

WILDLIFE HABITAT INCENTIVES PROGRAM MASSACHUSETTS STATE PLAN

I. BACKGROUND

The Wildlife Habitat Incentives Program (WHIP) is administered by the Natural Resources Conservation Service (NRCS). The voluntary program offers technical and financial assistance for restoring, developing and enhancing wildlife habitat on eligible land.

This Massachusetts WHIP plan addresses the implementation and the administration of the program in Massachusetts. The plan identifies Massachusetts NRCS' objectives, the National and State priorities, the general conservation actions we will implement to meet our objectives, partnership involvement, state application ranking process and the criteria we will use to measure success.

This plan was developed with input from the State Technical Committee.

II. STATE OBJECTIVES

The state objective for WHIP is to enhance, restore and manage upland, wetland and aquatic habitats that are critical to maintaining the biodiversity of the Commonwealth. To accomplish this objective, we have formulated the following goals:

- Focus restoration and/or management efforts on native aquatic, upland and wetland habitats that are important for *at-risk** wildlife species.
- Emphasize restoration and/or management efforts that will benefit at-risk wildlife species.
- Work as part of a coordinated effort to help accomplish the goals of the Massachusetts Comprehensive Wildlife Conservation Strategy.
- Reduce the impacts of exotic invasive plant species on at-risk wildlife species and/or their habitat.

III. NATIONAL PRIORITIES

NRCS has established the following national priorities:

- Promote the restoration of declining or important native wildlife habitats.
- Protect, restore, develop or enhance wildlife habitat of at-risk species (candidate species, and State and Federal listed threatened and endangered species).
- Reduce the impacts of invasive species on wildlife habitats.
- Protect, restore, develop or enhance declining or important aquatic wildlife species' habitats.

* “*at-risk*” wildlife species as referred to in this document include Federal or State listed threatened and endangered species, special concern species and species listed in the Massachusetts Comprehensive Wildlife Conservation Strategy as “in greatest need of conservation”. The “at-risk” wildlife species and their associated habitats are shown in Appendix A.

IV. STATE PRIORITIES

The Massachusetts Division of Fisheries and Wildlife developed a Comprehensive Wildlife Conservation Strategy (CWCS) to satisfy the requirements of the State Wildlife Grant Program. This document identifies the species that the State fish and wildlife agency deems “in greatest need of conservation”. The goal of the Massachusetts CWCS is to conserve the wildlife biodiversity of Massachusetts. They identified 256 animal species in greatest need of conservation and assigned these species to one or more of 22 habitat types (large scale, medium scale or small scale habitats) essential to the survival of the species. The CWCS also identified the primary strategies that should be used by the Massachusetts Division of Fisheries and Wildlife and other partners to achieve the goal of conserving the Commonwealth’s biodiversity. The strategies fell into the broad categories of: habitat protection, surveys and inventories, conservation planning, environmental regulation, habitat restoration and management, and education.

Massachusetts NRCS fully supports the goal of conserving the wildlife biodiversity of the Commonwealth. In order to provide a coordinated effort, and to ensure that Massachusetts NRCS focuses our WHIP efforts on habitats and species in greatest conservation need, we reviewed the CWCS and identified the primary strategies under each of the 22 habitat types that we could utilize under WHIP. The selected strategies are shown in Table 1. Ten of the 22 habitat types show no identified primary strategies because the nature of the strategies did not fit with WHIP (i.e., surveys and inventories, regulations and/or permanent habitat protection). With input from the State Technical Committee, we assessed the identified primary strategies; developed conservation actions based on the strategies, and prioritized the conservation actions under each habitat type. As in the past, Massachusetts NRCS will focus our WHIP activities on habitats and communities. This approach results in benefits to a whole host of wildlife species that are dependent on the habitat of focus.

The following have been identified as priority habitat types for the Massachusetts WHIP.

- Coastal Areas
 - Coastal Dunes, Beaches**
 - Salt Marshes**
- Freshwater Wetlands
 - Marshes and Wet Meadows**
 - Shrub Dominated Wetlands**
- **Rivers and Streams**
- Terrestrial Systems
 - Grasslands**
 - Pitch Pine/Scrub Oak**
 - Upland Oak Forest**
 - Young Forest/Shrub Land**

Table 1. Strategies that can be employed through Massachusetts WHIP to further the goal of the CWCS

Large scale Habitats	Primary Strategies *
Connecticut and Merrimack Mainstems	<ul style="list-style-type: none"> • Pursue dam removal and fish passage projects to reconnect mainstem habitats to tributary habitats.
Large and Midsize Rivers	<ul style="list-style-type: none"> • Identifying dam removal as a primary restoration tool and encouraging dam removal.
Marine and Estuarine Habitats	
Upland Forest	<ul style="list-style-type: none"> • Oak regeneration cutting practices.
Large un-fragmented Landscape mosaic	
Pitch pine/scrub oak	<ul style="list-style-type: none"> • Protecting, managing and restoring Pitch pine/scrub oak areas (and buffer areas when appropriate) supporting populations of rare and uncommon animals, using prescribed fire in most cases.
Medium Scale Habitats	Primary Strategies *
Small Streams	<ul style="list-style-type: none"> • Identifying dam removal as a primary restoration tool and encouraging dam removal. • Reduce impacts from existing impervious surfaces using innovative technologies.
Shrub Swamps	<ul style="list-style-type: none"> • Restoring and managing select shrub swamps to maintain appropriate successional stages.
Forested Swamps	
Lakes and Ponds	
Salt Marsh	<ul style="list-style-type: none"> • Implementing management or restoration actions to reduce the effects of invasive species. • Identifying dam, ditch and culvert removal as primary restoration tools and encouraging their removal.
Coastal Dunes, beaches, small islands	<ul style="list-style-type: none"> • Restoring native vegetation where eliminated by human impacts and allowing natural processes of erosion and deposition to occur.
Grasslands	<ul style="list-style-type: none"> • Managing land in and around grasslands supporting populations of rare and uncommon animals. • Converting protected grasslands currently dominated by non-native cool season grasses and other exotic invasive plant species to grasslands dominated by native grasses, forbs and ericads. • Developing management agreements with airports and military bases that promote conservation of grassland animals.
Young forests/shrub lands	<ul style="list-style-type: none"> • Establishing, restoring and managing these habitats.
Riparian forest	<ul style="list-style-type: none"> • Managing protected riparian forests to remove exotic invasive species.
Small scale habitats	Primary Strategies *
Vernal Pools	
Coastal Plain ponds	
Springs, caves and mines	
Peatlands and associated habitats	
Marshes and wet meadows	
Rocky coastlines	
Rock cliffs, ridgetops, talus slopes and similar habitats	

