spot along the shoreline of Duarte's Pond the morning of the derby. The reservation is located near Ripley's Field Preserve and Horatio Norton Farm with trail connections to each. Blackwater Pond Reservation offers moderate-distance hikes and is a link to other conservation properties.

4. Neighborhood Concerns

The land bank considers the concerns of neighbors as part of the planning process. All abutting property owners 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 West Tisbury 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 West Tisbury town advisory board, or may simply contact land bank staff.

Neighborhood concerns may include unauthorized nighttime use of the reservation, inadequate water levels for swimming, eutrophication of Duarte's Pond, loitering, vandalism, trespassing and unauthorized use of private boats from private property. The land bank has addressed such problems on other properties through regular patrol and checking of properties, periodic nighttime checks, clear posting of boundaries, hours of use and property rules, and by cooperation with the local police department.

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 use of natural resources with protection of the same.

2. Goals at Purchase

The purchase of Blackwater Pond Reservation meets six of the land bank's nine criteria for property acquisition: forest land, pond frontages, scenic vistas, wildlife habitats, trails, and sites for passive recreation. Preliminary management plans were adopted by the land bank commission and West Tisbury town advisory board and are attached as Appendix E, p. 95.

3. Opportunities

Access	Access to Blackwater Pond Reservation is by the existing 10-vehicle trailhead off Lambert's Cove Road.
Birding	The reservation offers good opportunities to observe birds. Existing trails offer pond vistas from the causeway and pond shoreline.
Boating	Canoes, rowboats and kayaks may be launched at Duarte's Pond with little difficulty. Heavy use of the property for boating could disrupt or drive away birds that breed on the reservation in areas that are difficult to access on foot but less difficult to access over the water. The shallowness of the pond perhaps has limited boating from becoming a major use of Duarte's Pond. The only public boat access to Blackwater Pond would be via the portage of non-motorized boats along a trail approximately a quarter of a mile long.

Causeway	An earthen causeway bisects Duarte's Pond. There are two breaks in the causeway. Raised boardwalk would need to be constructed over the breaks to allow access to Blackwater Pond from the trailhead.
Fishing	Duarte's Pond is a fine place to fish. The lightly vegetated shoreline offers anglers a wide area from which to cast that is free of overhead branches in many areas. Some of these popular fishing locations have eroded banks as a result of the fishing pressure. Stabilizing these banks and providing universal access to them would control the erosion and allow more people to enjoy them. The small dock also offers anglers a place from which to cast. Replacing the dock with a universally accessible dock would allow others to enjoy the benefits of fishing from a pier. Blackwater Pond and Homestead Pond have had no public access for fishing until this time. Shoreline fishing there would be a challenge due to the density of shrubs and abundance of overhanging trees. A portion of Turtle Pond along Ben Chase Road is free of shrubs and has shoreline fishing opportunities.
Fuelwood	The reservation has adequate acres to be managed under some type of community woodlot program if the need arose.
Historical	Both the manipulation of Blackwater Brook to create the ponds and the use of the reservation as one of the first cultivated cranberry bogs are fine displays of the skill and industry of earlier inhabitants of the island. Future repair work on dams and spillways should be designed to reproduce this stonework and craftsmanship.
Garage shop	The two-bay garage serves as a centrally located maintenance shop for the land bank staff. The entrance drive could be reworked to increase safety. However, reworking the drive may not be necessary if the primary shop is relocated to an alternative property and the Blackwater Pond Reservation shop is used as a satellite shop in the future.
Trails	The only existing trail at Blackwater Pond Reservation provides access to Duarte's Pond and can be expanded. A universally-accessible (UA) trail can be created that runs from the existing trailhead to a UA fishing platform and on to a bench with views of the Southern Duarte's Pond. A passive recreation trail can be constructed across the causeway with the use of two boardwalks. Activating a trail agreement from The Nature Conservancy would bring the trail to Blackwater Pond where a series of two loop trails can be constructed with views of Blackwater Pond, Homestead Pond, the steep topography, the shrub swamp, vernal pools and Turtle Pond. Additional trail easements would link the reservation to Horatio Norton Farm. Existing ancient ways would link the reservation to Ripley's Field Preserve.
Toilets	Due to the popularity of this property for fishing and the use as a UA property a portalet of sorts would be useful in the mowed grassland area during the summer season. The existing septic system may be used if a permamnt toilet is installed.

Vandalism, freezing pipes, cleaning and maintenance are all concerns regarding the installation of a permamnt toilet.

Views Views exist along the shoreline of Duarte’s Pond. A new trail that would proceed along Blackwater Pond and through the reservation can offer intimate views of the ponds from the shore and sweeping views from ridges that overlooking Blackwater Pond, Homestead Pond, and Turtle Pond.

4. Universal Access

The area around Duarte’s Pond is well suited for universal accessibility. The reservation’s ROS (‘Recreation Opportunities Spectrum’) classification is “more-developed.” 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 Blackwater Pond Reservation as follows.

Property Name:	Blackwater Pond Reservation
Size:	106 acres.
Primary Activities:	fishing, boating, birding, hiking, picnicking and horseback riding.
Primary Elements:	two sign stations and trailhead.
Primary Spaces:	pond views, swamp views.
Obstacles that Limit Accessibility:	steep slope, wetlands and distance from trailhead.
Existing or Potential Alternatives:	Priester’s Pond Preserve, Manaquayak Preserve.
Proposed ROS Classification:	more-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.

Vehicle parking for Blackwater Pond Reservation is proposed off the Lambert’s Cove Road at the existing trailhead for Duarte’s Pond. Two of the twelve trailhead spaces would be reserved for vehicles with a universal access placard. The grassy terrain adjacent to Northern Duarte’s Pond is relatively flat. Approximately 680 feet of universal access trail is possible from the trailhead to a stabilized fishing area along the bank, through the mowed grass to a universal access fishing platform and then on to another stabilized fishing area along the bank. Universal access to Blackwater Pond and beyond would be difficult due to extreme slopes and areas of saturated soils.

The following two tables address compliance with the Universal Access Plan (Table 11, Table 12). The first lists features of Blackwater Pond Reservation (“primary elements and spaces”), their

distance from the trailhead, and possible obstacles to making these features accessible. The second table is a checklist for compliance with objectives of the Universal Access Plan.

Table 11. Primary Elements and Spaces at Blackwater Pond Reservation

<u>Primary Element or Space</u>	<u>Distance from offsite trailhead (feet)</u>	<u>Conflict for trailhead linking</u>	<u>Overcome conflict</u>
1. trailhead	0	none	-
2. sign station	15	none	-
3. Duarte's Pond	100	none	-
4. Blackwater Pond	10,000	surface, distance	no
5. Turtle Pond	31,000	surface, slope, distance	no
6. Homestead Pond	23,000	surface, slope, distance	no
7. shrub swamp	27,000	surface, slope, distance	no

Table 12. Universal Access Plan Compliance Checklist for Blackwater Pond Reservation, West Tisbury, MA.

<u>Objective</u>	<u>Expected Degree of Compliance</u>	<u>Reason for non-compliance</u>
1. ROS Category	100%	None
2. Solicit opinion	100%	None
3. Inform public	100%	None
4. Parking	100%	None
5. Toilets	100%	None
6. More-developed trails	100%	None
7. Less-developed trails	0%	Elements are inaccessible due to distance.
8. Facilities	0%	Facilities nearby in town center.
9. Chemicals	100%	None
10. Site information	100%	None

IV. Land Management Planning

This final section of the management plan states goals for Blackwater Pond Reservation 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

Goal: Provide long-term protection for plants, animals and natural processes occurring at Blackwater Pond Reservation.

Objective 1: Protect and encourage rare and endangered species on the reservation.

Strategies:

- A. Monitor the property for rare plants and animals during regular property checks.
- B. If an endangered species is found, devise and implement a strategy to protect and encourage its population.

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

Strategies:

- A. Implement reasonable recommendations made by a civil engineer on how to best maintain dams and spillways to reduce the likelihood of dam failure.
- B. Manage dam according to reasonable recommendations made by the engineer, taking into consideration risk and benefits to the property and wildlife.
- C. Maintain new 10-foot culvert under Ben Chase Road between Ben Chase Swamp and Turtle Pond free from debris.
- D. Monitor the process of eutrophication in ponds as deemed necessary by the land bank staff using depth gauges and basic water quality analysis (temperature, pH, dissolved oxygen, nutrients and chlorophyll a) three times per year.
- E. Pursue dredging Northern Duarte's Pond and channeling through Southern Duarte's Pond, if necessary, to set back eutrophication and to maintain adequate water levels for native fish survival.
- F. Strengthen earthen dams, where necessary, to reduce the likelihood of dam failure and pond drainage.
- G. Manage invasive vegetation.
- H. Reroute trails if passive recreational use is disturbing to nesting wildlife species.
- I. Use raised boardwalks where appropriate to minimize impacts on wetlands.

Objective 3: Reduce and control erosion of trails, dirt roads, and pond shorelines.

Strategies:

- A. Install water bars where necessary.
- B. Reroute or temporarily close trails and roads where necessary.

- C. Stabilize and if necessary, revegetate, eroded pond shore areas.
- D. Prohibit horses and bicycle riding (allow bicycles to be walked) from Blackwater Pond trail using signs and stiles where necessary. See Site Management Map.

Objective 4: Protect the value of the reservation as breeding habitat for waterfowl and promote habitat characteristics that make the reservation desirable to fish and migrating and breeding wildlife.

