

## Action Plan 9 Protecting Bio-Diversity and Rare and Endangered Species Habitat

### **Problem**

The biodiversity of Buzzards Bay and its watershed, particularly populations of locally rare and endangered species, are threatened by habitat loss, alteration, and stresses caused by human activity and pollution discharges. Vital habitats include those that support protected plants and animals, wetlands, fish nursery and spawning areas, submerged aquatic vegetation, and shellfish beds. Protection of these areas can only be achieved by adequate evaluation of threatened species, mapping their habitat, enforcing existing laws, adoption of new laws to create buffers around these habitats, and education of the public and government officials about their importance. The mapped distribution of listed species and vernal pools suggest that not all areas of the watershed have experienced the same level of baseline mapping effort.

The adoption of municipal conservation plans may be another approach to go beyond project permit review and to achieve more comprehensive and effective strategies to protect key wildlife habitat, and to build necessary public support.

Recommendations and discussions related to this action plan are included in Action Plan 7 Protecting and Restoring Wetlands; Action Plan 8 Restoring Migratory Fish Passage; Action Plan 10 Managing Water Withdrawals to Protect Wetlands, Habitat, and Water Supplies; Action Plan 11 Managing Invasive and Nuisance Species; and Action Plan 12 Protecting Open Space. This action plan addresses problems not discussed in those action plans, especially those issues relating to the Massachusetts Natural Heritage and Endangered Species Program.

### **Goal**

*Goal 9.1. Conserve and protect vital fish and wildlife habitats of Buzzards Bay and in its surrounding watershed.*

### **Objectives**

Objective 9.1. Ensure that rare and endangered species areas and vernal pools continue to be mapped and this information made publicly available.

Objective 9.2. Ensure that rare and endangered species habitat is considered in the relevant permit review process.

Objective 9.3. Ensure that important biological and core habitat is protected and conserved.

Objective 9.4. Ensure that the public and government officials are aware of the importance of rare and endangered species and core bio-habitat through effective education efforts.

### **Approaches**

The primary mechanism to permanently protecting the most important habitats in the Buzzards Bay watershed is the purchase or donation of lands for open space protection, or the purchase or donation of conservation restrictions. Municipal conservation commissions and area land trusts should coordinate to both ensure municipal open space plans remain current, and contain clear goals and priorities in targeting the acquisition of priority habitat. Each open space plan update should include the latest information of rare and endangered species habitat, and where appropriate fund inventories to fill data gaps. To provide sufficient funds to meet municipal acquisition goals, all municipalities should consider adopting the Community Preservation Act.

The second most important strategy to protect rare and endangered species habitat is to map accurately these resources. In this regard, municipalities and non-profits should help map listed species habitat and certify vernal pools throughout their community. With technical oversight, volunteers can be trained to map and gather the necessary information to certify vernal pools. Some site investigations can be undertaken by trained individuals using online NHESP reporting tools and species information. Other important habitat types must be mapped by trained wetlands and wildlife biologists. Federal agency staff could provide some assistance to the state in such an effort.

### **Costs and Financing**

Certain costs, like providing trained staff to help organize efforts to certify vernal pools, or update open space plans are relatively modest, and some free technical assistance could be provided by the Buzzards Bay NEP. However, the real cost associated with this action plan is the acquisition of open space and it would be easy for watershed municipalities to utilize several million dollars per year for open space protection. Fortunately, because much of the most desirable land, from an environmental protection point of view, contains considerable areas of wetlands and they are often difficult to build upon, they often have the lowest costs per acre of land available for sale.

### **Measuring Success**

Several direct measures can be tracked for this action plan, with total acres of habitat permanently protected being the most important. Other measures, like the number of vernal pools that have been certified, or species inventoried, are easy to track programmatically. Some species populations within Buzzards Bay or the watershed can be tracked, as is the case with nesting pairs of certain bird species, such as the Roseate Tern and Piping Plover.

Table 32. Total number of MESA listed species (as of 2012) in Buzzards Bay watershed municipalities.

Municipality	Amphibian	Beetle	Bird	Butterfly/ Moth	Crustacean	Dragonfly/ Damselfly	Fish	Mammal	Mussel	Reptile	Vascular Plant	Grand Total
Acushnet									1	1	1	3
Bourne	2	1	11	13		3	1	1	2	3	20	57
Carver			4	3		2	1		2	3	8	23
Dartmouth	1	1	10	11	2	2				2	21	50
Fairhaven			5							2	2	9
Falmouth	1	1	9	12	2	3	2		1	1	26	58
Marion			3	1						2	6	12
Mattapoisett			4	1						2	2	9
Middleborough	1		11	1			1		2	4	9	29
New Bedford	1		5	1	2	2				2	14	27
Plymouth		1	14	19		4	1	2	4	2	25	72
Rochester	1			1			1		2	2	6	13
Wareham	1		5	16		2		1	2	3	18	48
Westport	2	1	4	2					1	1	8	19
Grand Total	10	5	85	81	6	18	7	4	17	30	166	429

There are 149 separate species in the combined list for these towns (47 endangered, 48 threatened, 57 of special concern). Table calculated from summary tables on the NHESP “Town Species Viewer” website at [www.mass.gov/eea/agencies/dfg/dfw/natural-heritage/species-information-and-conservation/town-species-viewer.html](http://www.mass.gov/eea/agencies/dfg/dfw/natural-heritage/species-information-and-conservation/town-species-viewer.html). Last accessed October 30, 2013.

## Background<sup>127</sup>

### Natural Heritage & Endangered Species Program

The Natural Heritage & Endangered Species Program (NHESP) is responsible for the conservation and protection of Massachusetts’ biodiversity. The primary responsibility of the Natural Heritage and Endangered Species Program is the regulatory protection of rare species and their habitats as codified under the Massachusetts Endangered Species Act (“MESA,” [MGL Chapter 131A](#)<sup>128</sup>) and Wetlands Protection Act ([MGL Chapter 131, Section 40](#)). Additional protection is offered under the Massachusetts Forest Cutting Practices Act ([MGL Chapter 132, Section 40-46](#)) and supporting regulations ([304 CMR 11.00](#)), which require the review of certain forest cutting plans for potential impacts to rare species.