* Strategies were selected from the 2005 Massachusetts Comprehensive Wildlife Conservation Strategy

Priority Habitat Types

1. Coastal Areas

Coastal Dunes and Beaches

This habitat is home to three species covered under the Federal Endangered Species Act: the endangered Roseate Tern, the threatened Piping Plover and the threatened Northeastern Beach Tiger Beetle. The greatest threat to coastal dunes and beaches is from human use, especially recreational activities. Non-motorized recreational activities can be a source of both direct mortality and harassment of shorebirds, while the use of motorized vehicles extends these human impacts to more remote areas. The trails, roads and walkways created by human use can also result in erosion by wind and waves and allow for the introduction/spread of exotic invasive plant species.

Salt marsh/salt ponds

Historically, Massachusetts has lost a large portion of its salt marshes as a result of human activities such as filling and draining. Of the 48,000 acres of tidal salt marsh still remaining, approximately 8,000 acres are considered degraded by restriction of normal tidal flows and invasion of exotic invasive plants. Tidal restrictions cause hydrologic changes that typically reduce the maximum elevations of tidal flooding and lower the water's salt concentration. These changes cause a major transformation in vegetation and alter the entire upstream salt marsh. Common Reed and other exotic invasive plant species that are more tolerant of brackish conditions often displace native salt marsh grasses and rushes, thereby reducing plant diversity and changing vegetative structure. This change in vegetation, in turn, causes a major shift in wildlife use, as once diverse native salt marsh species are replaced by fewer, more generalist species.

WHIP Habitat Improvement Practices to be Emphasized for Coastal Areas

Priority	Conservation Action
	<i>Coastal Dunes, Beaches</i>
1	Restoration of native vegetation
2	Exotic invasive plant species control
	<i>Salt Marsh/Salt Ponds</i>
1	Restoration of tidal flux hydrology
2	Exotic invasive plant species control

2. Freshwater Wetlands

Marshes and Wet Meadows

Marshes and wet meadows are some of the most important inland habitats for numerous species of animals, both rare and common. This habitat includes deep and shallow emergent marshes, wet meadows, fens and kettlehole wet meadows. Threats to this habitat include filling and dredging, nutrient enrichment from adjacent fields, septic systems and roads, impoundments that alter natural water level fluctuations and displacement of natural vegetation by exotic invasive plant species.

Shrub Dominated Wetlands

The main threats to shrub dominated wetlands are the alteration of the hydrologic regime and the successional nature of shrub swamps. Shrub dominated wetlands often form in areas that have been flooded by beaver. After the food resource has been depleted, beaver abandon the site, and the impoundment created by the dam drains. The area succeeds to wet meadow and then to shrub land. The reduction of acreage flooded by beaver (due to increased development in low-lying areas and low human tolerance of beaver flooding) has resulted in substantially less acreage in shrub dominated wetlands.

Several rare turtles, including the Spotted Turtle, Bog Turtle and Blandings Turtle, utilize shrub dominated wetlands in conjunction with other wetland types. Shrub swamps provide important breeding habitat for many species of migratory birds. Many species of salamanders breed in the open water areas around shrub swamps.

WHIP Habitat Improvement Practices to be Emphasized for Freshwater Wetlands

Priority	Conservation Action
	<i>Marshes and Wet Meadows</i>
1	Restoration/management activities (such as fill removal, hydrologic alterations, etc.)
2	Exotic invasive plant species control
	<i>Shrub Swamps</i>
1	Restoration/management activities to maintain the successional stage
2	Exotic invasive plant species control

3. Rivers and Streams

Identified threats to the biodiversity of rivers and streams in Massachusetts include: degraded water quality, flow alterations, habitat loss and fragmentation, barriers to fish passage and invasive species.

Healthy rivers and streams are essential for fish and other wildlife. However, due to their long, linear quality, they are particularly vulnerable to habitat fragmentation. Massachusetts has over 3000 dams. These dams fragment habitat, restricting the natural movements of resident and diadromous fish species and other aquatic organisms. River and stream crossings, especially culverts, also disrupt river and stream continuity. Culverts can create barriers to aquatic organism movement if any of the following conditions exist: drop at culvert outlet; lack of water depth in the culvert; excessive water velocities within the culvert and/or at the culvert inlet or outlet; or excessive sediment accumulation within the culvert or at culvert inlet.

Riparian areas adjacent to streams and rivers are also important to the stream corridor function. Riparian areas impact in-stream habitat by: providing shade, purifying water, stabilizing stream channels, providing nutrient inputs, and providing downed woody debris. Urbanization and agriculture have impacted Massachusetts' rivers and streams. The impervious and semi-pervious surfaces have created "flashier" streams that are prone to flooding, sedimentation and severe erosion. The result is degraded water quality, habitat degradation, encroachment of exotic species and, ultimately, reduction in biodiversity.

WHIP Habitat Improvement Practices to be Emphasized for Rivers and Streams

Priority	Conservation Action
1	Remove barriers to fish/wildlife passage
2	Establish riparian buffers along streams (where no buffers currently exist)
3	Installation of runoff management systems designed to prevent water quality degradation of waters designated as critical to maintaining the aquatic biodiversity of the Commonwealth

4. Terrestrial Systems

Grasslands

The suite of species associated with this habitat type has experienced one of the most widespread and persistent population declines of any bird group. Seven species of state-listed birds in Massachusetts are highly dependent on grasslands for nesting, migration or wintering habitat. Four other birds associated with grasslands are uncommon and declining in the state.