Strategies:

- A. Retain snags in woodland where these trees do not pose unacceptable safety or fire hazard.
- B. Retain perching trees along edges of ponds and mowed grassland.
- C. Retain overhanging trees along pond shores providing they are not invasive species and they do not pose a significant risk to the stability of a dam.
- D. Maintain berry-producing shrubland and cultivated blueberry patch.
- E. Construct wood duck nesting boxes in appropriate areas.
- F. Limit human use in Blackwater Pond by limiting boat access through portage along proposed land bank trails only.
- G. Require dogs to be leashed during waterfowl nesting season from April 15 through July 30, approximately.

Objective 5: Manage invasive species and succession.

Strategies:

- A. Cut or uproot invasive species such as white water lily, Japanese knotweed and oriental bittersweet.
- B. Monitor for re-growth and continue to cut or uproot invasive plants.
- C. Pursue controlling the water level in ponds by using the dams or dredging.
- D. Post signs regarding the transfer of invasive weeds from pond to pond via boats and encourage boats be rinsed prior to use in the ponds.

Objective 6: Maintain existing plant communities to provide a range of habitat requirements to wildlife species.

Strategies:

- A. Maintain the reservation in its present wooded and wetland state.
- B. Mow grassy shoreline along Duarte's Pond on a regular basis during mowing season to retain park-like setting.
- C. Monitor changes in vegetative cover during regular property checks and by updating ecological inventory by 2015.

Objective 7: Reduce forest fire danger in pitch pine woodlands.

Strategies:

- A. Monitor for and reduce "ladder" fuels.
- B. Prohibit open flame fires on the reservation.

B. Recreation and Aesthetics

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

Objective 1: Create and maintain intimate views of the Ben Chase Swamp and Blackwater, Turtle, Duarte's and Homestead Ponds from the trails.

Strategies:

- A. Trim back vegetation along discrete areas of Blackwater, Turtle, Duarte's and Homestead Ponds and the Ben Chase Swamp to create intimate views of the ponds and shrub swamp from the proposed trail system.
- B. Maintain views of Turtle Pond from Ben Chase Road.
- C. Remove boat storage rack on Northern Duarte's Pond.

Objective 2: Maintain and upgrade the existing 10-vehicle trailhead off Lambert's Cove Road.

Strategies:

- A. Create additional parking for two UA vehicles.
- B. Create UA sign station to replace existing sign station at Duarte's Pond.
- C. Consider creating an additional 3-vehicle trailhead off Ben Chase Road.

Objective 3: Upgrade existing trail system and designate a portion of it to be universally-accessible, as shown on Site Management Map.

Strategies:

- A. Work with Massachusetts Public Access Board to create universally accessible fishing in Northern Duarte's Pond.
- B. Upgrade the trail from the trailhead to a fishing area along Northern Duarte's Pond with a bench so as to meet standards for a "recreation access route" as defined in the land bank universal access plan.
- C. Upgrade existing dock on Northern Duarte's Pond to one that is universally accessible.
- D. Stabilize bank in areas along Northern Duarte's Pond and harden areas for universally accessible bank fishing.
- E. Comply with universal access standards for a more-developed property where possible.
- F. Install a universally accessible-portalet.
- G. Build a permanent toilet and use existing septic system if land bank staff deems the portalet to be inadequate.
- H. Check and maintain trails monthly.

Objective 3: Expand existing trail system providing a loop trail back to the trailhead and links to other conservation areas.

Strategies:

- A. Create trail network as shown on the Site Management Map.
 - a. Make trail corridors six feet wide and eight to ten feet tall when possible.
 - b. Free trails of rocks, roots, and other obstacles where practical.

BLACKWATER POND MANAGEMENT PLAN

- c. Install erosion control measures where needed.
 - d. Mark trails with colored markers.
- B. Use raised and rustic boardwalks wherever necessary to traverse wetlands (approximately 1600' of wetlands impacted). See Site Management Map.
- C. Construct a raised boardwalk without rails to bridge the gap in the causeway across Duarte's Pond to allow foot traffic across the pond and to allow non-motorized boats to portage over the boardwalk.
- D. Install a sign station in the southern portion of the reservation as shown on Site Management Map.
- E. Minimize need for signs and railings.
- F. Allow land bank staff discretion to close or relocate trails or add new trails, such as spur trails for off-property trail connections.
- G. Install fencing, signs, minimal railings, or screening as necessary to prevent trespassing or undesirable off-trail travel.
- H. Allow multiple uses of trails where appropriate by walkers, equestrians, riders of non-motorized bicycles and cross-country skiers.
- I. Prohibit use of motorized vehicles, such as dirt bikes and all-terrain vehicles, on the reservation.
- J. Instruct cyclists to dismount and walk their bicycles over the Nature Conservancy trail agreement area and the trail along Blackwater Pond.
- K. Check and maintain trails monthly.
- L. Prohibit horses from the Blackwater Pond trail. See Site Management Map.

Objective 4: Pursue the removal of any and all overhead wires.

Strategies:

- A. Consult with the power company and phone company to remove wires.
- B. Consult with a certified and insured electrician to remove any and all wires.

BLACKWATER POND MANAGEMENT PLAN

Objective 5: Entertain possibilities for other trail links.

Strategies:

- A. Activate trail easements with access to existing conservation areas.
- B. Keep existing trail easements fallow if they do not connect directly to a conservation area; once connection is made, exercise easements.
- C. Maintain existing links to other conserved properties.
- D. Create links to other conserved land.

Objective 6: Abide by West Tisbury town dog bylaws.

Strategies:

- A. Allow unleashed dogs provided they are within voice control throughout the year, with the exception of waterfowl breeding season (April 1 through July 30, approximately) during which all dogs are required to be leashed.
- B. Encourage visitors to clean up after their pets.

Objective 7: Discourage boating in Blackwater, Homestead and Turtle Ponds due to pond depths and size and in order to limit disturbance to nesting waterfowl and migratory birds.

Strategies:

- A. Post signs that inform the public of the value of waterfowl nesting habitats and the disturbance caused by boating.
- B. Allow portage only of non-motorized boats across the Nature Conservancy trail agreement for access to Blackwater Pond from land bank property.

Objective 8: Maintain all dams and sluiceways in their attractive, historical condition.

Strategies:

- A. Repair stone face of dams and sluiceways where visible and necessary.
- B. Ensure that repair work on dam restores the original stone masonry or is a historically accurate replica.

Objective 9: Allow skating in Blackwater, Northern and Southern Duarte's, and Turtle Ponds.

Strategies:

- A. Post sign on sign station and at each pond that states, "skate at your own risk".
- B. Prohibit skating at Homestead Pond due to the unusual depth of the pond.

C. Natural Products

Goal: Allow fishing throughout; allow category "B" hunting on a portion of the reservation.

Objective 1: Allow fishing in Blackwater, Northern and Southern Duarte's, Homestead and Turtle Ponds.

Strategies:

- A. Allow fishing from the shoreline of the ponds providing shoreline vegetation does not degrade.
- B. If fishing degrades shoreline vegetation designate areas for fishing, stabilize the bank

and install rustic boardwalks where necessary.

Objective 2: Allow category “B” hunting south of Duarte’s Pond.

Strategies:

- A. Allow category “B” hunting on the portion of the reservation south of the earthen dam between Blackwater and Southern Duarte’s Pond. See Site Management Map.
- B. Post “no hunting” signs on either end of the Nature Conservancy trail agreement area.
- C. Prohibit waterfowl hunting on Northern and Southern Duarte’s Pond, Turtle Pond, and Homestead Ponds.
- D. Post hunting regulations clearly at all sign stations during hunting seasons.

Objective 3: Prohibit camping.

Strategies:

- A. Prohibit camping on the reservation unless special permission is granted by the land bank commission.
- B. Post “closed at dark” signs on the sign stations.

D. Community Interaction

Goal: Provide helpful and interesting information about the property for visitors; allow educational use of the property.

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

Strategies

- A. Mark the property on land bank map and provide directions.
- B. Maintain land bank logo marker on Lambert’s Cove Road.
- C. Limit trespassing by marking boundaries as trails meet them.
- D. Install gates or fencing as needed.
- E. Maintain boulders at the intersection of Mott’s Hill Road and Ben Chase Road and elsewhere as needed, to prohibit vehicular trespassing on land bank properties.
- F. Provide directions to nearby conservation land.
- G. Post map of property and trails on sign stations.
- H. Plant vegetation where necessary that blends in with the natural context of its environs to define and screen the boundaries where residential dwellings are visible from the trail.

Objective 2: Provide useful and interesting information about the property and its surroundings.

Strategies:

- A. Post information about the history of the area, wetland significance and the animals, plants and natural processes occurring on the property.
- B. Maintain a copy of this plan at the land bank office and the West Tisbury library and conservation commission if they wish to have a copy.

Objective 3: Post signs that explain the rules of property.

Strategies

- A. Quote the town dog bylaws and post the reservation dog policy.
- B. Post the hours that the reservation is open.
- C. Post the activities allowed and prohibited on the reservation.

E. Land Administration

Goal: Maintain, oversee and police the reservation.

Objective 1: Comply with all applicable regulations.

Strategies:

- A. Comply with wetlands protection act.
- B. Comply with any applicable local conservation by-laws and zoning regulations.
- C. File a notice of intent with the West Tisbury Conservation Commission regarding areas of bank stabilization, improvements to the existing pier and the trail system that is within the resource area and bordering buffer zone.

Objective 2: Regulate use by maintaining set hours.