The program is focused on 219 species of vertebrate and invertebrate animals and 256 species of native plants and their habitats that are officially listed as Endangered, Threatened, or of Special Concern under the Massachusetts Endangered Species Act (MESA). A summary of

the 149 MESA listed species (47 endangered, 48 threatened, 57 of special concern) in the Buzzards Bay watershed are shown by municipalities and taxa in Table 32 and a complete species list is shown in Table 33. The Program, founded in 1978, is part of the Massachusetts Division of Fisheries and Wildlife, and one of the programs forming the Natural Heritage network. The Natural Heritage & Endangered Species Advisory Committee oversees and guides NHESP activities.

In practical terms, NHESP reviews projects within “Priority Habitats of Rare Species” and “Estimated Habitats of Rare Wildlife” published in the Massachusetts Natural Heritage Atlas<sup>129</sup>. Areas in the latter category, which are a subset of the first category, are used for review of projects under the Wetlands Protection Act. Projects in either category are reviewed for compliance under MESA. These areas, plus another special wetland category-certified vernal pools-are shown in Figure 79. In the permitting process, it is the responsibility of the landowner or project proponent to determine if their project falls within Priority Habitat or Estimated Habitat mapped by the NHESP using published information.

<sup>127</sup> A large portion of the information and text in this action plan was taken from information prepared by the NHESP, particularly information contained on this page:

[www.mass.gov/eea/agencies/dfg/dfw/natural-heritage/](http://www.mass.gov/eea/agencies/dfg/dfw/natural-heritage/) and the MassGIS website.

<sup>128</sup> The Massachusetts Endangered Species Act (MESA) was enacted in December 1990 (MGL c.131A). Implementing regulations were promulgated in 1992 and revised and implemented as of July 1, 2005 ([321 CMR 10.00](#)). The 2005 MESA revisions clarified filing requirements, specified time lines for the review process NHESP must meet, and also implemented fees to help ensure timely reviews and consultations with project proponents.

<sup>129</sup> The atlas is based on observations documented within the last 25 years in the database of the Natural Heritage & Endangered Species Program. Priority Habitat areas are the filing trigger for determining whether or not a proposed project or activity must be reviewed by the NHESP for compliance with the Massachusetts Endangered Species Act (MESA) and its implementing regulations. Areas delineated as Priority Habitats can include wetlands, uplands, and marine habitats.

Table 33. All 149 MESA listed species (as of 2012) in Buzzards Bay watershed municipalities listed in Table 32.

Taxonomic Group Common Name	Scientific Name	# of towns	Last obs.
<b>Amphibian</b>			
Eastern Spadefoot (T)	<i>Scaphiopus holbrookii</i>	4	2012
Marbled Salamander (T)	<i>Ambystoma opacum</i>	6	2012
<b>Beetle</b>			
Cow Path Tiger Beetle (SC)	<i>Cicindela purpurea</i>	4	2008
Northeastern Beach Tiger Beetle (E)	<i>Cicindela dorsalis dorsalis</i>	1	2001
<b>Bird</b>			
American Bittern (E)	<i>Botaurus lentiginosus</i>	2	1993
Arctic Tern (SC)	<i>Sterna paradisaea</i>	2	2010
Bald Eagle (T)	<i>Haliaeetus leucocephalus</i>	2	2012
Barn Owl (SC)	<i>Tyto alba</i>	4	1985
Common Loon (SC)	<i>Gavia immer</i>	2	1921
Common Moorhen (SC)	<i>Gallinula chloropus</i>	1	1992
Common Tern (SC)	<i>Sterna hirundo</i>	10	2012
Eastern Whip-poor-will (SC)	<i>Caprimulgus vociferus</i>	3	2012