The loss of farmland to development and succession, fragmentation of existing grasslands and agricultural intensification on the remaining farmland have all led to the decline in grassland species in Massachusetts. Additionally, many grassland bird surveys and studies have demonstrated that habitat size is one of the most important characteristics to providing optimal habitat for grassland breeding birds, with many grassland bird species requiring a certain amount of habitat be present before they will utilize a site. Improving the habitat quality on existing grassland acreage can be accomplished through maintenance and enhancement activities such as delayed mowing, consolidating adjacent grassland fields through hedgerow and tree line removal and improvement of vegetation structure through strip disking, reseeding, etc.

Pitch Pine/Scrub Oak

Southern New England contains some of the largest remaining areas of pitch pine/scrub oak habitat in North America, with most of it contained along the eastern coast of New Jersey, on Long Island, New York, and in southeastern Massachusetts. It is estimated that only about half of the pitch pine/scrub oak habitat that existed in the northeast at the time of European settlement, still exists today. According to the Massachusetts Division of Fish and Wildlife, pitch pine/scrub oak comprises more than 100,000 acres of Massachusetts and serves as primary habitat for an extraordinary portion of protected Massachusetts animal populations. Pitch pine barrens are predominantly found in southeastern Massachusetts along with remnants in the Connecticut River valley. Pitch pine/scrub oak barrens are a fire maintained and fire dependent natural community, that exist only on sandy soils. If there is no disturbance such as fire, tree oaks and white pine can invade and take over. Only a small fraction of this acreage is receiving appropriate management and restoration actions, without which this suite of natural communities will inevitably disappear from the Commonwealth.

Upland Forest

Approximately 62% of the state is forested, and over 90% of Massachusetts forests are classified as upland forest. The two general upland forest types found in Massachusetts are northern hardwood forest (beech, birch, maple) and central hardwood forest (oak/hickory), although within each of these two general forest types, several sub-types occur. Both northern and central hardwood forest types provide

wildlife habitat, however, the oak acorn production (an important wildlife food) is substantially greater in the central hardwood forest type.

Poor forest cutting practices pose a substantial threat to the state’s oak forest types. High grade cutting (cutting high economic value trees only and retaining poorly formed or undesirable species) has been a problem in Massachusetts. The continuous partial canopy created by the retention of the relatively mature, low value trees is not favorable to oak regeneration, and the more shade tolerant red maple and black birch are replacing our oak forests. This change in forest composition can have far reaching effects on the dynamics of wildlife communities that have evolved around the acorn mast habitats.

Young forest/shrub land

Young forest/shrub land habitats provide essential habitat for a significant number of species that are experiencing population declines throughout the Northeast (shrub lands are dominated by low woody vegetation with varying amounts of herbaceous vegetation and sparse tree cover, while young forest habitat is the first stage of forest growth, characterized by high stem densities of rapidly growing trees and shrubs). The biggest threats to these “thicket” habitats are development, and forest cutting practices that only remove about 1/3 of the standing volume (i.e., partial cuts) thus prohibiting the development of young forest.

Research conducted in New England indicated that in a primarily forested landscape, biodiversity would be greatest with a forest age class mix of approximately 10% young forest/seedling, 30% sapling/pole forest, 50% sawtimber and 10% older forest. Currently, Massachusetts forests are estimated to be 1% seedling/young forest, 19% sapling/pole forest, 77% sawtimber forest and 3% older forest. Most of Massachusetts’ forest are an even age class, necessitating the setting aside of some sawtimber forest to grow into old forest and the setting back of other sawtimber forest to young forest.

Habitat Improvement Practices to be Emphasized for Terrestrial Systems

Priority	Conservation Action
	<i>Grasslands</i>
1	Restoration and management of grasslands (e.g., delayed mowing, strip disking, removing tree rows, etc.)
2	Reseeding of grasslands to native grasses, forbs, etc.
	<i>Pitch Pine/scrub oak</i>
1	Restoration/management activities (e.g., prescribed fire, planting)
	<i>Upland Oak Forest</i>
1	Management practices for oak regeneration
	<i>Young forests/shrub lands</i>
1	Restoration and management activities
2	Create or widen shrubby forest/field edges and/or shrub rows

V. PARTNERSHIP INVOLVEMENT

Massachusetts NRCS works with a variety of partners to deliver WHIP. Many of our WHIP projects would not be possible without the collaborative efforts of a host of organizations that have provided technical and/or financial assistance. The technical assistance has included such aspects as design, planning, monitoring and implementation oversight. These joint projects result in successful implementation, increase the habitat benefits gained per dollar expended, and create greater local support for enhancing wildlife habitat in the Commonwealth.

Federal Partners

U.S. Fish and Wildlife Service
National Marine Fisheries Service

State Partners

Massachusetts Coastal Zone Management Program
Massachusetts Division of Fisheries and Wildlife
Massachusetts Division of Marine Fisheries
Massachusetts Riverways Program
Massachusetts Wetlands Restoration Program

Other Partners

Corporate Wetlands Restoration Partnership
Mass Audubon
The Nature Conservancy
The Ruffed Grouse Society
The Trustees of Reservations

VI. STATE APPLICATION RANKING PROCESS

The ranking process used in Massachusetts is based on ecological, economic and social factors, as mandated and will be tailored in such a way to prioritize applications that will maximize wildlife habitat improvement for “at risk” species. The ranking process will be reviewed on an annual basis to ensure its effectiveness in differentiating high quality projects.

Beginning in fiscal year 2007, the Program Ranking Tool, integrated with ProTracts, will be utilized to implement the application ranking process. This tool integrates cost effectiveness, environmental benefits and national, state and local concerns.