Strategies:

- A. Open property every day of year from one half-hour before sunrise to one half-hour after; except close the property to the non-hunting public during the deer shotgun season.
- B. Allow nighttime use only with special permission from land bank commission.

Objective 3: Keep well-maintained boundaries and monitor for encroachment.

Strategies:

- A. Locate corners and walk boundaries annually.
- B. Post boundaries with land bank boundary markers.
- C. Keep photographic record of corners.
- D. Work to correct any encroachments.

Objective 4: Monitor past encroachments and building restrictions.

Strategies:

- A. Monitor properties periodically to check compliance with terms of restrictions.
- B. Bring inconsistencies or matters of non-compliance to the attention of the land bank commission.

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: Employ adequate staff to effectively implement land management goals.

Strategies:

- A. Inspect property at least monthly.

- B. Promptly respond to problems.
- C. Monitor property as needed in accordance with land bank patrol policy.

Objective 7: Develop good working relationships with neighbors.

Strategies:

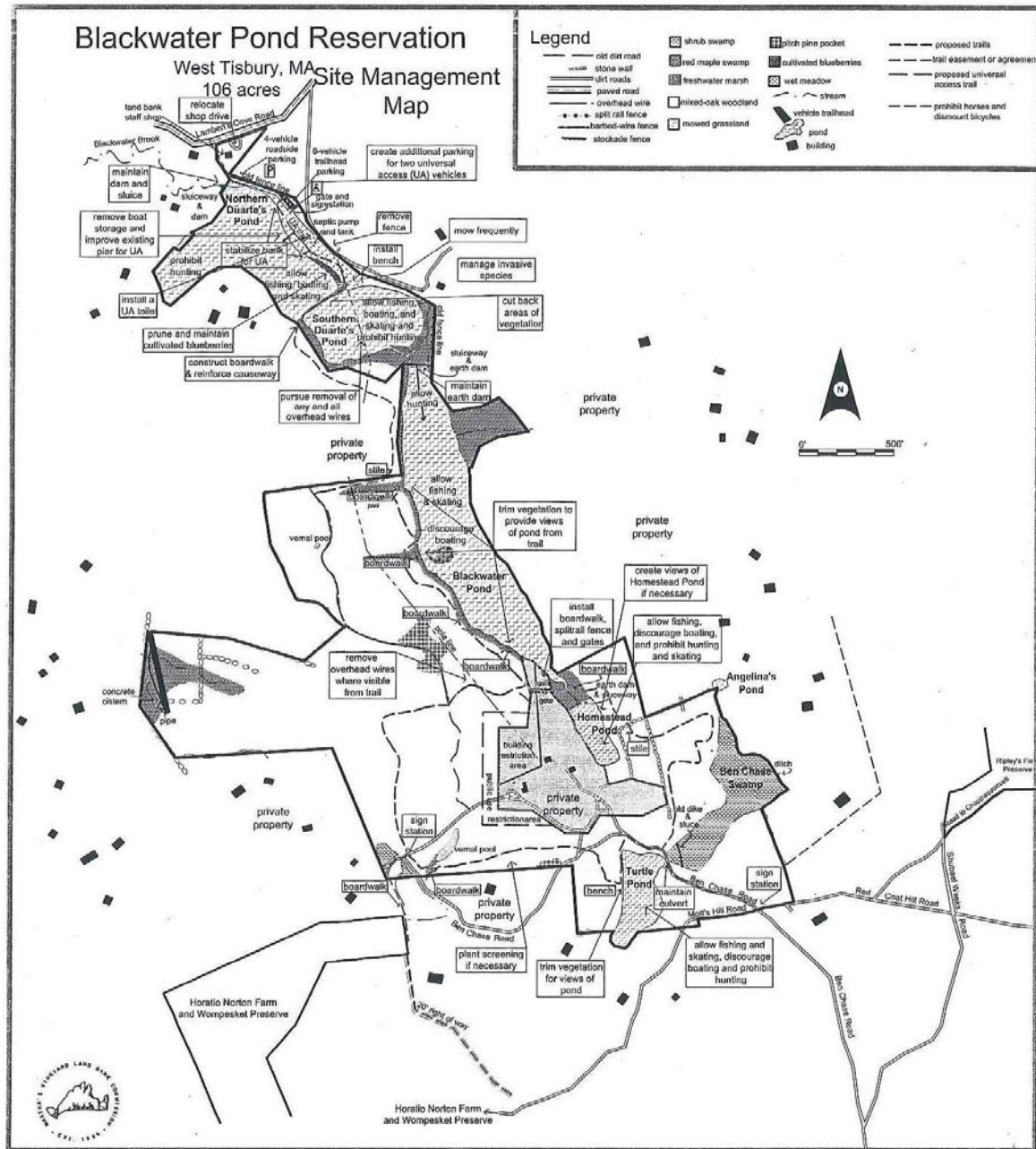
- A. Consider neighborhood requests for signs, fencing, screening, etc. to prevent trespass.
- B. Promptly respond to questions and address concerns.
- C. Screen shop from Lambert's Cove Road and from trailhead access drive.

Objective 8: Improve safety of access to land bank maintenance shop.

Strategies:

- A. Relocate loop drive as shown on Site Management Map.
- B. Consider relocating primary shop to an alternative property and use existing shop as a satellite shop.

V. Site Management Map



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Appendix A: Deeds, Agreements and Easements

Deeds, agreements and easements are filed at the land bank office for public review.

Appendix B: Taxonomic List of Plants at Blackwater Pond Reservation, West Tisbury, MA

Kingdom Plantae

Division Bryophyta (Mosses and Liverworts)

Anomodontaceae

Anomodon attenuatis a tree moss

Entodontaceae

Entodon sp. a tree moss

Polytrichaceae

Polytrichum juniperinum a haircap moss

Dicranaceae

Dicranum scoparum wind blown moss

Thuidiaceae

Thuidium recognitum fern moss

Sphagnidaceae

Sphagnum centrale a sphagnum

Division Hepatophyta (Liverworts)

Cephaloziaceae

Cephalozia lunulifolia liverwort

Adelanthaceae

Odontoschisma prostratum liverwort

Division Lichenes (Lichen)

Usneaceae

Usnea strigosus tree lichen

Division Polypodiophyta (Ferns)

Aspleniaceae (Spleenwort Family)

Thylypteris noveboracensis New York fern
Thylypteris simulata Massachusetts fern
Thylypteris palustris marsh fern
Dryopteris intermedia fancy fern

Blechnaceae (Deer-fern Family)

Woodwardia virginica Virginia chain fern

Dennstaedtiaceae (Bracken Family)

Dennstaedtia punctilobula

hay-scented fern

Pteridium aquilinum

bracken fern

Onocleaceae (Sensitive Fern Family)

Onoclea sensibilis

sensitive fern

Osmundaceae (Royal Fern Family)

Osmunda cinnamomea

cinnamon fern

Osmunda regalis

royal fern

Division Lycopodiophyta (non-seed vascular plants)

Lycopodiaceae (Clubmoss Family)

Lycopodium sp.

a clubmoss

Division Pinophyta (Gymnosperms)

Cupressaceae (Cypress Family)

Juniperus virginiana

eastern red cedar

Pinaceae (Pine Family)

Picea glauca

white spruce

Pinus rigida

pitch pine

Pinus strobus

white pine

Division Magnoliophyta (Angiosperms)

Aceraceae (Maple Family)

Acer rubrum

red maple

Agavaceae (Agave Family)

Yucca filamentosa

yucca

Anacardiaceae (Cashew Family)

Rhus copallinum

shining sumac

Toxicodendron vernix

poison sumac

Toxicodendron radicans

poison-ivy

Apiaceae (Carrot Family)

Heracleum lanatum

cow parsnip

Daucus carota

Queen Anne's lace

Apocynaceae (Dogbane Family)

Vinca minor

periwinkle

Aquifoliaceae (Holly Family)

<i>Ilex opaca</i>	American holly
<i>Ilex verticillata</i>	winterberry
Araceae (Arum Family)	
<i>Arisaema triphyllum</i>	jack-in-th-pulpit
Araliaceae (Ginseng Family)	
<i>Aralia nudicaulis</i>	wild sarsparilla
<i>Hedera helix</i>	English ivy
Asclepiadaceae (Milkweed Family)	
<i>Asclepias incarnata</i>	downy swamp milkweed
Asteraceae (Aster Family)	
<i>Achillea millefolium</i>	common yarrow
<i>Aster dumosus</i>	bushy aster
<i>Aster divaricatus</i>	white wood aster
<i>Aster novi-belgii</i>	New York aster
<i>Aster paternu</i>	narrow-leaved white-topped aster
<i>Aster spectabilis</i>	showy aster
<i>Aster racemosus</i>	small white aster
<i>Aster undulatus</i>	wavy-leaved aster
<i>Bidens connata</i>	swamp beggar ticks
<i>Bidens frondosa</i>	beggar ticks
<i>Chicorium intybus</i>	chicory
<i>Chrysanthemum leucanthemum</i>	oxeye daisy
<i>Cirsium vulgare</i>	bull thistle
<i>Conyza canadensis</i>	horseweed
<i>Erigeron strigosus</i>	daisy fleabane
<i>Eupatorium dubium</i>	eastern joe-pye weed
<i>Eupatorium hyssopifolium</i>	hyssop-leaved boneset
<i>Eupatorium maculatum</i>	spotted joe-pye-weed
<i>Euthamia graminifolia</i>	grass-leaved goldenrod
<i>Euthamia tenuifolia</i>	slender-leaved goldenrod
<i>Gnaphalium obtusifolium</i>	sweet everlasting
<i>Hypochoeris radicata</i>	cat's ear
<i>Prenanthes trifoliatus</i>	fall rattlesnake root
<i>Rudbeckia hirta</i>	black-eyed susan
<i>Solidago bicolor</i>	silverrod
<i>Solidago elliotii</i>	Elliott's goldenrod
<i>Solidago juncea</i>	early goldenrod
<i>Solidago odora</i>	sweet goldenrod
<i>Solidago nemoralis</i>	grey goldenrod
<i>Solidago rugosa</i>	rough-stemmed goldenrod