Grasshopper Sparrow (T)	<i>Ammodramus savannarum</i>	5	2012
King Rail (T)	<i>Rallus elegans</i>	2	1995
Least Bittern (E)	<i>Ixobrychus exilis</i>	2	1993
Least Tern (SC)	<i>Sternula antillarum</i>	8	2010
Long-eared Owl (SC)	<i>Asio otus</i>	1	1974
Northern Harrier (T)	<i>Circus cyaneus</i>	2	2009
Northern Parula (T)	<i>Parula americana</i>	3	1995
Peregrine Falcon (E)	<i>Falco peregrinus</i>	1	2010
Pied-billed Grebe (E)	<i>Podilymbus podiceps</i>	1	1984
Piping Plover (T)	<i>Charadrius melodus</i>	9	2011
Roseate Tern (E)	<i>Sterna dougallii</i>	10	2012
Sharp-shinned Hawk (SC)	<i>Accipiter striatus</i>	3	2001
Short-eared Owl (E)	<i>Asio flammeus</i>	1	historic
Upland Sandpiper (E)	<i>Bartramia longicauda</i>	5	2011
Vesper Sparrow (T)	<i>Poocetes gramineus</i>	6	2012
<b>Butterfly/Moth</b>			
Barrens Buckmoth (SC)	<i>Hemileuca maia</i>	4	2012
Barrens Dagger Moth (T)	<i>Acronicta albarufa</i>	2	2003
Buchholz's Gray (E)	<i>Hypomecis buchholzariora</i>	2	2010
Chain Dot Geometer (SC)	<i>Cingilia catenaria</i>	6	2006
Chain Fern Borer Moth (T)	<i>Papaipema stenocelis</i>	1	2011
Coastal Heathland Cutworm (SC)	<i>Abagrotis nefascia</i>	3	2001
Coastal Swamp Metarranthis (SC)	<i>Metarranthis pilosaria</i>	3	2011
Drunk Apamea Moth (SC)	<i>Apamea inebriata</i>	3	2002
Dune Noctuid Moth (SC)	<i>Sympistis riparia</i>	1	2006
Frosted Elf (SC)	<i>Calliphrys irus</i>	3	2010
Gerhard's Underwing (SC)	<i>Catocala herodias gerhardi</i>	4	2011
Hessel's Hairstreak (SC)	<i>Calliphrys hesseli</i>	2	1987
Imperial Moth (T)	<i>Eacles imperialis</i>	2	2012
Melshemer's Sack Bearer (T)	<i>Cicinnus melshemeri</i>	3	2008
Oak Hairstreak (SC)	<i>Satyrium favonius</i>	1	1996
Pale Green Pinion Moth (SC)	<i>Lithophane viridipallens</i>	4	2011
Pine Barrens Lycia (T)	<i>Lycia ypsilon</i>	1	2010
Pine Barrens Speranza (SC)	<i>Speranza exonerata</i>	4	2011
Pine Barrens Zale (SC)	<i>Zale lunifera</i>	3	2011
Pine Barrens Zanclognatha (T)	<i>Zanclognatha martha</i>	1	2011
Pink Sallow Moth (SC)	<i>Psectraglaea carnosa</i>	4	2010
Pitcher Plant Borer Moth (T)	<i>Papaipema appassionata</i>	1	1971
Precious Underwing (E)	<i>Catocala pretiosa pretiosa</i>	2	2011
Sandplain Euchlaena (SC)	<i>Euchlaena madusaria</i>	1	2010
Slender Clearwing Sphinx (SC)	<i>Hemaris gracilis</i>	2	2010
Spartina Borer Moth (SC)	<i>Photodes inops</i>	3	2007
The Pink Streak (T)	<i>Dargida rubripennis</i>	1	1998
Unexpected Cynia (T)	<i>Cynia inopinata</i>	2	2008
Water-willow Borer Moth (T)	<i>Papaipema sulphurata</i>	9	2011
Waxed Sallow Moth (SC)	<i>Chaetoglaea cerata</i>	3	1986
<b>Crustacean</b>			
Agassiz's Clam Shrimp (E)	<i>Eulimnadia agassizii</i>	1	1970
American Clam Shrimp (SC)	<i>Limnadia lenticularis</i>	3	1985
Coastal Swamp Amphipod (SC)	<i>Synurella chamberlaini</i>	2	2010
Dragonfly/Damselfly		18	2013
Attenuated Bluet (T)	<i>Enallagma daeckii</i>	3	2004
Comet Darner (SC)	<i>Anax longipes</i>	5	2013
Ocellated Darner (SC)	<i>Boyeria grafiana</i>	1	1912
Pine Barrens Bluet (T)	<i>Enallagma recurvatum</i>	4	2010
Scarlet Bluet (T)	<i>Enallagma pictum</i>	4	2012
Spatterdock Darner (SC)	<i>Rhionaeschna mutata</i>	1	2012
<b>Fish</b>			
Bridle Shiner (SC)	<i>Notropis bifrenatus</i>	6	2009
Shortnose Sturgeon (E)	<i>Acipenser brevirostrum</i>	1	1871
<b>Mammal</b>			
Northern Right Whale (E)	<i>Eubalaena glacialis</i>	2	2010
Southern Bog Lemming (SC)	<i>Synaptomys cooperi</i>	2	1894
<b>Mussel</b>			
Creep (SC)	<i>Strophitus undulatus</i>	1	2007
Dwarf Wedgemussel (E)	<i>Alasmodonta heterodon</i>	2	historic
Eastern Pondmussel (SC)	<i>Ligumia nasuta</i>	7	2010