VII. MEASURING PROGRAM SUCCESS

NRCS field staff will utilize the state approved habitat evaluation procedure to determine baseline and applied conditions. Although Massachusetts NRCS does not have the staffing to perform environmental monitoring of individual projects, various partners are conducting monitoring efforts on WHIP sites or on sites where similar restoration work has occurred. These monitoring efforts provide valuable information that is utilized to restore/manage other sites and to revise conservation practice standards and specifications.

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Appendix A

At-risk Species and their Habitats

Note: The following tables were adapted from the Massachusetts 2005 CWCS. The state CWCS plan assigned these species to one or more habitat types, if the habitat was essential to the survival of the species. Species are listed alphabetically by their scientific name.

State Listed – on Massachusetts list of endangered, threatened and special concern species. **Not Listed** – a species of conservation concern but not yet listed on the state list. **State Status** - E = endangered; T = threatened; SC = special concern. **Fed Status** – E = endangered; T = threatened. **NE Concern** - Specie listed as a regional conservation concern by the Northeast Endangered Species and Wildlife Diversity Technical Committee, 1999. **Other Concerns** – **BS**- At-risk Breeding Species (The species was judged by DFW biologists to have significant breeding populations in MA and because of their relative rarity and declines in abundance, distribution or habitat); **GR** = Globally Rare (with global rank of G1 through G3 according to NatureServe); **PIF** = Partners in Flight (on PIF conservation priority list for MA as Tier 1 species and breeding or migrating in state); **SB** = Shorebird Plan (in US Shorebird Conservation Plan as a species of high concern); **WB** = Waterbird Plan (in North American Waterbird Conservation Plan as a species of high concern and breeding in state); **WC** = Wintering Concentration (regionally significant wintering populations of the species occur in MA).

Table 1. At-risk wildlife species in Coastal Dunes, Beaches and Small Islands

State Listing Status	Taxon Grouping	Scientific Name	Common Name	State Status	Fed Status	NE Concern	Other Concern
State-listed	Birds	<i>Charadrius melodus</i>	Piping Plover	T	T		GR
		<i>Oceanodroma leucorhoa</i>	Leach's Storm Petrel	E			
		<i>Sterna dougallii</i>	Roseate Tern	E	E		GR
		<i>Sterna hirundo</i>	Common Tern	SC		SC	
		<i>Sterna paradisaea</i>	Artic Tern	SC			
		<i>Sterna antillarum</i>	Least Tern	SC		SC	
	Beetles	<i>Cicindela dorsalis dorsalis</i>	Northeastern Beach Tiger Beetle	E	T		GR
		<i>Cicindela limbalis</i>	Bank Tiger Beetle	SC			
	Lepidoptera	<i>Bagisara rectifascia</i>	Straight Lined Mallow Moth	SC			
		<i>Cingilia catenaria</i>	Chain Dot Geometer	SC			
<i>Oncocnemis riparia</i>		Dune Noctuid Moth	SC				
Not listed	Birds	<i>Arenaria interpres</i>	Ruddy Turnstone	--			SB
		<i>Calidris alba</i>	Sanderling	--			SB
		<i>Calidris canutus</i>	Red Knot	--		SC	SB
		<i>Egretta thula</i>	Snowy Egret	--			WB
		<i>Haematopus palliatus</i>	American Oystercatcher	--			SB
		<i>Larus atricilla</i>	Laughing Gull	--			BS
		<i>Limnodromus griseus</i>	Short-billed Dowitcher	--			SB
		<i>Numenius borealis</i>	Eskimo Curlew	--			SB
		<i>Numenius phaeopus</i>	Whimbrel	--			SB
	<i>Nycticorax nycticorax</i>	Black-crowned Night Heron	--			BS	
Mammals	<i>Somateria mollissima</i>	Common Eider	--			WC	
	<i>Microtus breweri</i>	Beach Vole	--			GR	

Table 2. At-risk wildlife species in Salt Marshes

State Listing Status	Taxon Grouping	Scientific Name	Common Name	State Status	Fed Status	NE Concern	Other Concern
State-listed	Reptiles	<i>Malaclemys terrapin</i>	Diamondback Terrapin	T		SC	
	Birds	<i>Asio flammeus</i>	Short-eared Owl	E		SC	
		<i>Sterna dougallii</i>	Roseate Tern	E	E		GR
		<i>Sterna hirundo</i>	Common Tern	SC		SC	
		<i>Sterna paradisaea</i>	Artic Tern	SC			
		<i>Sterna antillarum</i>	Least Tern	SC		SC	
		<i>Tyto alba</i>	Barn Owl	SC			
	Snails	<i>Cincinnatia winkleyi</i>	New England Siltsnail	SC			GR
		<i>Lottoridinops tenuipes</i>	Coastal Marsh Snail	SC			
		<i>Vertigo perryi</i>	Olive Vertigo	SC			GR
	Lepidoptera	<i>Bagisara rectifascia</i>	Straight Lined Mallow Moth	SC			
		<i>Neoligia semicana</i>	Northern Brocade Moth	SC			
		<i>Spartiniphaga inops</i>	Spartina Borer	SC			GR
Not Listed	Birds	<i>Ammodramus caudacutus</i>	Saltmarsh Sharp-tailed Sparrow	--		SC	PIF
		<i>Ammodramus maritimus</i>	Seaside Sparrow	--			PIF
		<i>Anas rubripes</i>	American Black Duck	--			BS, MC
		<i>Egretta thula</i>	Snowy Egret	--			WB
		<i>Nycticorax nycticorax</i>	Black-crowned Night Heron	--			BS
		<i>Sturnella magna</i>	Eastern Meadowlark	--			BBS

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Table 3. At-risk wildlife species in Marshes and Wet Meadows