<i>Sonchos oleraceus</i> <i>Taraxacum officinale</i>	common sow thistle common dandelion
Balsaminaceae (Touch-me-not family) <i>Impatiens capensis</i>	spotted touch-me-not
Betulaceae (Birch Family) <i>Corylus americana</i> <i>Betula populifolia</i> <i>Ostrya virginiana</i>	American hazelnut grey birch hop hornbeam
Brassicaceae (Mustard Family) <i>Cardamine pensylvanica</i>	common bittercress
Caprifoliaceae (Honeysuckle Family) <i>Lonicera cf. morrowii</i> <i>Lonicera japonica</i> <i>Sambucus canadensis</i> <i>Viburnum dentatum</i>	Morrow's honeysuckle Japanese honeysuckle elderberry southern arrowwood
Caryophyllaceae (Pink Family) <i>Cerastium fontanum</i> <i>Dianthus armeria</i> <i>Silene latifolia</i>	mouse-ear chickweed depfords pink white campion
Celastraceae (Stafftree Family) <i>Celastrus orbiculatus</i>	oriental bittersweet
Cistaceae (Rock-rose Family) <i>Helianthemum propinquim</i>	creeping rockrose
Clethraceae (Clehra Family) <i>Clethra alnifolia</i>	sweet pepperbush
Clusiaceae (Mangosteen Family) <i>Hypericum perforatum</i> <i>Hypericum mutilum</i> <i>Triadenum virginicum</i>	common St. Johnswort dwarf St. Johnswort marsh St. Johnswort
Cornaceae (Dogwood Family) <i>Cornus amomum</i> <i>Nyssa sylvatica</i>	silky dogwood "beetlebung", black gum
Cuscutaceae (Dodder Family)	

<i>Cuscuta sp.</i>	dodder
Cyperaceae (Sedge Family)	
<i>Carex atlantica var. capillaceae</i>	threadstem
<i>Carex bebbii</i>	Bebb's broom sedge
<i>Carex brunnescens</i>	a sedge
<i>Carex hystericina</i>	a sedge
<i>Carex intumescens</i>	swamp sedge
<i>Carex longii</i>	long's sedge
<i>Carex lurida</i>	sallow sedge
<i>Carex pensylvanica</i>	Pennsylvania sedge
<i>Carex swanii</i>	swan's sedge
<i>Carex stricta</i>	tussock sedge
<i>Cyperus strigosus</i>	straw-colored flatsedge
<i>Cyperus esculentus</i>	yellow flatsedge
<i>Dulichium arundinaceum</i>	threeway sedge
<i>Eleocharis obtusa</i>	blunt spikesedge
<i>Rhynchospora capitellata</i>	brown beaksedge
<i>Rhynchospora glomerata</i>	clustered beaksedge
<i>Scirpus cyperinus</i>	wool grass
<i>Scirpus pungens</i>	chairmaker's rush
<i>Scirpus validus</i>	a sedge
Droseraceae (Sundew Family)	
<i>Drosera rotundifolia</i>	round-leaved sundew
Elaeagnaceae (Oleaster Family)	
<i>Elaeagnus angustifolia</i>	Russian olive
Ericaceae (Heath Family)	
<i>Arctostaphylos uva-ursi</i>	bearberry
<i>Epigaea repens</i>	trailing arbutis
<i>Gaultheria procumbens</i>	wintergreen
<i>Gaylussacia baccata</i>	black huckleberry
<i>Gaylussacia frondosa</i>	dangleberry
<i>Kalmia angustifolia</i>	sheep laurel
<i>Lyonia ligustrina</i>	maleberry
<i>Rhododendron viscosum</i>	swamp azalea
<i>Rhododendron sp.</i>	rhododendron
<i>Vaccinium angustifolium</i>	late lowbush blueberry
<i>Vaccinium corymbosum</i>	highbush blueberry
<i>Vaccinium macrocarpon</i>	cranberry
<i>Vaccinium pallidum</i>	lowbush blueberry

Fabaceae (Bean Family)

Lotus corniculatus
Robinia pseudo-acacia

birdsfoot trefoil
black locust

Fagaceae (Beech Family)

Fagus grandifolia
Quercus alba
Quercus coccinea
Quercus velutina
Quercus ilicifolia

American beech
white oak
scarlet oak
black oak
scrub oak

Grossulariaceae (Gooseberry Family)

Ribes sp.

gooseberry

Iridaceae (Iris Family)

Iris versicolor
Sisyrinchium atlanticum

blue flag iris
Eastern blue-eyed grass

Juglandaceae (Walnut Family)

Carya glabra

pignut hickory

Juncaceae (Rush Family)

Juncus effusus
Juncus marginatus
Juncus tenuis
Luzula sp.

soft rush
a rush
path rush
woodrush

Lamiaceae (Mint Family)

Lycopus uniflorus
Physostegia virginiana

common water horehound
false dragonhead

Lauraceae (Laurel Family)

Lindera benzoin
Sassafras albidum

spicebush
sassafras

Lemnaceae (Duckweed Family)

Lemna minor

duckweed

Liliaceae (Lily Family)

Convallaria majalis
Hypoxis hirsuta
Maianthemum canadense
Medeola virginiana
Smilacina racemosa

lily-of-the-valley
yellow star grass
Canada mayflower
indian cucumber-root
false solomon's seal

Lythraceae (Loosestrife Family)

Decodon verticillatus

Lythrum salicaria

water willow

purple loosestrife

Magnoliaceae (Magnolia Family)

Liriodendron tulipifera

tulip tree

Melastomataceae (Melastome Family)

Rhexia virginica

meadow-beauty

Monotropaceae (Indian Pipe Family)

Monotropa uniflora

indian pipe

Myricaceae (Bayberry Family)

Myrica pennsylvanica

bayberry

Nymphaeaceae (Water-Lily Family)

Nymphaea odorata

white water-lily

Oleaceae (Olive Family)

Forsythia suspensa

forsythia

Onagraceae (Evening-primrose Family)

Epilobium ciliatum

Oenothera biennis

glandular willow herb

common evening primrose

Orchidaceae (Orchid Family)

Cypripedium acule

Spiranthes cernua

pink lady's slipper

nodding ladies' tresses

Oxalidaceae (Wood Sorrel Family)

Oxalis stricta

yellow wood sorrel

Plantaginaceae (Plantain Family)

Plantago lanceolata

Plantago major

English plantain

common plantain

Poaceae (Grass family)

Andropogon virginicus

Anthoxanthum odoratum

Dactylis glomerata

Danthonia spicata

Deschampsia flexuosa

broomsedge

sweet vernal grass

orchard grass

poverty grass

hairgrass

<i>Dichanthelium columbiaenum</i>	deer tongue grass
<i>Glyceria obtusa</i>	coastal mannagrass
<i>Holcus lanatus</i>	velvetgrass
<i>Panicum virgatum</i>	switchgrass
<i>Schizachyrium scoparium</i>	little bluestem
<i>Spartina pectinata</i>	freshwater cordgrass
<i>Leersia oryzoides</i>	blunt mannagrass
Polygalaceae (Milkwort Family)	
<i>Polygala cruciata</i>	crossleaf milkwort
Polygonaceae (Smartweed Family)	
<i>Polygonum cuspidatum</i>	Japanese knotweed
<i>Polygonum punctatum</i>	water smartweed
<i>Polygonum scandens</i>	climbing false buckwheat
<i>Rumex crispus</i>	curled dock
<i>Rumex acetostella</i>	field sorrel
Primulaceae (Primrose Family)	
<i>Lysimachia quadrifolia</i>	whorled loosestrife
<i>Lysimachia terrestris</i>	swamp candles
<i>Trientalis borealis</i>	starflower
Pyrolaceae (Shinleaf Family)	
<i>Chimaphila maculata</i>	striped wintergreen
Ranunculaceae (Buttercup Family)	
<i>Anemone quinquefolia</i>	wood anemone
<i>Ranunculus sp.</i>	a buttercup
Rosaceae (Rose Family)	
<i>Amelanchier sp.</i>	a shadbush
<i>Aronia arbutifolia</i>	red chokeberry
<i>Aronia cf. melanocarpa</i>	black chokeberry
<i>Geum laciniatum</i>	rough avens
<i>Fragaria vesca</i>	woodland strawberry
<i>Prunus maritima</i>	beach plum
<i>Prunus serotina</i>	black cherry
<i>Potentilla canadensis</i>	dwarf cinquefoil
<i>Potentilla simplex</i>	common cinquefoil
<i>Pyrus communis</i>	pear
<i>Pyrus malus</i>	apple
<i>Rosa multiflora</i>	multiflora rose