Taxonomic Group Common Name	Scientific Name	# of towns	Last obs.
Tidewater Mucket (SC)	<i>Leptodea ochracea</i>	7	2011
<b>Reptile</b>			
Blanding's Turtle (T)	<i>Emydoidea blandingii</i>	1	1994
Diamond-backed Terrapin (T)	<i>Malaclemys terrapin</i>	6	2012
Eastern Box Turtle (SC)	<i>Terrapene carolina</i>	14	2012
Eastern Worm Snake (T)	<i>Carphophis amoenus</i>	1	historic
Northern Red-bellied Cooter (E)	<i>Pseudemys rubriventris pop. 1</i>	6	2012
Wood Turtle (SC)	<i>Glyptemys insculpta</i>	2	1993
<b>Vascular Plant</b>			
Acadian Quillwort (E)	<i>Isoetes acadensis</i>	1	2009
Adder's-tongue Fern (T)	<i>Ophioglossum pusillum</i>	4	2012
Algae-like Pondweed (T)	<i>Potamogeton confervoides</i>	2	1974
American Sea-bite (SC)	<i>Suaeda calceoliformis</i>	1	1995
American Waterwort (E)	<i>Elatine americana</i>	1	1980
Bayard's Green Adder's-mouth (E)	<i>Malaxis bayardii</i>	2	1919
Bead Pinweed (E)	<i>Lechea pulchella var. moniliformis</i>	1	1910
Bristly Foxtail (SC)	<i>Setaria parviflora</i>	6	2010
Britton's Violet (T)	<i>Viola brittoniana</i>	1	1909
Broad Tinker's-weed (E)	<i>Triosteum perfoliatum</i>	2	2012
Bushy Rockrose (SC)	<i>Crocanthemum dumosum</i>	4	2011
Canadian Sanicle (T)	<i>Sanicula canadensis</i>	2	2005
Climbing Fern (SC)	<i>Lygodium palmatum</i>	1	2010
Creeping St. John's-wort (T)	<i>Hypericum adpressum</i>	1	2008
Dwarf Bulrush (T)	<i>Lipocarpha micrantha</i>	5	1990
Eastern Silvery Aster (E)	<i>Symphotrichum cancolor</i>	1	1926
Grass-leaved Ladies'-tresses (T)	<i>Spiranthes vernalis</i>	2	1981
Gypsywort (E)	<i>Lycopus rubellus</i>	3	2000
Heartleaf Twayblade (E)	<i>Listera cordata</i>	1	historic
Houghton's Flatsedge (E)	<i>Cyperus houghtonii</i>	1	1890
Inundated Horned-sedge (T)	<i>Rhynchospora inundata</i>	2	2008
Lesser Snakeroot (E)	<i>Ageratina aromatica</i>	2	1935
Linear-leaved Milkweed (T)	<i>Asclepias verticillata</i>	3	1915
Lion's Foot (E)	<i>Nabalus serpentarius</i>	4	1933
Long-beaked Bald-sedge (SC)	<i>Rhynchospora scirpoides</i>	3	2012
Long-leaved Panic-grass (T)	<i>Panicum rigidulum ssp. pubescens</i>	5	2012
Long's Bitter-creed (E)	<i>Cardamine longii</i>	1	2000
Long's Bulrush (T)	<i>Scirpus longii</i>	1	2011
Mattamuskeet Panic-grass (E)	<i>Dichanthelium dichotomum ssp. mattamuskeetense</i>	4	1999
Mitchell's Sedge (T)	<i>Carex mitchelliana</i>	1	1989
Narrow-leaved Spring Beauty (E)	<i>Claytonia virginica</i>	1	historic
New England Blazing Star (SC)	<i>Liatris scariosa var. novae-angliae</i>	8	2011
New England Boneset (E)	<i>Eupatorium novae-angliae</i>	1	2008
Northern Gama-grass (E)	<i>Tripsacum dactyloides</i>	2	2011
Ovate Spike-sedge (E)	<i>Eleocharis ovata</i>	1	1992
Oysterleaf (E)	<i>Mertensia maritima</i>	1	1857
Pale Green Orchid (T)	<i>Platanthera flava var. herbiola</i>	3	1997
Papillose Nut Sedge (E)	<i>Scleria pauciflora</i>	1	2010
Parker's Pipewort (E)	<i>Eriocaulon parkeri</i>	1	2006
Philadelphia Panic-grass (SC)	<i>Panicum philadelphicum ssp. philadelphicum</i>	3	2000
Pinnate Water-milfoil (SC)	<i>Myriophyllum pinnatum</i>	4	1983
Plymouth Gentian (SC)	<i>Sabatia kennedyana</i>	10	2011
Pondshore Knotweed (SC)	<i>Persicaria puritanorum</i>	4	2009
Prickly Pear (E)	<i>Opuntia humifusa</i>	1	2007
Purple Cudweed (E)	<i>Gamochaeta purpurea</i>	3	1889
Purple Milkweed (E)	<i>Asclepias purpurascens</i>	1	2011
Purple Needlegrass (T)	<i>Aristida purpurascens</i>	4	2009
Pygmyweed (T)	<i>Crassula aquatica</i>	2	2006
Redroot (SC)	<i>Lachnanthes caroliniana</i>	2	2011
Reed Bentgrass (E)	<i>Calamagrostis pickingii</i>	1	2010
Resupinate Bladderwort (T)	<i>Utricularia resupinata</i>	3	2002
Rigid Flax (T)	<i>Linum medium var. texanum</i>	4	2006
Round-fruited False-loosestrife (E)	<i>Ludwigia sphaerocarpa</i>	2	2010
Salt Reedgrass (T)	<i>Spartina cynosuroides</i>	2	2009
Saltpond Grass (T)	<i>Leptochloa fusca ssp. fascicularis</i>	1	1985
Saltpond Pennywort (T)	<i>Hydrocotyle verticillata</i>	2	2005
Sandplain Flax (SC)	<i>Linum intercursum</i>	3	2011
Sea Pink (E)	<i>Sabatia stellaris</i>	1	1988
Sea-beach Knotweed (SC)	<i>Polygonum glaucum</i>	4	2010
Short-beaked Bald-sedge (T)	<i>Rhynchospora nitens</i>	2	2002
Subulate Bladderwort (SC)	<i>Utricularia subulata</i>	2	2001
Swamp Oats (T)	<i>Sphenopholis pensylvanica</i>	2	2000
Tall Nut-sedge (E)	<i>Scleria triglomerata</i>	1	1888
Terete Arrowhead (SC)	<i>Sagittaria teres</i>	5	2009
Tiny-fruited Spike-sedge (E)	<i>Eleocharis microcarpa var. filiculmis</i>	1	2006
Torrey's Beak-sedge (E)	<i>Rhynchospora torreyana</i>	1	1989
Walter's Sedge (E)	<i>Carex striata</i>	3	2003
Weak Rush (E)	<i>Juncus debilis</i>	3	2002
Wright's Panic-grass (SC)	<i>Dichanthelium wrightianum</i>	2	2001