State Listing Status	Taxon Grouping	Scientific Name	Common Name	State Status	Fed Status	NE Concern	Other Concern
State-listed	Reptiles	<i>Clemmys muhlenbergii</i>	Bog Turtle	E	T		GR
	Birds	<i>Ammodramus henslowii</i>	Henslow's Sparrow	E		SC	PIF
		<i>Botaurus lentiginosus</i>	American Bittern	E		SC	
		<i>Circus cyaneus</i>	Northern Harrier	T		SC	
		<i>Cistothorus platensis</i>	Sedge Wren	E		SC	
		<i>Gallinula chloropus</i>	Common Moorhen	SC			
		<i>Ixobrychus exilis</i>	Least Bittern	E			
		<i>Podilymbus podiceps</i>	Pied-Billed Grebe	E		SC	
		<i>Rallus elegans</i>	King Rail	T			
	Mammals	<i>Sorex palustris</i>	Water Shrew	SC		SC	
	Snails	<i>Vertigo perryi</i>	Olive Vertigo	SC			GR
	Odonates	<i>Enallagma laterale</i>	New England Bluet	SC			GR
	Lepidoptera	<i>Apamea inebriate</i>	Drunk Apamea Moth	SC			GR
		<i>Apamea mixta</i>	Coastal Plain Apamea Moth	SC			
		<i>Bagisara rectifascia</i>	Straight Lined Mallow Moth	SC			
		<i>Euphyes dion</i>	Dion Skipper	T			
		<i>Neoligia semicana</i>	Northern Brocade Moth	SC			
<i>Pieris oleracea</i>		Eastern Veined White	T				
<i>Spartiniphaga inops</i>		Spartina Borer	SC			GR	
Not Listed	Amphibians	<i>Rana pipiens</i>	Northern Leopard Frog	--		SC	
	Reptiles	<i>Thamnophis sauritus</i>	Eastern Ribbon Snake	--		SC	
	Birds	<i>Anas rupripes</i>	American Black Duck	--			BS, MC
		<i>Butorides virescens</i>	Green Heron	--			BBS
		<i>Porzana Carolina</i>	Sora	--			
Lepidoptera	<i>Macrochilo bivittata</i>	Two-striped Cord Grass Moth	--			GR	

Table 4. At-risk wildlife species in Shrub Swamps

State Listing Status	Taxon Grouping	Scientific Name	Common Name	State Status	Fed Status	NE Status	Other Concern
State-listed	Reptiles	<i>Clemmys guttata</i>	Spotted Turtle	SC		SC	
		<i>Clemmys muhlenbergii</i>	Bog Turtle	E	T		GR
		<i>Emydoidea blandingii</i>	Blanding's Turtle	T		SC	
	Lepidoptera	<i>Catocala pretiosa pretiosa</i>	Precious Underwing Moth	E			GR
		<i>Cingilia catenaria</i>	Chain Dot Geometer	SC			
		<i>Hemaris gracilis</i>	Slender Clearwing Sphinx Moth	SC			GR
		<i>Lithophane viridipallens</i>	Pale Green Pinion Moth	SC			
		<i>Metarranthis pilosaria</i>	Coastal Swamp Metarranthis	SC			GR
		<i>Papaipema stenocelis</i>	Chain Fern Borer	T			
Not Listed	Birds	<i>Papaipema sulpherata</i>	Water-Willow Stem Borer	T			GR
		<i>Anas rupripes</i>	American Black Duck	--			BS, MC
		<i>Buteo platypterus</i>	Broad-Winged Hawk	--			BBS
		<i>Butorides virescens</i>	Green Heron	--			BBS

State Listed – on Massachusetts list of endangered, threatened and special concern species. **Not Listed** – a species of conservation concern but not yet listed on the state list. **State Status** - E = endangered; T = threatened; SC = special concern. **Fed Status** – E = endangered; T = threatened. **NE Concern** - Specie listed as a regional conservation concern by the Northeast Endangered Species and Wildlife Diversity Technical Committee, 1999. **Other Concerns** – **GR** = Globally Rare (i.e., with global rank of G1 through G3 according to NatureServe); **MRE** = Migratory Restoration Effort; **TFC** = Core Target Fish Community Species.

Table 5. At-risk wildlife species in *Connecticut and Merrimack Mainstems*

State Listing Status	Taxon Grouping	Scientific Name	Common Name	State Status	Fed Status	NE Concern	Other Concern
State-Listed	Fishes	<i>Acipenser brevirostrum</i>	Shortnose Sturgeon	E	E		GR
		<i>Acipenser oxyrinchus</i>	Atlantic Sturgeon	E		SC	GR
		<i>Hybognathus regius</i>	Eastern Silvery Minnow	SC			
		<i>Lota lota</i>	Burbot	SC			
	Birds	<i>Haliaeetus leucocephalus</i>	Bald Eagle	E	T		
	Mussels	<i>Alasmidonta undulate</i>	Triangle Floater	SC			
		<i>Lampsilis cariosa</i>	Yellow Lampmussel	E		SC	GR
		<i>Leptodea ochracea</i>	Tidewater Mucket	SC		SC	
		<i>Ligumia nasuta</i>	Eastern Pondmussel	SC		SC	
		<i>Strophitis undulates</i>	Creeper	SC			
	Odonates	<i>Gomphus fraternus</i>	Midland Clubtail	E			
		<i>Gomphus quadricolor</i>	Rapids Clubtail	T			GR
		<i>Gomphus vastus</i>	Cobra Clubtail	SC			
		<i>Gomphus ventricosus</i>	Skillet Clubtail	SC			
		<i>Neurocordulia obsolete</i>	Umber Shadowdragon	SC			
		<i>Neurocordulia yamaskaensis</i>	Stygian Shadowdragon	SC			
		<i>Stylurus amnicola</i>	Riverine Clubtail	E			
		<i>Stylurus spiniceps</i>	Arrow Clubtail	T			
	Beetles	<i>Cicindela marginipennis</i>	Cobblestone Tiger Beetle	E			
		<i>Cicindela puritana</i>	Puritan Tiger Beetle	E	T		
Not Listed	Fishes	<i>Alosa aestivalis</i>	Blueback Herring	--			MRE
		<i>Alosa pseudoharengus</i>	Alewife	--			MRE
		<i>Alosa sapidissima</i>	American Shad	--			MRE
		<i>Anguilla rostrata</i>	American Eel	--			MRE
		<i>Catostomus commersoni</i>	White Sucker	--			TFC
		<i>Luxilus cornutus</i>	Common Shiner	--			TFC
		<i>Salmo salar</i>	Atlantic Salmon	--			MRE
<i>Semotilus corporalis</i>	Fallfish	--			TFC		