<i>Rosa palustris</i>	swamp rose
<i>Rubus allegheniensis</i>	common blackberry
<i>Rubus flagellaris</i>	prickly dewberry
<i>Rubus hispidus</i>	bristly dewberry
<i>Rubus idaeus</i>	red raspberry
<i>Spiraea cf. latifolia</i>	broadleaf spiraea
Rubiaceae (Madder Family)	
<i>Cephalanthus occidentalis</i>	buttonbush
<i>Galium sp.</i>	a bedstraw
<i>Mitchella repens</i>	partridgeberry
Salicaceae (Willow Family)	
<i>Salix babylonica</i>	weeping willow
<i>Salix bebbiana</i>	beaked willow
<i>Salix discolor</i>	pussy willow
Scrophulariaceae (Figwort Family)	
<i>Gratiola aurea</i>	golden hedge hyssop
<i>Melampyrum lineare</i>	cowwheat
<i>Verbascum thapsus</i>	common mullein
<i>Veronica officinalis</i>	common speedwell
Smilacaceae (Catbrier Family)	
<i>Smilax glauca</i>	glaucous greenbrier
<i>Smilax rotundifolia</i>	common greenbrier
Solanaceae (Nightshade Family)	
<i>Solanum dulcamara</i>	bittersweet nightshade
Sparganiaceae (Bur-reed Family)	
<i>Sparganium angrocladum</i>	shining bur-reed
Typhaceae (Cat-tail Family)	
<i>Typha cf. latifolia</i>	common cattail
Ulmaceae (Elm Family)	
<i>Ulmus pumila</i>	Siberian elm
Violaceae (Violet Family)	
<i>Viola blanda</i>	sweet white violet
<i>Viola macloskeyi</i>	northern white violet
<i>Viola sagittata</i>	arrowhead violet
<i>Viola sororia</i>	LeConte's violet

Vitaceae (Grape Family)

Ampelopsis brevipedunculata

porcelainberry

Parthenocissis quinquefolia

Virginia creeper

Vitis aestivalis

summer grape

Vitis labrusca

fox grape

Xyridaceae (Yellow-eyed Grass Family)

Xyris torta

twisted yellow-eyed grass

Source: Gleason and Cronquist 1991, Hale 1979 and Conrad and Redfearn 1979.

Appendix C: Crustaceans, insects, spiders, and mammals at Blackwater Pond, West Tisbury, MA

Scientific name	Common name	Wetlands ^a	Woodland	Grassland
Kingdom Metazoa (Animalia)				
Phylum Arthropoda				
Subphylum Crustacea				
Class Malacostraca				
Order Anostraca				
Family Chirocephalidae: <i>Eubbranchipus cf. vernalis</i>	fairy shrimp	SP		
Order Isopoda				
Family Asellidae: species unknown	isopod	SP		
Class Insecta				
Order Coleoptera (beetles)				
Family Gyrinidae: unknown species	whirligig beetles	S		
Family Dytiscidae: species unknown	predacious diving beetle	SP		
Family Coccinellidae: <i>Coccinella sp.</i>	ladybird beetles	S	S	
Order Hymenoptera (sawflies, ants, wasps, and bees)				
Family Sphecidae: <i>Sceliphron caementarium</i>	mud dauber		SP	
Family Cynipidae: <i>Amphibolips confluenta</i>	oak apple gall wasp	SP	F	
Family Sphecidae: <i>Sphex ichneumoneus</i>	great golden digger wasp	S		
Family Sphecidae: <i>Chlorion sp.</i>	cricket killer wasp	S		
Family Vespidae: <i>Vespula sp.</i>	yellow jacket		F	
Family Apidae: <i>Bombus pennsylvanicus</i>	bumble bee		SP, S	
Order Lepidoptera (butterflies and moths)				
Superfamily Papilionoidea (butterflies)				
Family Arctiidae: <i>Hyphantria cunea</i>	fall webworm		SP	
Family Papilionidae: <i>Papilio troilus</i>	spicebush swallowtail	SP, S	SP	SP
Family Papilionidae: <i>Papilio glaucus</i>	tiger swallowtail	S		

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Scientific name	Common name	Wetlands ^a	Woodland	Grassland
Family Papilionidae: <i>Papilio polyxenes</i>	black swallowtail	S		
Family Lycaenidae: <i>Celastrina argiolus</i>	spring azure			SP
Family Lycaenidae: <i>Lycaena phlaeac</i>	American copper	SP, S	SP	SP
Family Hesperidae: <i>Epargyreus clarus</i>	silver-spotted skipper		S, SP	
Family Nymphalidae: <i>Coenonympha tullia</i>	common ringlet			S
Family Nymphalidae: <i>Cercyonis pegala</i>	common wood-nymph	S	S	
Family Nymphalidae: <i>Nymphalis antiopa</i>	mourning cloak	S	S	
Family Nymphalidae: <i>Satyrodes appalachia</i>	appalachian brown	S		
Family Lycaenidae: <i>Everes comyntas</i>	eastern tailed-blue	S	S	
Family Zygaenidae: <i>Harrisina americana</i>	grapeleaf skeletonizer	SP		
Family Saturniidae: <i>Actias luna</i>	luna moth			F
Family Noctuidae: <i>Alypia octomaculata</i>	eight-spotted forester		S, SP	
Order Diptera (flies)				
Family Culicidae: species unknown	mosquitoes	S, F	S, F	F
Family Tabanidae: <i>Chrysops sp.</i>	deer flies	SP, S	SP, S	
Order Collembola				
Family unknown: species unknown	springtails	SP		
Order Trichoptera				
Family unknown: species unknown	caddisfly	SP		
Order Odonata (damselflies and dragonflies)				
Family Aeschnidae: <i>Anax junius</i>	common green darner	SP, S		
Family Libellulidae: <i>Celithemis elisa</i> *	calico penant	S		
Family Libellulidae: <i>Sympetrum semicinctum</i>	band-winged meadowhawk	F		
Family Libellulidae: <i>Erythemis simplicicollis</i> *	eastern pondhawk	SP, S, F		
Family Libellulidae: <i>Libellula lydia</i> *	common whitetail	S		

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Scientific name	Common name	Wetlands ^a	Woodland	Grassland
Family Libellulidae: <i>Libellula pulchella</i> *	twelve-spotted skimmer	S		
Family Libellulidae: <i>Libellula saturata</i>	red skimmer	SP, S		
Family Libellulidae: <i>Libellula incesta</i> *	slaty skimmer	S, F		
Family Libellulidae: <i>Libellula exusta</i> *	white corporal	SP, S		
Family Libellulidae: <i>Perithemis tenera</i>	eastern amberwings	S		
Family Libellulidae: <i>Tamea carolina</i> *	Carolina saddlebags	S		
Family Libellulidae: <i>Tamea lacerata</i> *	black saddlebags	S		
Family Libellulidae: <i>Perithemis tenera</i> *	eastern amberwings	S, F		
Family Libellulidae: <i>Pachydiplax longipennis</i> *	blue dasher	S, F		
Family Lestidae: <i>Lestes disjunctus</i> *	common spreadwing	S		
Family Lestidae: <i>Lestes forcipatus</i> *	sweetflag spreadwing	S		
Family Lestidae: <i>Lestes congener</i> *	spotted spreadwing	S		
Family Aeshnidae: <i>Anax junius</i> *	green darner	S		
Family Coenagrionidae: <i>Enallagma traviatum</i> *	slender bluet	S		
Family Coenagrionidae: <i>Enallagma divagans</i> *	turquoise bluet	S		
Family Coenagrionidae: <i>Enallagma geminatum</i> *	skimming bluet	S		
Family Coenagrionidae: <i>Enallagma civile</i> *	familiar bluet	S		
Family Coenagrionidae: <i>Enallagma cyathigerum</i>	common bluet	SP, S		
Family Coenagrionidae: <i>Enallagma signatum</i> *	orange bluet	S		
Family Coenagrionidae: <i>Ischnura posita</i> *	fragile forktail	S		
Family Coenagrionidae: <i>Ischnura kellicotti</i> *	lilypad forktail	S		

BLACKWATER POND MANAGEMENT PLAN

Scientific name	Common name	Wetlands ^a	Woodland	Grassland
Family Coenagrionidae: <i>Argia fumipennis</i> *	variable dancer	S		
Family Cordulidae: <i>Epithea cynosure</i> *	Common baskettail	S		
Order Orthoptera (grasshoppers and crickets)				
Family Gryllidae: <i>Gryllus pennsylvanicus</i>	field cricket	SP		
Class Arachnida				
Order Opiliones				
Family Phalangidae: <i>Leiobunum sp.</i>	eastern daddy-long-legs		F	
Order Araneae				
Family Araneidae: <i>Argiope aurantia</i>	black-and-yellow argiope		SP, S	
Order Acarina				
Family Ixodidae: <i>Ixodes scapularis</i>	deer tick	S, SP	S, SP	S, SP
Phylum Chordata				
Subphylum Vertebrata				
Class Mammalia				
Order Lagomorpha				
Family Leporidae: <i>Sylvilagus floridanus</i>	eastern cottontail			W
Order Rodentia				
Family Sciuridae: <i>Sciurus carolinensis</i>	grey squirrel	SP, S, W	S, SP, W	
Family Sciuridae: <i>Tamias striatus</i>	eastern chipmunk	S	F	
Family Cricetidae: <i>Ondatra zibethica</i>	muskrat	SP		
Order Carnivora				
Family Mustelidae: <i>Mephitis mephitis</i>	striped skunk		S, F	
Family Mustelidae: <i>Lutra canadensis</i>	river otter	W		S
Family Felidae: <i>Felis catus</i>	feral cat			S
Family Canidae: <i>Canis familiaris</i>	domestic dog	S		
Order Artiodactyla				
Family Cervidae: <i>Odocoileus virginianus</i>	white-tailed deer	S	W, SP	
Class Reptilia				
Order Squamata				