Table calculated from summary tables on the NHESP "Town Species Viewer" website at [www.mass.gov/eea/agencies/dfw/natural-heritage/species-information-and-conservation/town-species-viewer.html](http://www.mass.gov/eea/agencies/dfw/natural-heritage/species-information-and-conservation/town-species-viewer.html). Accessed October 30, 2013.

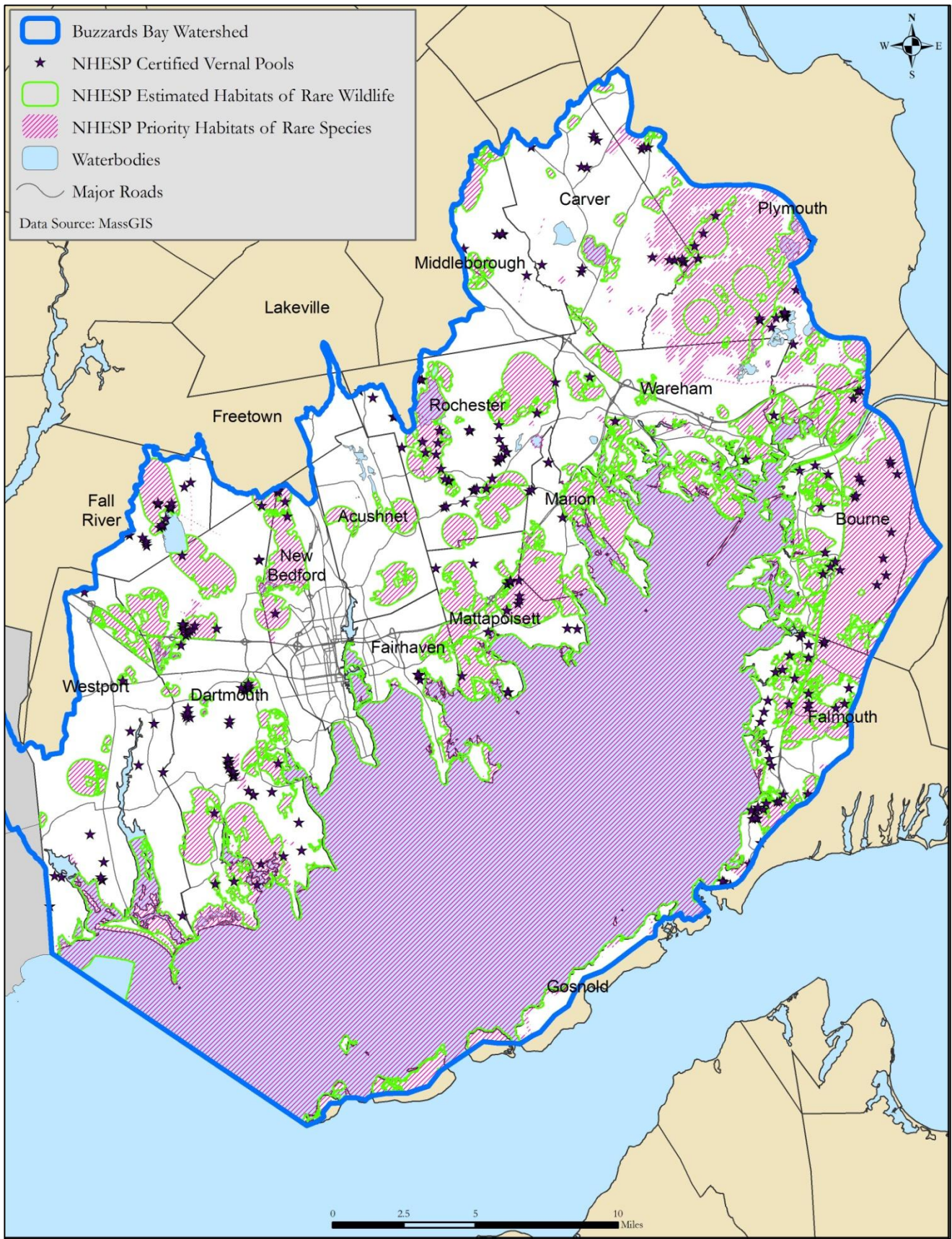


Figure 79. Location of certified vernal pools and rare and endangered species wildlife (purple hatching) and plant species only (green) in the Buzzards Bay watershed (MassGIS data retrieved 2013).

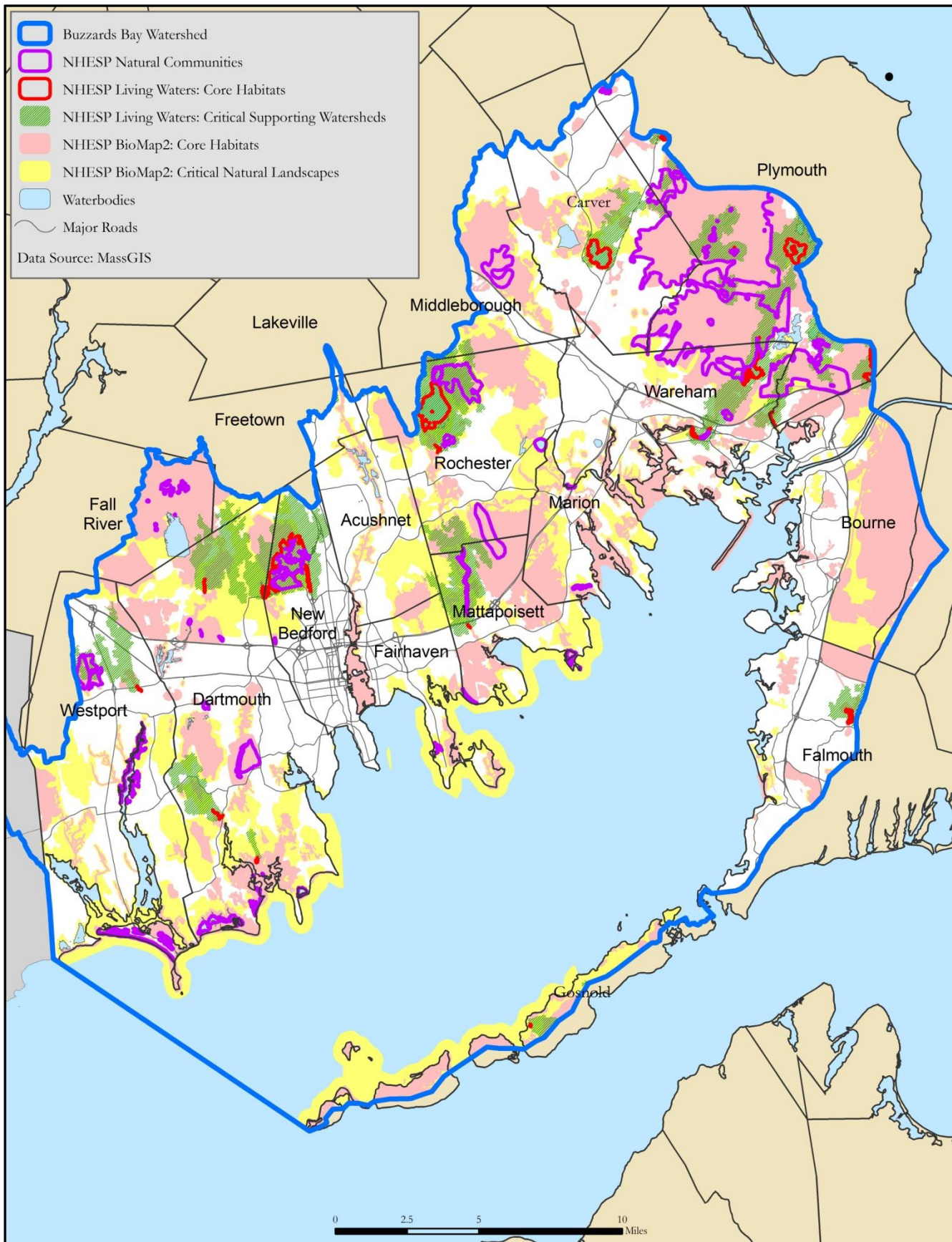


Figure 80. Additional habitat and supporting habitat areas mapped in support of NHESP mission (MassGIS data retrieved 2013).