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Table 6. At-risk wildlife species in *Large and Mid-sized Rivers*

State Listing Status	Taxon Grouping	Scientific Name	Common Name	State Status	Fed Status	NE Concern	Other Concern	
State-Listed	Fishes	<i>Acipenser brevirostrum</i>	Shortnose Sturgeon	E	E		GR	
		<i>Acipenser oxyrinchus</i>	Atlantic Sturgeon	E		SC	GR	
		<i>Couesius plumbens</i>	Lake Chub	E				
		<i>Hybognathus regius</i>	Eastern Silvery Minnow	SC				
		<i>Catostomus catostomus</i>	Longnose Sucker	SC				
		<i>Lota lota</i>	Burbot	SC				
	Reptiles	<i>Clemmys insculpta</i>	Wood Turtle	SC		SC		
	Birds	<i>Haliaeetus leucocephalus</i>	Bald Eagle	E	T			
	Snails	<i>Ferissia walkeri</i>	Walker's Limpet	SC				
		<i>Pomatiopsis lapidaria</i>	Slender Walker	E				
	Mussels	<i>Alasmidonta heterodon</i>	Dwarf Wedgemussel	E	E		GR	
		<i>Alasmidonta undulate</i>	Triangle Floater	SC				
		<i>Alasmidonta varicose</i>	Brook Floater	E		SC	GR	
		<i>Lampsilis cariosa</i>	Yellow Lampmussel	E		SC	GR	
		<i>Leptodea ochracea</i>	Tidewater Mucket	SC		SC		
		<i>Ligumia nasuta</i>	Eastern Pondmussel	SC		SC		
		<i>Strophitis undulates</i>	Creeper	SC				
	Odonates	<i>Boyeria grafiana</i>	Ocellated Darner	SC				
		<i>Gomphus abbreviatus</i>	Spine-crowned Clubtail	E			GR	
		<i>Gomphus descriptus</i>	Harpoon Clubtail	E				
		<i>Gomphus fraternus</i>	Midland Clubtail	E				
		<i>Gomphus quadricolor</i>	Rapids Clubtail	T			GR	
		<i>Gomphus ventricosus</i>	Skillet Clubtail	SC				
		<i>Neurocordulia obsoleta</i>	Umber Shadowdragon	SC				
		<i>Neurocordulia yamaskaensis</i>	Stygian Shadowdragon	SC				
		<i>Ophiogomphus aspersus</i>	Brook Snaketail	SC			GR	
		<i>Ophiogomphus carolus</i>	Riffle Snaketail	T				
		<i>Stylurus amnicola</i>	Riverine Clubtail	E				
		<i>Stylurus scudderi</i>	Zebra Clubtail	E				
		<i>Stylurus spiniceps</i>	Arrow Clubtail	T				
	Beetles	<i>Cicindela duodecimguttata</i>	Twelve-Spotted Tiger Beetle	SC				
	Not Listed	Fishes	<i>Alosa aestivalis</i>	Blueback Herring	--			MRE
			<i>Alosa pseudoharengus</i>	Alewife	--			MRE
<i>Alosa sapidissima</i>			American Shad	--			MRE	
<i>Anguilla rostrata</i>			American Eel	--			MRE	
<i>Catostomus commersoni</i>			White Sucker	--			TFC	
<i>Enneacanthus obesus</i>			Banded Sunfish	--		SC		
<i>Erimyzon oblongus</i>			Creek Chubsucker	--			TFC	
<i>Etheostoma fusiforme</i>			Swamp Darter	--				
<i>Etheostoma olmstedi</i>			Tessellated Darter	--			TFC	
<i>Luxilus cornutus</i>			Common Shiner	--			TFC	
<i>Rhinichthys atratulus</i>			Blacknose Dace	--			TFC	
<i>Rhinichthys cataractae</i>			Longnose Dace	--			TFC	
<i>Salmo salar</i>			Atlantic Salmon	--			MRE	
<i>Salvelinus fontinalis</i>			Brook Trout	--			EBTJV	
<i>Semotilus atromaculatus</i>		Creek Chub	--			TFC		
<i>Semotilus corporalis</i>		Fallfish	--			TFC		
Misc. Invertebrates		<i>Alloperla voinae</i>	A Stonefly	--			GR	
		<i>Hansonoperla Appalachia</i>	Hanson's Appalachian Stonefly	--			GR	
	<i>Perlesta nitida</i>	A Stonefly	--			GR		

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Table 7. At-risk wildlife species in *Small Streams*