BLACKWATER POND MANAGEMENT PLAN

Scientific name	Common name	Wetlands ^a	Woodland	Grassland
Family Colubridae: <i>Thamnophis sirtalis sirtalis</i>	eastern garter snake	F		
Family Colubridae: <i>Thamnophis sauritus sauritus</i>	eastern ribbon snake	F		
Order Caudata				
Family Plethodontidae: <i>Plethodon cinereus</i>	redback salamander	S, SP	S, SP	
Order Anura				
Family Hylidae: <i>Pseudocaris crucifer</i>	spring peeper	SP		
Family Hylidae: <i>Hyla versicolor</i>	grey tree frog	SP		
Family Ranidae: <i>Rana clamitans melanota</i>	green frog	SP, S		
Family Ranidae: <i>Rana palustris</i>	pickerel frog	SP		
Order Testudines				
Family Emydidae: <i>Chelysemys picta picta</i>	eastern painted turtle	SP, S		
Family Chelydridae: <i>Chelydra serpentina</i>	snapping turtle	S (nest)		
Class Osteichthyes				
Order Cypriniformes				
Family Cyprinidae: <i>Lythrurus umratalis</i>	redfin shiner	SP, S		
Order Salmoniformes				
Family Salmonidae: <i>Salvelinus fontinalis</i>	brook trout	SP		
Family Salmonidae: <i>Oncorhynchus mykiss</i>	rainbow trout	SP		
Order Esociformes				
Family Esocidae: <i>Esox niger</i>	chain pickerel	SP, S		
Order Siluriformes				
Family Ictaluridae: <i>Ameiurus nebulosus</i>	brown bullhead	SP, S		
Order Perciformes				
Family Centrarchidae: <i>Lepomis macrochirus</i>	bluegill	SP, S		

^aSeason of occurrence: SP = spring, S = summer, F = fall, W = winter.

*Appendix D, p. 91.

Appendix D: Summary of Personal Odonate Records for Duarte's Pond, West Tisbury

SUMMARY OF PERSONAL ODONATE RECORDS FOR DUARTE'S POND, WEST TISBURY
Prepared for the Martha's Vineyard Land Bank by Matthew L. Pelikan
December 21, 2005

The following is an annotated list of my odonate records for Duarte's Pond, West Tisbury. These records are all from the public-access area on the northwestern side of the pond. These records are highly incomplete: many casual sightings for the following species do not appear in these records, and due to casual record-keeping, some common and widespread species that I have observed at this pond do not appear here at all. An addendum, consisting of records from the adjoining Hoft Farm preserve, attempts a similar and summary of records from nearby ponds and uplands, hopefully contributing to a more complete picture of what odonates can be expected in this area. (Even at that, for one species that definitely occurs here in good numbers, Spangled Skimmer *Libellula cyanea*, I was unable to find any specific records for Duarte's Pond/Hoft Farm.)

Duarte's Pond (especially taken in conjunction with the Hoft Farm) is one of the Vineyard's best locations for odonates, with large numbers and good variety present throughout the season. With relatively little pond-side development, it seems likely that water quality is very good here, and the varying characteristics of the ponds and wetlands mean that a range of habitat types are present. To my knowledge, no state-listed odonates have been found here, but several of the species on the following list (notably two *Enallagma*) merit conservation attention because they appear to have very limited distribution on the Vineyard.

SLENDER BLUET (*Enallagma traviatum*)

Duarte's Pond is one of only two known location on the Vineyard for this species, though it is very possible that it has been overlooked elsewhere.

6/29/04	West Tisbury/Duarte's Pond	3+ ID by terminal appendages
7/9/04	West Tisbury/Duarte's Pond	3+, probably pretty common; ID by terminal appendages

TURQUOISE BLUET (*Enallagma divagans*)

Duarte's Pond is the only known location on the Vineyard for this species, though it is very possible that it has been overlooked elsewhere.

6/5/04	West Tisbury/Duarte's Pond	3+
6/29/04	West Tisbury/Duarte's Pond	1+ ID by terminal appendages
7/9/04	West Tisbury/Duarte's Pond	1 ID by terminal appendages

SKIMMING BLUET (*Enallagma geminatum*)

A widespread species on the Vineyard; common here but not as numerous here as at some other locations, e.g., Priester's Pond.

6/24/03	West Tisbury/Duarte's Pond	1
6/29/04	West Tisbury/Duarte's Pond	2+ ID by terminal appendages
7/9/04	West Tisbury/Duarte's Pond	1+ ID in hand

ORANGE BLUET (*Enallagma signatum*)

Local on the Vineyard; it is not known whether this species occurs regularly at Duarte's Pond.

7/9/04	West Tisbury/Duarte's Pond	1 m
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EASTERN (COMMON) FORKTAIL (*Ischnura verticalis*)

Probably the most widely distributed odonate on the Vineyard, and common almost everywhere it occurs. The following records greatly under-report the occurrence of this species at Duarte's Pond, where it is quite common.

6/24/03	West Tisbury/Duarte's Pond	c. 10
6/5/04	West Tisbury/Duarte's Pond	abundant

FRAGILE FORKTAIL (*Ischnura posita*)

Many casual sightings have gone unrecorded; while outnumbered by Eastern Forktail, here and at most locations, this species occurs at nearly all freshwater ponds on the Vineyard.

BLACKWATER POND MANAGEMENT PLAN

6/24/03 West Tisbury/Duarte's Pond 1

LILYPAD FORKTAIL (*Ischnura kellicotti*)

6/27/03 West Tisbury/Duarte's Pond 1
7/9/04 West Tisbury/Duarte's Pond fairly common

VARIABLE (VIOLET) DANCER (*Argia fumipennis*)

Reliably present and sometimes numerous here.

6/24/03 West Tisbury/Duarte's Pond 1
6/26/03 West Tisbury/Duarte's Pond 1
6/27/03 West Tisbury/Duarte's Pond 1
6/29/04 West Tisbury/Duarte's Pond plentiful
7/9/04 West Tisbury/Duarte's Pond common

COMMON BASKETTAIL (*Epiheca cynosura*)

6/24/03 West Tisbury/Duarte's Pond 1

EASTERN AMBERWING (*Perithernis tenera*)

Much more common than these few records suggest. Amberwings are abundant along Duarte's Pond's shoreline and in nearby fields.

6/29/04 West Tisbury/Duarte's Pond 5
7/9/04 West Tisbury/Duarte's Pond abundant

BLUE DASHER (*Pachydiplax longipennis*)

This species, which is widespread and abundant on M.V., is probably one of the most numerous odes breeding in the Duarte's Pond complex.

6/27/03 West Tisbury/Duarte's Pond common
9/21/03 West Tisbury/Duarte's Pond 1 m, 2 f
6/5/04 West Tisbury/Duarte's Pond 1 m, 1 f
7/9/04 West Tisbury/Duarte's Pond common

SLATY SKIMMER (*Libellula incesta*)

Widespread and common on M.V., Slaty Skimmer does especially well at Duarte's Pond. Many sightings are not recorded here, and this species is very common at this location.

7/9/04 West Tisbury/Duarte's Pond c. 20

WHITE-TAILED CORPORAL (*Libellula exusta*)

This species is fairly common and widespread on M.V., and I'm sure I simply didn't bother to record it on many occasions at Duarte's Pond. It can be expected here.

6/24/03 West Tisbury/Duarte's Pond many
6/5/04 West Tisbury/Duarte's Pond 7
6/29/04 West Tisbury/Duarte's Pond 2

COMMON WHITETAIL (*Libellula lydia*)

Reliably present, presumably breeding, but not numerous at Duarte's Pond.

6/24/03 West Tisbury/Duarte's Pond 1
6/26/03 West Tisbury/Duarte's Pond 1 m, 1 f
6/27/03 West Tisbury/Duarte's Pond several
6/29/04 West Tisbury/Duarte's Pond 2

A number of odes have been recorded at Hoft Farm but not Duarte's Pond; but because of the small area involved and the interconnectedness of the ponds, most or all of these should be considered possible at Duarte's Pond. In the case of adult odonates found in uplands, it's impossible to determine which pond they originated in. In the absence of a study of larvae in the ponds, Hoft Farm uplands and wetlands and Duarte's Pond can all probably be considered to be ecologically connected, from a dragonfly's perspective.

BLACKWATER POND MANAGEMENT PLAN

The genus *Lestes*: I've never found a spreadwing of any kind on the Land Bank property at Duarte's Pond, although odes I identified as Sweetflag and Common Spreadwings have been found on the edge of the upper portion of the pond (above the dike), down the hill from the Hoft Farm field station. But generally the best place for spreadwings here is along the northern edge of the Hoft Farm's back field, where a band of shrub swamp separates the field from shallow swale. I feel quite confident of the identifications in the following *Lestes* records, but it should be kept in mind that this is a very difficult genus.

COMMON SPREADWING (*Lestes disjunctus*)

6/26/03	West Tisbury/Hoft Farm	c. 6
8/24/03	West Tisbury/Hoft Farm	1
7/9/04	West Tisbury/Hoft Farm	2

SWEETFLAG SPREADWING (*Lestes forcipatus*)

7/9/04	West Tisbury/Hoft Farm	c. 9, some ID'd in hand by terminal appendages
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SPOTTED SPREADWING (*Lestes congener*)

8/24/03	West Tisbury/Hoft Farm	4
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FAMILIAR (CIVIL) BLUET (*Enallagma civile*)

The scarcity of this species in and around Duarte's Pond is puzzling, given how common Familiar Bluet is generally on the Vineyard.