In recent years, the posting of GIS coverages and online mapping tools of NHESP habitat areas has assisted with compliance with these state laws. NHESP also has webpages summarizing all species observed in each municipality. The precise location of specific species is not disclosed online to protect those populations. NHESP has also set up online reporting tools and species identification pages that should help result in more accurate and comprehensive mapped coverages of listed species.

In broader terms, the goal of the NHESP is the protection of the state's wide range of native biological diversity. This is achieved by biological field surveys, effective information exchange, research, endangered species regulations, project review, restoration projects, focused land protection efforts, and education.

In support of this broader mission, NHESP undertook several projects to map additional areas. NHESP delineated these areas using a variety of data sources, primarily field data, ancillary literature, and color-infrared aerial photographs, and created GIS map coverages in partnership with MassGIS. These additional mapped areas are shown in Figure 80.

The first of these efforts was completed in 2002, when NHESP scientists mapped additional areas that support rare and endangered species habitat as part of the BioMap biodiversity mapping project. The effort resulted in the BioMap Core Habitat GIS map layer that depicts the most viable habitat for rare species and natural communities in Massachusetts, and Supporting Natural Landscape that buffers and connects Core Habitat areas, and identifies large, naturally vegetated blocks that are relatively free from the impact of roads and other development<sup>130</sup>.

In 2003, a similar effort was undertaken in the Living Waters project. This effort resulted in two additional map coverages. The first of these was the Living Waters Core Habitats that represents lakes, ponds, rivers, and streams that are important for the protection of freshwater biodiversity in Massachusetts. The companion coverage was the Critical Supporting Watersheds (CSWs) data layer that represents those areas with the most direct hydrologic contributions to Living Waters Core Habitats. As such, they represent the areas with the highest potential to sustain or degrade Living Waters Core Habitats<sup>131</sup>.

Finally, in 2006, NHESP completed the Natural Communities data layer that consists of mapped areas

that represent the extent of various natural communities in Massachusetts where agencies have an interest in preserving biodiversity through conservation. These polygons are based on records of natural communities and "on-the-ground" field data and available information about the landscape (particularly topographic maps and aerial photographs). The draft classification lists names and describes 105 natural community types found in Massachusetts<sup>132</sup>.

The areas mapped through all these efforts (in Figure 80) are not directly offered the same legal protection as Priority Habitats of Rare Species and Estimated Habitats of Rare Wildlife under state law. They are however, used by federal, state, and municipal groups to establish priorities for awarding grants and technical assistance in efforts to protect open space and restore habitat.

### **Federal Endangered Species Act**

Although this action plan largely focuses on the Massachusetts Endangered Species Act, the Federal Endangered Species Act of 1973 ([www.epw.senate.gov/esa73.pdf](http://www.epw.senate.gov/esa73.pdf) et seq., as amended) is an important consideration in the review of projects that may affect federal listed species in the bay<sup>133</sup>. Federal laws and regulations authorize the determination and listing of species as endangered and threatened, and prohibit the unauthorized taking, possession, sale, and transport of endangered species. Furthermore, section 7 of the Act requires that federal agencies ensure that any action authorized, funded, or carried out by a federal agency is not likely to jeopardize the continued existence of listed species or to modify their critical habitat. The U.S. Fish and Wildlife Service (USFWS) administers the Act, and the NOAA National Marine Fisheries Service is the steward federal agency for offshore living marine resources and habitat, especially fish, whales, dolphins, sea turtles and other marine life. A list of coastal and marine species in Buzzards Bay listed under the federal act is shown in Table 34.

### **Vernal Pools**

Vernal pools are small, shallow ponds that exist only during periods of high groundwater, and disappear during the driest periods of the year. Typically, they exist only in the winter, spring, and early summer. Their ephemeral nature means they generally lack fish, which in turn means they become ideal nurseries for certain species of amphibians, molluscs, crustaceans, and insects

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<sup>130</sup> Natural Heritage and Endangered Species Program biologists delineated Core Habitats for rare aquatic species and exemplary aquatic habitats using Natural Heritage Element Occurrences along with other field datasets.

<sup>131</sup> The CSWs were produced through the AQUALAND grid-based watershed model at a 30 x 30 m resolution. The AQUALAND model was created through the combined efforts of the Natural Heritage Program and the University of Massachusetts' Landscape Ecology Program.

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<sup>132</sup> According to NHESP, all sites in the "Natural Communities" mapped areas have been visited by NHESP biologists or by other biologists who have submitted reports on community occurrences that NHESP biologists have reviewed and accepted. Aquatic community types are not included. The natural community types are from Swain and Kearsley (2011).

<sup>133</sup> Proposals to build offshore turbines, and the 2012 proposed navigation changes for escort tugs in Buzzards Bay, are two examples that triggered a review under the federal regulations.

Table 34. Federal listed threatened and endangered species (and their state classification) with the potential to occur in Buzzards Bay and along its shores.