State Listing Status	Taxon Grouping	Scientific Name	Common Name	State Status	Fed Status	NE Concern	Other Concern
State-listed	Fishes	<i>Lampetra appendix</i>	American Brook Lamprey	T		SC	
		<i>Couesius plumbeus</i>	Lake Chub	E			
		<i>Phoxinus eos</i>	Northern Redbelly Dace	E			
		<i>Catostomus catostomus</i>	Longnose Sucker	SC			
	Amphibians	<i>Gyrinophilus porphyriticus</i>	Spring Salamander	SC			
	Reptiles	<i>Clemmys insculpta</i>	Wood Turtle	SC		SC	
	Snails	<i>Pomatiopsis lapidaria</i>	Slender Walker	E			
	Crustaceans	<i>Cambarus bartonii</i>	Appalachian Brook Crayfish	SC			
	Odonates	<i>Boyeria grafiana</i>	Ocellated Darner	SC			
		<i>Somatochlora elongata</i>	Ski-Tailed Emerald	SC			
		<i>Somatochlora forcipata</i>	Forcipate Emerald	SC			
		<i>Somatochlora Georgiana</i>	Coppery Emerald	E			GR
		<i>Somatochlora kenndeyi</i>	Kennedy's Emerald	E			
		<i>Somatochlora linearis</i>	Mocha Emerald	SC			
Lepidoptera	<i>Papaipema sulphurata</i>	Water-Willow Stem Borer	T			GR	
Not Listed	Fishes	<i>Cottus cognatus</i>	Slimy Sculpin	--			
		<i>Rhinichthys atratulus</i>	Blacknose Dace	--			TFC
		<i>Rhinichthys cataractae</i>	Longnose Dace	--			TFC
		<i>Salmo salar</i>	Atlantic Salmon	--			MRE
		<i>Salvelinus fontinalis</i>	Brook Trout	--			EBTJV
		<i>Semotilus atromaculatus</i>	Creek Chub	--			TFC
		<i>Semotilus corporalis</i>	Fallfish	--			TFC
	Amphibians	<i>Rana pipiens</i>	Northern Leopard Frog	--		SC	
	Reptiles	<i>Thamnophis sauritus</i>	Eastern Ribbon Snake	--		SC	
	Birds	<i>Seiurus motacilla</i>	Louisiana Waterthrush	--		SC	PIF
	Misc.	<i>Alloperla voinae</i>	A Stonefly	--			GR
	Invertebrates	<i>Hansonoperla appalachia</i>	Hanson's Appalachian Stonefly	--			GR
		<i>Perlesta nitida</i>	A Stonefly	--			GR
	Snails	<i>Physa vernalis</i>	Vernal Physa	--			GR

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Table 8 At-risk wildlife species in Grasslands

State Listing Status	Taxon Grouping	Scientific Name	Common Name	State Status	Fed Status	NE Status	Other Concern
State-listed	Birds	<i>Circus cyaneus</i>	Northern Harrier	T		SC	
		<i>Bartramia longicauda</i>	Upland Sandpiper	E		SC	
		<i>Tyto alba</i>	Barn Owl	SC			
		<i>Asio flammeus</i>	Short-Eared Owl	E		SC	PIF
		<i>Pooecetes gramineus</i>	Vesper Sparrow	T			
		<i>Ammodramus savannarum</i>	Grasshopper Sparrow	T			
		<i>Ammodramus henslowii</i>	Henslow's Sparrow	E		SC	PIF
	Mammals	<i>Synaptomys cooperi</i>	Southern Bog Lemming	SC			
	Beetles	<i>Cicindela purpurea</i>	Purple Tiger Beetle	SC			
		<i>Nicrophorus americanus</i>	American Burying Beetle	E	E		GR
	Lepidoptera	<i>Abagrotis nefascia</i>	Coastal Heathland Cutworm	SC			GR
		<i>Callophrys irus</i>	Frosted Elfin	SC			GR
		<i>Cyenia inopinatus</i>	Unexpected Cyenia	T			
		<i>Digrammia eremiata</i>	Three-lined Angle Moth	T			
		<i>Erynnis persius persius</i>	Persius Duskywing	E			GR
		<i>Euchlaena madusaria</i>	Sandplain Euchlaena	SC			
<i>Faronta rubripennis</i>		The Pink Streak	T			GR	
<i>Grammia phyllira</i>		Phyllira Tiger Moth	E				
<i>Ptichodis bistrigata</i>		Southern Ptichodis	T			GR	
Not Listed	Reptiles	<i>Heterodon platirhinos</i>	Eastern Hognose Snake	--		SC	
	Birds	<i>Colinus virginianus</i>	Northern Bobwhite	--			BBS, MC
		<i>Falco sparverius</i>	American Kestrel	--			BBS
		<i>Scolopax minor</i>	American Woodcock	--			MC, SB
		<i>Sturnella magna</i>	Eastern Meadowlark	--			BBS

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Table 9. At-risk wildlife species in Pitch Pine / Scrub Oak Systems

State Listing Status	Taxon Grouping	Scientific Name	Common Name	State Status	Fed Status	NE Status	Other Concern
State-listed	Reptiles	<i>Terrapene carolina</i>	Eastern Box Turtle	SC		SC	
	Birds	<i>Circus cyaneus</i>	Northern Harrier	T		SC	
		<i>Asio otus</i>	Long-eared Owl	SC		SC	
		<i>Poocetes gramineus</i>	Vesper Sparrow	T			
	Beetles	<i>Cicindela patruela</i>	Barrens Tiger Beetle	E			GR
		<i>Nicrophorus americanus</i>	American Burying Beetle	E	E		GR
	Lepidoptera	<i>Abagrotis nefascia</i>	Coastal Heathland Cutworm	SC			GR
		<i>Acronicta albarufa</i>	Barrens Daggermoth	T			GR
		<i>Anisota stigma</i>	Spiny Oakworm	SC			
		<i>Apodrepanulatrix liberaria</i>	New Jersey Tea Inchworm	E			
		<i>Callophrys irus</i>	Frosted Elfin	SC			GR
		<i>Catocala herodias gerhardi</i>	Gerhard's Underwing	SC			GR
		<i>Chaetagnela cerata</i>	Waxed Sallow Moth	SC			GR
		<i>Cicinnus melsheimeri</i>	Melsheimer's Sack Bearer	T			
		<i>Cingilia catenaria</i>	Chain Dot Geometer	SC			
		<i>Digrammia eremiata</i>	Three-lined Angle Moth	T			
		<i>Eacles imperialis</i>	Imperial Moth	T			
		<i>Erynnis persius persius</i>	Persius Duskywing	E			GR
		<i>Euchlaena madusaria</i>	Sandplain Euchlaena	SC			
		<i>Hemaris gracilis</i>	Slender Clearwing Sphinx Moth	SC			GR
		<i>Hemileuca maia</i>	Barrens Buckmoth	SC			
		<i>Hypomecis buchholzaria</i>	Buchholz's Gray	E			GR
		<i>Itame sp. 1</i>	Pine Barrens Itame	SC			GR
		<i>Lycia rachelae</i>	Twilight Moth	E			
		<i>Lycia ypsilon</i>	Pine Barrens Lycia	T			
		<i>Mettarranthis apiciaria</i>	Barrens Metarranthis	E			
	<i>Psectraglaea carnosia</i>	Pink Sallow Moth	SC			GR	
	<i>Pichodis bistrigata</i>	Southern Ptichodis	T			GR	
	<i>Stenoporpa polygrammaria</i>	Faded Gray Geometer	T				
	<i>Zale sp. 1</i>	Pine Barrens Zale	SC			GR	
<i>Zanclognatha martha</i>	Pine Barrens Zanclognatha	T					
Not Listed	Reptiles	<i>Coluber constrictor</i>	Black Racer	--			
		<i>Heterodon platirhinos</i>	Eastern Hognose Snake	--		SC	
	Birds	<i>Caprimulgus vociferus</i>	Whip-poor-will	--		SC	
		<i>Colinus virginianus</i>	Northern Bobwhite	--			BBS
		<i>Dendroica discolor</i>	Prairie Warbler	--			PIF
		<i>Pipilo erythrophthalmus</i>	Eastern Towhee	--			BBS
		<i>Toxostoma rufum</i>	Brown Thrasher	--			BBS
	Lepidoptera	<i>Schizura apicalis</i>	Plain Schizura	--			GR
<i>Zale curema</i>		Northeastern Pine Zale	--			GR	