8/24/03	West Tisbury/Hoft Farm	1
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GREEN DARNER (*Anax junius*)

Common, sometimes abundant, and widespread on the Vineyard. Many sightings are missing here for this species, which is reliably present through most of the season.

6/26/03	West Tisbury/Hoft Farm	1
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EASTERN AMBERWING (*Perithernis tenera*)

7/9/04	West Tisbury/Hoft Farm	abundant
9/6/04	West Tisbury/Hoft Farm	1

BLUE DASHER (*Pachydiplax longipennis*)

While typically common on pond edges, this species is also often numerous along field edges.

6/26/03	West Tisbury/Hoft Farm	very common
7/9/04	West Tisbury/Hoft Farm	abundant
9/6/04	West Tisbury/Hoft Farm	1

EASTERN PONDHAWK (*Erythemis simplicicollis*)

Found both along the pond edge and on fields.

6/26/03	West Tisbury/Hoft Farm	2 f
6/27/03	West Tisbury/Hoft Farm	3 f
9/21/03	West Tisbury/Hoft Farm	1 f
7/9/04	West Tisbury/Hoft Farm	1 f

SLATY SKIMMER (*Libellula incesta*)

6/26/03	West Tisbury/Hoft Farm	1
6/27/03	West Tisbury/Hoft Farm	5
9/6/04	West Tisbury/Hoft Farm	3

TWELVE-SPOTTED SKIMMER (*Libellula pulchella*)

7/9/04	West Tisbury/Hoft Farm	1
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CALICO PENNANT (*Celithemis elisa*)

7/9/04	West Tisbury/Hoft Farm	common
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BLACKWATER POND MANAGEMENT PLAN

SYMPETRUM SP.

9/6/04 West Tisbury/Hoft Farm abundant; most appeared to be Ruby, two appeared to be Yellow-legged, and one looked like Saffron-winged. *Sympetrum* (most apparently Ruby Meadowhawk, *Sympetrum rubicundulum*) can be incredibly abundant here in late summer and fall.

CAROLINA SADDLEBAGS (*Tamea carolina*)

8/24/03	West Tisbury/Hoft Farm	1
7/9/04	West Tisbury/Hoft Farm	2

BLACK SADDLEBAGS (*Tamea lacerata*)

7/9/04	West Tisbury/Hoft Farm	5
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Appendix E: Taxonomic List of Avian Species at Blackwater Pond Reservation, West Tisbury, MA.

Family Accipitridae (hawks and eagles)

osprey	<i>Pandion haliaetus</i>	piscivore, high dives
red-tailed hawk	<i>Buteo jamaicensis</i>	carnivore-small mammals,
high patrol		
Cooper's hawk	<i>Accipiter cooperii</i>	carnivore- birds, aerial
pursuit		

Family Alcedinidae (kingfishers)

belted kingfisher	<i>Ceryle alcyon</i>	piscivore, water plunger
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Family Anatidae (swans, geese, and ducks)

American black duck	<i>Anas rubripes</i>	insectivore, dabbling
Canada goose	<i>Branta canadensis</i>	w: granivore, ground gleaner
		s: omnivore, surface diver
bufflehead	<i>Bucephala albeola</i>	w: piscivore, surface diver
		s: omnivore, surface diver
green-winged teal	<i>Anas crecca</i>	omnivore, dabbling
mallard	<i>Anas platyrhynchos</i>	omnivore, dabbling
northern pintail	<i>Anas acuta</i>	granivore, dabbling and
gleaner		
wood duck	<i>Aix sponsa</i>	omnivore, dabbling
mute swan	<i>Cygnus olor</i>	insectivore, surface diver
American wigeon	<i>Anas americana</i>	omnivore, dabbling
ruddy duck	<i>Oxyura jamaicensis</i>	insectivore, surface diver
black scoter	<i>Melanitta nigra</i>	carnivore-invertebrate,
surface diver		
common merganser	<i>Mergus merganser</i>	piscivore, surface diver
hooded merganser	<i>Lophodytes cucullatus</i>	piscivore, surface diver

Family Ardeidae (herons)

great blue heron	<i>Ardea herodias</i>	piscivore, stalker
green heron	<i>Butorides striatus</i>	piscivore, stalker

Family Bombycillidae (waxwings)

cedar waxwing	<i>Bombycilla cedrorum</i>	omnivore, hawks
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Family Cathartidae (American vultures)

turkey vulture	<i>cathartes aura</i>	scavenger, high patroller
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Family Certhiidae (creepers)

brown creeper	<i>Certhia americana</i>	insectivore, bark gleaner
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Family Charadriidae (plovers)

killdeer	<i>Charadrius vociferus</i>	insectivore, ground gleaner
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Family Columbidae (pigeons and doves)

mourning dove	<i>Zenaida macroura</i>	granivore, ground gleaner
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Family Corvidae (jays and crows)

blue jay	<i>Cyanocitta cristata</i>	omnivore, ground gleaner
American crow	<i>Corvus brachyrhynchos</i>	omnivore, ground gleaner

Family Emberizidae (warblers and sparrows)

yellow-rumped warbler	<i>Dendroica coronata</i>	omnivore, lower canopy gleaner
pine warbler	<i>Dendroica pinus</i>	insectivore, bark gleaner
northern cardinal	<i>Cardinalis cardinalis</i>	s: omnivore, ground gleaner w: granivore, ground gleaner
eastern towhee	<i>Pipilo erythrophthalmus</i>	omnivore, ground gleaner
chipping sparrow	<i>Spizella passerina</i>	omnivore, ground gleaner
song sparrow	<i>Melospiza melodia</i>	insectivore, foliage gleaner
red-winged blackbird	<i>Agelaius phoeniceus</i>	omnivore, ground gleaner
brown-headed cowbird	<i>Molothrus ater</i>	s: omnivore, ground gleaner w: granivore, ground gleaner
common grackle	<i>Quiscalus quiscula</i>	omnivore, ground gleaner
yellow warbler	<i>Dendroica petechia</i>	insectivore, bark gleaner
black-throated blue warbler	<i>Dendroica caerulescens</i>	insectivore, hover and gleaner
black-and-white warbler	<i>Mniotilta varia</i>	insectivore, bark gleaner
common yellowthroat	<i>Geothlypis trichas</i>	insectivore, foliage gleaner
ovenbird	<i>Seiurus aurocapillus</i>	insectivore, ground gleaner
northern parula	<i>Parula americana</i>	insectivore, foliage gleaner
dark-eyed junco	<i>Junco hyemalis</i>	granivore, ground gleaner
white-throated sparrow	<i>Zonotrichia albicollis</i>	omnivore, ground gleaner
swamp sparrow	<i>Melospiza georgiana</i>	insectivore, ground gleaner
northern oriole	<i>Icterus galbula</i>	insectivore, foliage gleaner
summer tanager	<i>Piranga rubra</i>	insectivore, foliage gleaner

Family Falconidar (falcons and caracara)

merlin	<i>Falco columbarius</i>	carnivore-birds, aerial pursuit
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Family Fringillidae (finches)

American goldfinch	<i>Carduelis tristis</i>	s: omnivore, ground gleaner w: granivore, ground gleaner
house finch	<i>Carpodacus mexicanus</i>	s: omnivore, ground gleaner

w: granivore, ground gleaner

Family Hirundinidae (swallows)

tree swallow	<i>Tachycineta bicolor</i>	insectivore, air screener
barn swallow	<i>Hirundo rustica</i>	insectivore, air screener

Family Mimidae (mimic thrushes)

gray catbird	<i>Dumetella carolinensis</i>	s: omnivore, ground gleaner w: frugivore, lower canopy gleaner
northern mockingbird	<i>Mimus polyglottos</i>	omnivore, foliage-ground gleaner

Family Muscicapidae (thrushes)

golden-crowned kinglet	<i>Regulus satrapa</i>	insectivore, lower canopy gleaner
American robin	<i>Turdus migratorius</i>	omnivore, ground gleaner
ruby-crowned kinglet	<i>Regulus calendula</i>	insectivore, foliage gleaner
eastern bluebird	<i>Sialia sialis</i>	insectivore, hawks

Family Numididae (fowls)

Guinea fowl	<i>Numida melpagris</i>	omnivore, ground gleaner
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Family Paridae (titmice and chickadees)

black-capped chickadee	<i>Parus atricapillus</i>	s: insectivore, low canopy gleaner w: omnivore, low canopy gleaner
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Family Passeridae (weavers)

house sparrow	<i>Passer domesticus</i>	granivore, ground gleaner
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Family Phalacrocoracidae (cormorants)

double-crested cormorant	<i>Phalacrocorax auritus</i>	piscivore, surface diver
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Family Picidae (woodpeckers)

red-bellied woodpecker	<i>Melanerpes carolinus</i>	insectivore, bark gleaner
northern flicker	<i>Colaptes auratus</i>	s: insectivore, ground gleaner w: omnivore, ground gleaner
hairy woodpecker	<i>Picoides villosus</i>	insectivore, bark gleaner
downy woodpecker	<i>Picoides pubescens</i>	insectivore, bark gleaner

Family Scolopacidae (sandpipers and phalaropes)

spotted sandpiper	<i>Actitis macularia</i>	insectivore, ground gleaner
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Family Rallidae (rails, gallinules and coots)

Virginia rail	<i>Rallus limicola</i>	insectivore, ground prober
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Family Sittidae (nuthatches)

white-breasted nuthatch	<i>Sitta carolinensis</i>	insectivore, bark gleaner
red-breasted nuthatch	<i>Sitta canadensis</i>	insectivore, bark gleaner

Family Troglodytidae (wrens)

Carolina wren	<i>Thryothorus ludovicianus</i>	insectivore, lower canopy gleaner
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Family Tyrannidae (flycatchers)

eastern kingbird	<i>Tyrannus tyrannus</i>	insectivore, hawks
great-crested flycatcher	<i>Myiarchus crinitus</i>	insectivore, hawks
eastern pewee	<i>Contopus virens</i>	insectivore, hawks
eastern phoebe	<i>Sayornis phoebe</i>	insectivore, hawks

Family Strigidae (typical owls)

eastern screech owl	<i>Otus asio</i>	insectivore, swoops
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Family Vireonidae (vireos)

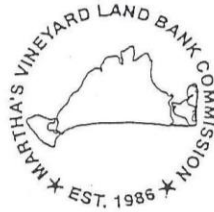
red-eyed vireo	<i>Vireo olivaceus</i>	s: insectivore, foliage gleaner w: frugivore, lower canopy gleaner
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* Sources: Scott (1987) and Ehrlich, Dobkin & Wheye (1988).