Common Name <sup>1</sup>	Scientific Name	Federal Status <sup>2</sup>	State Status <sup>3</sup>	Regulatory Authority
<b>Reptiles</b>				
Diamond-backed Terrapin	<i>Malaclemys terrapin</i>		ST	MDFW
Green Sea Turtle	<i>Chelonia mydas</i>	T	ST	NMFS
Kemp's Ridley Sea Turtle	<i>Lepidochelys kempii</i>	E	SE	NMFS
Leatherback Sea Turtle	<i>Dermochelys coriacea</i>	E	SE	NMFS
Loggerhead Sea Turtle	<i>Caretta caretta</i>	T	ST	NMFS
<b>Birds</b>				
American Bittern	<i>Botaurus lentiginosus</i>		SE	MDFW
Arctic Tern	<i>Sterna paradisaea</i>		SC	MDFW
Bald Eagle	<i>Haliaeetus leucocephalus</i>	<sup>4</sup>	SE	MDFW
Common Moorhen	<i>Gallinula chloropus</i>		SC	MDFW
Common Tern	<i>Sterna hirundo</i>		SC	MDFW
King Rail	<i>Rallus elegans</i>		ST	MDFW
Least Bittern	<i>Ixobrychus exilis</i>		SE	MDFW
Least Tern	<i>Sternula antillarum</i>	E <sup>5</sup>	SC	MDFW, USFWS
Pied-Billed Grebe	<i>Podilymbus podiceps</i>		SE	MDFW
Piping Plover	<i>Charadrius melodus</i>	T	ST	USFWS
Red knot	<i>Calidris canutus rufa</i>	C		USFWS
Roseate Tern	<i>Sterna dougallii</i>	E	SE	MDFW, USFWS
<b>Mammals</b>				
North Atlantic Right Whale	<i>Eubalaena glacialis</i>	E	SE	NMFS

<sup>1</sup> As reported in a draft environmental assessment for a proposed navigation rule change in Buzzards Bay (modified from ARCADIS, 2012).

<sup>2</sup> Federal Listed by the US Fish and Wildlife Service: E - federal listed endangered, T - federal listed threatened, C - candidate.

<sup>3</sup> State Designations by the Massachusetts Division of Fisheries and Wildlife: SE - state listed endangered, ST - state listed threatened, SC - state listed special concern.

<sup>4</sup> Bald eagles occur in Buzzards Bay but the species have been federally delisted. Nesting bald eagles and their nests are still protected by law under the Bald and Golden Eagle Act.

<sup>5</sup> Designation for interior U.S. populations only, not in Buzzards Bay.

because of the lack of fish predation. Vernal pools are thus extremely important to various wildlife species that may breed exclusively in these habitats. Some species, such as fairy shrimp, spend their entire life cycles confined to vernal pool habitat.

The Massachusetts Wetlands Protection Act (WPA) Regulations ([310 CMR 10.00](#)) provided the original legal basis for protecting vernal pool habitat in Massachusetts; vernal pools first received protection in 1987 when 'wildlife habitat' was added as one of the eight interests protected under the WPA regulations. Vernal pools were not recognized as a specific wetland type, but rather a distinct wetland function that provided important wildlife habitat functions. Consequently, "vernal pool habitat" ([310 CMR 10.04](#)) was defined primarily by the wildlife that depend on vernal pools.

Certified vernal pools are protected if they fall under the jurisdiction of the Massachusetts Wetlands Protection Act Regulations ([310 CMR 10.00](#)), and the certification of a pool only establishes that it functions biologically as a vernal pool. Certification does not determine that the pool is within a resource area protected by the Wetlands Protection Act.

Certified vernal pools are also afforded protection under the state Water Quality Certification regulations (401 Program), the state Title 5 regulations, and the Forest Cutting Practices Act regulations. The Water Quality certification is particularly significant, because under the Federal Clean Water Act's Section 401 requirements, certified pools are considered to be Outstanding Resource Waters (ORW), and state policy does not permit fill or discharges within ORWs. The number of vernal

Table 35. 2013 Certified Vernal Pools versus a 2000 study of potential vernal pools.

<b>Municipality</b>	<b>2013 Certified Vernal Pools</b>	<b>2000 study of potential Vernal Pools</b>
Acushnet	0	48
Bourne	26	51
Carver	19	91
Dartmouth	54	252
Fairhaven	4	48
Fall River	39	151
Falmouth	57	96
Marion	3	22
Mattapoisett	20	58
Middleborough	12	388
New Bedford	6	28
Plymouth	46	392
Rochester	47	131
Wareham	3	100
Westport	14	253

Potential vernal pools were based on an analysis of 1993 and 1999 aerial photographs and wetland coverages. Data at [www.mass.gov/anf/research-and-tech/it-serv-and-support/application-serv/office-of-geographic-information-massgis/datalayers/vvp.html](http://www.mass.gov/anf/research-and-tech/it-serv-and-support/application-serv/office-of-geographic-information-massgis/datalayers/vvp.html).

pools certified in each Buzzards Bay municipality (as of 2009) is shown in Table 35.

## Major Issues

Despite the importance of vernal pools, most remain unprotected because they have not been documented and certified. This is illustrated by Table 35, which shows that many vernal pools have been certified in some communities, and none in others, despite the fact that they may likely contain dozens. There are also a number of regulatory technical limitations as to how vernal pools are protected under state and federal regulations.

In January 2009, NHESP and the Massachusetts Division of Fisheries and Wildlife proposed, and then later accepted, changes as to how vernal pools were certified. The report concluded that the Guidelines for the Certification of Vernal Pool Habitat needed to be revised to provide an even more defensible basis for certifications. This resulted in more rigorous data submission requirements and at the same time, made the certification of new pools more challenging, and even created a new appeal process for vernal pools.

A major issue revolving around the certification of vernal pools is the fact that most are on private property, and regulators are not allowed to map these areas without permission of landowners. However, agencies do accept data supporting the certification process from residents and citizen groups.

Because of limitations of state and federal protections for vernal pools, many Massachusetts municipalities have adopted their own vernal pool regulations. For example, the Town of Falmouth prohibits any construction on or alteration of natural landscapes within 100 feet of a vernal pool.

A similar issue relates to the apparent inconsistent level of mapping efforts of MESA listed species in each municipality. As shown by Table 32, the highly urbanized City of New Bedford has 27 listed species, whereas the adjacent more rural Town of Acushnet has only 3. Similarly, Dartmouth has 50 species listed, whereas Westport, which is comparable in size and habitat has only 19. In this latter case, the discrepancy between species documentation can be largely attributed to the studies of butterflies, moths, plants, and birds in Dartmouth by the Lloyd Center for the Environment.