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Table 10. At-risk wildlife species in Upland Forests

State Listing Status	Taxon Grouping	Scientific Name	Common Name	State Status	Fed Status	NE Concern	Other Concern
State-listed	Amphibians	<i>Ambystoma jeffersonianum</i>	Jefferson Salamander	SC		SC	
		<i>Ambystoma laterale</i>	Blue-Spotted Salamander	SC		SC	
		<i>Ambystoma opacum</i>	Marbled Salamander	T			
		<i>Hemidactylum scutatum</i>	Four-Toed Salamander	SC			
		<i>Scaphiopus holbrookii</i>	Eastern Spadefoot	T		SC	
	Reptiles	<i>Terrapene Carolina</i>	Eastern Box Turtle	SC		SC	
		<i>Carphophis amoenus</i>	Eastern Wormsnake	T			
		<i>Elaphe obsoleta</i>	Eastern Ratsnake	E			
		<i>Agkistrodon contortrix</i>	Copperhead	E			
		<i>Crotalus horridus</i>	Timber Rattlesnake	E		SC	
	Birds	<i>Accipiter striatus</i>	Sharp-Shinned Hawk	SC			PIF
		<i>Asio otus</i>	Long-Eared Owl	SC		SC	PIF
		<i>Parula americana</i>	Northern Parula	T			PIF
		<i>Dendroica striata</i>	Blackpoll Warbler	SC			
	Lepidoptera	<i>Erora laeta</i>	Early Hairstreak	T			GR
<i>Rhodoecia aurantiago</i>		Orange Sallow Moth	T				
<i>Satyrium favonius</i>		Oak Hairstreak	SC				
Not Listed	Reptiles	<i>Coluber constrictor</i>	Black Racer	--			
	Birds	<i>Buteo platypterus</i>	Broad-Winged Hawk	--			BBS
		<i>Hylocichla mustelina</i>	Wood Thrush	--			PIF
	Mammals	<i>Lasionycteris noctivagans</i>	Silver-haired Bat	--		SC	
		<i>Lasiurus borealis</i>	Eastern Red Bat	--		SC	
		<i>Lasiurus cinereus</i>	Hoary Bat	--		SC	
	Lepidoptera	<i>Pieris virginensis</i>	West Virginia White	--			GR

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Table 11. At-risk wildlife species in *Young Forests and Shrublands*

State Listing Status	Taxon Grouping	Scientific Name	Common Name	State Status	Fed Status	NE Concern	Other Concern
State-listed	Reptiles	<i>Elaphe obsoleta</i>	Eastern Ratsnake	E			
	Birds	<i>Vermivora chrysoptera</i>	Golden-Winged Warbler	E		SC	
		<i>Oporornis philadelphia</i>	Mourning Warbler	SC			
	Mammals	<i>Synaptomys cooperi</i>	Southern Bog Lemming	SC			
Not Listed	Reptiles	<i>Coluber constrictor</i>	Black Racer	--			
		<i>Heterodon platirhinos</i>	Eastern Hognose Snake	--		SC	
	Birds	<i>Bonasa umbellus</i>	Ruffed Grouse	--			
		<i>Buteo platypterus</i>	Broad-Winged Hawk	--			BBS
		<i>Caprimulgus vociferus</i>	Whip-poor-will	--		SC	
		<i>Colinus virginianus</i>	Northern Bobwhite	--			BBS
		<i>Dendroica discolor</i>	Prairie Warbler	--			PIF
		<i>Empidonax traillii</i>	Willow Flycatcher	--			PIF
		<i>Falco sparverius</i>	American Kestrel	--			BBS
		<i>Pipilo erythrophthalmus</i>	Eastern Towhee	--			BBS
		<i>Scolopax minor</i>	American Woodcock	--			SB
		<i>Spizella pusilla</i>	Field Sparrow	--			BBS
		<i>Toxostoma rufum</i>	Brown Thrasher	--			BBS
	<i>Vermivora pinus</i>	Blue-winged Warbler	--			PIF	
	<i>Zonotrichia albicollis</i>	White-throated Sparrow	--			BBS	
Mammals	<i>Sylvilagus transitionalis</i>	New England Cottontail	--		SC		
Lepidoptera	<i>Hadena ectypa</i>	A Noctuid Moth	--			GR	