** m = foraging guild during spring or fall migration, s = foraging guild during summer (breeding season), w = foraging guild during winter (or nonbreeding seasons).

Appendix F: Preliminary Management Plans for Blackwater Pond Reservation, West Tisbury, MA.

January 5, 1999



Martha's Vineyard Land Bank Commission

Duarte's Pond preliminary management plan

acreage	18.8 acres
tax parcel nos.	3-81
nature conservation goals	<ol style="list-style-type: none">(1) conduct biological survey of property to serve as base for formulation of management objectives.(2) identify rare and endangered species, if any, and create plan to protect and encourage their populations.(3) take measures to improve water quality, as economical and reasonable.
natural products goals	<ol style="list-style-type: none">(1) prohibit hunting, due to property's configuration and setting(2) allow for fish stocking of pond, as necessary.
recreational goals	<ol style="list-style-type: none">(1) choose appropriate location for trailhead(s), with parking for no fewer than 12 vehicles and with expansion potential if so needed(2) open property for hiking, picnicking, nonmotorized boating, skating, fishing, horseback-riding, nonmotorized biking and other traditional park uses; maintain and improve existing trails and lay out circumferential trail; consider the possi-

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bility of dredging a portion of the pond for swimming, if permissible under the wetlands laws and if economical.

- (3) permit on a continuing basis all special events currently occurring on the property (e.g., annual fishing derby, annual Jabberwocky day, etc.).

- (4) work to connect property, via trails, with other conservation areas and neighborhoods (e.g., Ripley's Field Preserve, Wompesket Preserve, Lamberts Cove cemetery and others).

administrative goals

- (1) remove pondside buildings (possibly through relocation to off-premises site) and restore land to natural condition; consider retaining garage along the Lamberts Cove Road for land bank storage
- (2) construct public bathroom, using existing septic system if possible
- (3) oversee and police land on regular basis in order to maintain property as an attractive conservation area
- (4) complete management plan before February of 2000; allow immediate public use of the existing road and the parallel pondshore.

approved by vote of the West Tisbury town advisory board: January 5, 1999

approved by vote of the land bank commission: January 4, 1999

March 20, 2001



Martha's Vineyard Land Bank Commission

Blackwater Pond Reservation preliminary management plan

- | | |
|---------------------------|--|
| acreage | 76.6 acres |
| tax parcel nos. | 9-2.1 [portion] |
| nature conservation goals | <ul style="list-style-type: none">(1) conduct biological survey of property to serve as base for formulation of management objectives.(2) identify rare and endangered species, if any, and create plan to protect and encourage their populations. |
| natural products goals | <ul style="list-style-type: none">(1) designate property as a category "b" property in the land bank's hunting policy, which means that general hunting will be allowed (eligible species in category "b" properties are deer, ducks, geese, pheasant, rabbit and raccoon).(2) permit fishing in the Blackwater Pond and turtle pond. |
| recreational goals | <ul style="list-style-type: none">(1) open property for hiking, non-motorized biking and horseback-riding and other passive uses; maintain existing trails and install new trails, as needed and appropriate.(2) allowing skating and other such uses on the Blackwater Pond and turtle pond.(3) work to connect property with |

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other conservation areas and neighborhoods by means of trails and nearby roads.

- (4) use existing trailhead located at Duarte's Pond if trail agreement can be obtained over abutting land owned by the Nature Conservancy; if not, construct new trailhead near the Red Coat Hill Road.

administrative goals

- (1) evaluate possible removal of existing and defunct power lines, in the interests of aesthetics.
- (2) oversee and police land on regular basis in order to maintain property as an attractive conservation area.
- (3) repair and maintain dams, drainage ditches, dike, culverts and cistern
- (4) complete management plan before December of 2002.

approved by vote of the West Tisbury town advisory board: March 20, 2001

approved by vote of the land bank commission: March 12, 2001

Appendix G: Civil Engineering Dam Safety and Maintenance Report

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Civil Engineering
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P. O. Box 128
West Tisbury, MA 02575
(508 693 6736)

February 15, 2006

Matthew Dix
Martha's Vineyard Land Bank
PO Box 2057
Edgartown, Mass. 02539

Dear Mr. Dix:

Following is a report on the hydrologic characteristics, the condition and recommended maintenance of the three dams in the watershed of Duarte's Pond, on the Land Bank's property on Lambert's Cove Road, West Tisbury, Mass. This report is based on my inspection in January 2006 of the dams and determination of the areas from the USGS Vineyard Haven quadrangle map. A map of the watershed, ponds and dams is enclosed.

Dam #1 retaining the approximately one acre Williams Pond is an earthen embankment about 150' long and 6' high with crest about 5' wide, with a freeboard of about 6" and a down stream slope of 1:4. The dam is overgrown with trees and brush. The water outlets consist of a non functioning drop inlet to an obscured culvert in the middle of the dam and a one foot wide by 6" deep channel eroded at the west end of the dam that serves as the only outlet. The channel is heavily vegetated, on a flat slope and appears stable under present flow conditions.

Dam #2 retaining the approximately 9 acre "Reservoir" is an earthen embankment about 270' long, 4' high with a crest 10' wide, a freeboard of one foot and downstream slope of 1:4. There is stone wall along a portion of the upstream face. The dam is heavily overgrown with trees and brush. The water outlets consist of a concrete sluice outlet with drop boards, dated 1902, 40' from the west end of the dam with a 2 1/2' drop down to Duarte's Pond, and one deep by 10' wide depression in the dam crest at the east end of the dam that serves as an emergency spillway. The channel is very flat (5%) and stabilized with roots and brush.

Dam #3 retaining the approximately 9 acre Duarte's Pond is an earthen embankment about 50' long, 15' wide at the crest, varying from 3' high at the west end to about 8' high at the outlet channel at the east end. There is a stone wall along the downstream face. The outlet structure consists of a 6' wide by 3' deep concrete sluiceway (dated 1921) with drop boards, with a drop of about 4' leading to a 5' wide by 4' high concrete downstream channel forming the headwaters of Blackwater Brook. The concrete channel and walls are in fair condition. There is 5' wide 250' long causeway across the middle of the pond with about 6" of freeboard and with one 20' wide and one 3' wide channel through it. This causeway has no hydraulic significance.

A hydrologic analysis was done of the dams with their watersheds for a 100 year rainfall. The entire watershed for the three dams is about 200 acres of meadow and woods with maximum 1 hour rainfall detention time so a 3 inches/hour rainfall, a high intensity thunderstorm, was used for the 100 year storm.

The water flow over the dams was approximated using the "Rational" formula with $c=0.1$.

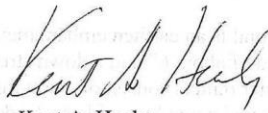
BLACKWATER POND MANAGEMENT PLAN

For dam #1 with a watershed area of 20 acres the water flow during the 100 year storm would be $0.1 \times 3 \times 20 = 6 \text{ ft}^3/\text{sec}$. This would result general overtopping of the dam by an inch or two with the flow deepest at the west end, but the velocities would less than 2 ft/sec and would cause little disruption of the vegetated crest.

For dam #2 with a watershed of 130 acres, the flow during the 100 year storm would be $0.1 \times 3 \times 130 = 39 \text{ ft}^3/\text{sec}$. This would overflow the concrete sluice outlet and result in most of the flow going through the $10' \times 1'$ depression at the east end of the dam. The flat slope and heavy vegetation at the east end would remain stable under that flow.

For dam #3 with a water shed of 200 acres, the water flow during the 100 year storm would be $0.1 \times 3 \times 200 = 60 \text{ ft}^3/\text{sec}$. The 6' wide by 3' deep spillway could handle that flow easily.

All three dams in the Duarte's Pond water shed can handle the flow from a 100 year storm event without significant damage. A more serious concern is the long term deterioration of the dams. The overtopping and uprooting of the trees during high wind will cause a general lowering of the dams with the loss of the ponds. All but the low brush on all three dams should be cut. The concrete sluice on dam #2 should be repaired. The concrete spillway on dam #3 should be cleared and repaired. The drop boards should be replaced.



Kent A. Healy
PE Mass. #28498

BLACKWATER POND MANAGEMENT PLAN