## Funding Issues

The state's efforts to protect and map important wildlife areas have been hindered by funding cutbacks. In 2004, the Natural Heritage Program was removed from the state's operating budget, and since then the program has been funded by a patchwork of project-specific bond monies, fees, federal grants, and voluntary contributions. The largest funding source has become voluntary donations on state income tax forms, with over 20,000 taxpayers contributing to the Natural Heritage & Endangered Species Fund.

More stable and expanded funding could assist the program in mapping important wildlife areas and help the program meet its goals. Such funding would not only assist the program in better implementing education and regulatory components of the program, but also address scientific information shortcomings plaguing most wildlife programs. These needed data include more current distribution and abundance data, lack of systematic population monitoring, lack of information on diseases and pathogens, and lack of information on invasive species that may be threatening endemic populations.

## Management Approaches

An important first step to protecting endangered and threatened species is to adequately inventory and map their distribution. The NHESP has improved its online information pages about rare and endangered species, and has created online reporting tools, but broader and coordinated participation by trained volunteers, environmental groups, and technical experts is needed to systematically overcome apparent inconsistencies in the level of documentation in each municipality. The Buzzards Bay NEP and Buzzards Bay Coalition could promote a more coordinated effort in the Buzzards Bay watershed.

With respect to vernal pools, these are the easiest special habitat type to inventory, and municipal conser-



vation commissions and local environmental organizations should exchange information and identify needs to better map and certify vernal pools in each community. With technical oversight, volunteers can be trained to map and gather the necessary information to certify vernal pools, and utilize online reporting tools. Sites of investigation can be identified using the NHESP report of potential certified vernal pools in southeastern Massachusetts. As noted earlier, other priority habitat types must be mapped by trained wetlands and wildlife biologists. Federal agency staff could provide some assistance to the state in such an effort.

The primary mechanism to permanently protecting the most important habitats in the Buzzards Bay watershed is the purchase or donation of lands for open space protection, or the purchase or donation of conservation restrictions. Municipalities (particularly conservation commissions) and area land trusts must take action in both establishing priorities and goals in open space protection. To help set acquisition priorities, municipalities should update their open space plans to include priority habitat to ensure that the protection of rare and endangered species habitat remains a high priority for land acquisition and protection. To provide sufficient funds to meet municipal goals, all municipalities should consider adopting the Community Preservation Act.

To help educate the public, municipalities should post on their website maps of rare and endangered species habitat and certified vernal pools and include information as to why it is important to protect these habitats in their community. Information could also be made available in brochures, and included in mailings like water bills. Posting and distributing this information increases the public's awareness of the important habitat that needs to be protected in each community. The costs of this are modest, especially if the town maintains its website in house. The conservation agent could work with the webmaster to post relevant information, and keep it updated and the Buzzards Bay NEP can provide technical assistance. To compliment state and local information, the Buzzards Bay NEP could post maps and lists of rare and endangered species in each Buzzards Bay watershed municipality or links to state pages where this information is available. These lists and online maps help local officials and residents to better understand important habitat areas in their community. The Buzzards Bay NEP should encourage town officials to utilize the newly available online mapping tools made available in 2012 on the NHESP website<sup>134</sup>.

To assist municipalities in setting local priorities, state land protection programs and environmental restoration programs should prioritize state listed rare and

endangered species and core bio-habitat in the scoring criteria in their land and habitat protection programs. Scoring could account for projects that coincide with mapped rare and endangered species habitat, BioMap Core Habitat, BioMap Supporting Natural Landscapes, and Living Waters areas. The Massachusetts EEA and U.S. FWS are key lead agencies in protecting important habitat types in Massachusetts. EEA already incorporates such priorities in their land acquisition programs (like the EEA's LAND, Landscape Partnership, and Conservation Partnership Grant programs). These criteria may not be an explicit consideration in other agency grant programs (such as DEP 319), but may be indirectly considered. Federal agencies tend to focus on habitat for federally listed species, but they should also consider any available designations of state listed priority habitat in their proposal ranking criteria.

To help improve local protection efforts, NHESP should provide additional training to municipal conservation agents and local planners on the use of NHESP maps and resources, and in the adoption of local strategies to compliment state protection efforts. This assistance could be accomplished by circuit riders to provide local training and support materials necessary for improved local protection.

## Financial Approaches

Certain costs, like providing trained staff to help organize efforts to certify vernal pools, or update open space plans are relatively modest, and some free technical assistance could be provided by the Buzzards Bay NEP. However, the real cost associated with this action plan is the acquisition of open space and it would be easy for watershed municipalities to utilize several million dollars per year for open space protection. Despite the high costs of land acquisition, because much of the most desirable lands from a habitat protection standpoint contain considerable areas of wetlands, they are often difficult to build upon and their cost per acre is low compared to easy to build upon lands.

## Monitoring Progress

Several direct measures can be tracked for this action plan. In terms of protecting important habitat, the total acres of open space permanently protected is now being tracked, and is one of the most important measures for that action. Other measures, such as the number of vernal pools that have been certified, or number of listed species inventoried in each municipality, and their geographic extent are easy measures to track programmatically. Some species populations within Buzzards Bay or the watershed are now being tracked, as is the case with nesting pairs of certain bird species, such as the Roseate Tern and Piping Plover. Ongoing annual bird counts may provide insights as to changes in habitat and climate changes. Efforts to enumerate seals and other marine

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<sup>134</sup> NHESP "Town Species Viewer" website at [www.mass.gov/eea/agencies/dfg/dfw/natural-heritage/species-information-and-conservation/town-species-viewer.html](http://www.mass.gov/eea/agencies/dfg/dfw/natural-heritage/species-information-and-conservation/town-species-viewer.html). Last accessed October 30, 2013.

mammals have been inconsistent, but could be undertaken periodically if such measures are determined useful indicators of specific impairments.

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