

CHAPTER 5.0 PROBLEMS, PRIORITY RESEARCH, AND SURVEY EFFORTS

*Wild beasts and birds are by right
not the property merely of the people who are alive today,
but the property of unknown generations,
whose belongings we have no right to squander.*

Theodore Roosevelt

5.1 SPECIES-SPECIFIC PROBLEMS AND NEEDS

In previous chapters, we summarized what we know about the abundance and distribution of Maine's fauna, we described how we selected Species of Greatest Conservation Need (SGCN), and how we identified and characterized Maine's key habitats. In this chapter, we outline how we integrated this information with information on problems and threats to SGCN and identified conservation actions needed to address those problems and threats (Tables 30-35).

Tables were developed for each broad species group: Birds (Table 30), Herpetofauna (Table 31), Invertebrates (Table 32), Inland Fish (Table 33) and Mammals (Table 34). For the Marine group, we developed Table 35 only for diadromous fish.¹ We focused our efforts on Priority 1 and Priority 2 SGCN for all taxa. However, for the bird, herpetofauna, invertebrate, and mammal taxa, we also included Priority 3 species (not SGCN) for future planning and to help partners understand where the species they are most concerned about fit into the relative conservation scheme.

Each table was organized by ecosystems (Coastal, Freshwater, and Upland), and by the 21 key habitats within each ecosystem (Table 9). We addressed each primary habitat separately, and under each primary habitat we included:

1. A list of Priority 1-3 species associated with that habitat (Tables 10-15) (Priority 3 species not included for inland and diadromous fish);

¹ Publications that describe problems and threats, data deficiencies, and potential conservation and management recommendations to reduce negative impacts to marine species of concern in Maine (McCullough et al. 2003, Stockwell 2004) and the Northeast region (NOAA 2004) are found in Appendices 5 and 10.

2. A description of threats to that habitat;
3. A management goal and general objectives for that habitat;
4. Strategies and tasks to address objectives for that habitat and the species associated with it; and
5. A section that describes the following for each SGCN for which that habitat serves as the species most important habitat:
 - o Status of the SGCN species;
 - o Distribution of the species;
 - o Threats to the species;
 - o Population and habitat objectives and actions for the species, which includes management actions, surveys, and monitoring; and
 - o Research and outreach objectives and actions for the species, which includes conservation actions.

Information used to populate Tables 30-35 came from a wide variety of sources. For threats specific to SGCN species and their habitats, we consulted international, national, regional, and state plans and initiatives. We also consulted our knowledge base of threats that was compiled through our comprehensive species planning process (Chapter 6.2.1). As part of the planning process, we develop species assessments for individual species or groups of species, which require the author (species expert) to identify known threats to the species and their habitats. Other species experts review these assessments and provide additional input. Finally, the species public working group further identifies threats to the species and its habitats as they develop species management goals and objectives. We also need to acknowledge that the species experts who compiled these tables, have, through years of experience and accumulated knowledge, become very familiar with the threats facing the species they work with. Finally, members of the CWCS Public Working Group were given the opportunity to critique these tables and provide further input, which several chose to do. For more detailed information on sources we consulted, please refer to the *Sources of Information* (Chapter 11) and the *Literature Cited and References* sections of this document.

Although we sought to identify the major, known threats to each SGCN, we know that there may be threats that we did not list. Also, our knowledge of some species is very limited, and consequently we may not clearly understand the threats they face.

**Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.
Featured Species**

American Bittern	51
American Black Duck (Breeding Population).....	51
American Black Duck (Wintering Population).....	16
American Coot.....	52
American Oystercatcher	21
American Pipit (Breeding).....	89
American Three-toed Woodpecker.....	78
American Woodcock.....	92
Arctic Tern	22
Atlantic Puffin.....	22
Bald Eagle	23
Baltimore Oriole.....	69
Barn Swallow	48
Barred Owl.....	78
Barrow’s Goldeneye	64
Bay-breasted Warbler.....	79
Bicknell’s Thrush.....	87
Black and White Warbler	70
Black Tern.....	52
Black-billed Cuckoo	70
Blackburnian Warbler	79
Black-crowned Night Heron	42
Black-throated Blue Warbler.....	71
Black-throated Green Warbler	71
Blue-gray Gnatcatcher.....	92
Blue-winged Warbler	93
Bobolink	99
Bonaparte’s Gull (Breeding)	48
Brown Thrasher	93
Canada Warbler.....	71
Cape May Warbler.....	80
Cattle Egret.....	24
Chestnut-sided Warbler	93
Chimney Swift.....	103
Common Eider (Breeding Population Only).....	24

**Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.
Featured Species (continued)**

Common Eider (Molting and Wintering Birds)	16
Common Loon (Breeding)	48
Common Loon (Wintering and Non-breeding).....	17
Common Moorhen	54
Common Murre.....	25
Common Nighthawk	94
Common Tern.....	26
Eastern Kingbird	94
Eastern Meadowlark.....	99
Eastern Screech Owl	72
Eastern Towhee.....	95
Field Sparrow.....	100
Glossy Ibis	26
Golden Eagle	105
Grasshopper Sparrow.....	100
Great Blue Heron.....	34
Great Cormorant.....	26
Great Egret	27
Great-crested Flycatcher	72
Greater Scaup (Non-breeding)	17
Greater Shearwater	14
Greater Yellowlegs	35
Harlequin Duck	27
Horned Lark (Breeding)	100
Least Bittern.....	54
Least Tern.....	35
Little Blue Heron	28
Loggerhead Shrike (Non-breeding)	95
Long-eared Owl	80
Louisiana Waterthrush.....	64
Marsh Wren	54
Nelson’s Sharp-tailed Sparrow	42
Northern Flicker	73
Northern Parula	73

**Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.
Featured Species (continued)**

Olive-sided Flycatcher	80
Peregrine Falcon	105
Pied-billed Grebe	49
Piping Plover.....	37
Prairie Warbler.....	84
Purple Finch.....	81
Purple Martin	53
Purple Sandpiper	28
Razorbill.....	28
Red Crossbill	81
Red Knot.....	37
Red-necked Phalarope	14
Roseate Tern	29
Rose-breasted Grosbeak.....	74
Ruddy Duck	18
Ruddy Turnstone	30
Rusty Blackbird.....	60
Saltmarsh Sharp-tailed Sparrow.....	43
Sanderling.....	38
Sandhill Crane	55
Scarlet Tanager	74
Sedge Wren.....	56
Semipalmated Sandpiper	38
Short-eared Owl.....	101
Snowy Egret	30
Tri-colored Heron.....	30
Upland Sandpiper.....	84
Veery	75
Vesper Sparrow	85
Whimbrel.....	38
Whip-poor-will	95
Willet.....	44
Willow Flycatcher.....	61
Wood Thrush	75

**Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.
Featured Species (continued)**

Yellow Rail57
 Yellow-bellied Sapsucker.....75
 Yellow-throated Vireo65

Habitats

COASTAL 11
 Marine Open Water **(CO)**..... 12
 Greater Shearwater 14
 Red-necked Phalarope 14
 Estuaries and Bays **(CE)** 15
 American Black Duck (Wintering Population) 16
 Common Eider (Molting and Wintering Birds)..... 16
 Common Loon (Wintering and Non-breeding) 17
 Greater Scaup (Non-breeding) 17
 Ruddy Duck 18
 Rocky Coastline and Islands **(CC)**..... 19
 American Oystercatcher 21
 Arctic Tern..... 22
 Atlantic Puffin 22
 Bald Eagle..... 23
 Cattle Egret 24
 Common Eider (Breeding Population Only)..... 24
 Common Murre 25
 Common Tern 26
 Glossy Ibis 26
 Great Cormorant 27
 Great Egret 27
 Harlequin Duck 28
 Little Blue Heron 28
 Purple Sandpiper 28
 Razorbill 28
 Roseate Tern 29
 Ruddy Turnstone 30

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

Habitats (continued)

COASTAL (continued)

Rocky Coastline and Islands **(CC)** (continued)

Snowy Egret.....	30
Tri-colored Heron	30

Unconsolidated Shore (beaches and mudflats) **(CU)**

Great Blue Heron	34
Greater Yellowlegs.....	35
Least Tern.....	35
Piping Plover.....	37
Red Knot.....	37
Sanderling.....	38
Semipalmated Sandpiper.....	38
Whimbrel.....	38

Estuarine Emergent Salt Marsh **(CS)**

Black-crowned Night Heron	42
Nelson’s Sharp-tailed Sparrow	42
Saltmarsh Sharp-tailed Sparrow	43
Willet	44

FRESHWATER

Lakes and Ponds **(WL)**

Barn Swallow	48
Bonaparte’s Gull (Breeding).....	48
Common Loon (Breeding).....	48
Pied-billed Grebe	49

Emergent Marsh and Wet Meadows **(WM)**

American Bittern	51
American Black Duck (Breeding Population).....	51
American Coot	52
Black Tern.....	52
Common Moorhen	54
Least Bittern.....	54
Marsh Wren	54

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

Habitats (continued)

FRESHWATER (continued)

Emergent Marsh and Wet Meadows (WM) (continued)

Purple Martin.....	53
Sandhill Crane	55
Sedge Wren	56
Yellow Rail	57

Forested Wetland (WF)	58
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Shrub-scrub Wetland (WS).....	59
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Rusty Blackbird	60
Willow Flycatcher	61

Peatlands (WP).....	61
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Rivers and Streams (WR).....	62
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Barrow’s Goldeneye.....	64
Louisiana Waterthrush	64
Yellow-throated Vireo.....	65

UPLAND	66
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Deciduous and Mixed Forest (UD)	67
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Baltimore Oriole	69
Black and White Warbler	70
Black-billed Cuckoo	70
Black-throated Blue Warbler	71
Black-throated Green Warbler	71
Canada Warbler.....	71
Eastern Screech Owl	72
Great-crested Flycatcher	72
Northern Flicker	73
Northern Parula.....	73
Rose-breasted Grosbeak.....	74
Scarlet Tanager	74
Veery.....	75
Wood Thrush	75

**Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.
Habitats (continued)**

UPLAND (continued)

Deciduous and Mixed Forest (UD) (continued)	
Yellow-bellied Sapsucker.....	75
Coniferous Forest (UC)	76
American Three-toed Woodpecker.....	78
Barred Owl.....	78
Bay-breasted Warbler.....	79
Blackburnian Warbler.....	79
Cape May Warbler.....	80
Long-eared Owl.....	80
Olive-sided Flycatcher.....	80
Purple Finch.....	81
Red Crossbill.....	81
Dry Woodland and Barrens (<60% canopy cover) (UB)	82
Prairie Warbler.....	84
Upland Sandpiper.....	84
Vesper Sparrow.....	85
Mountaintop Forest (incl. Krummholz) (UM)	86
Bicknell’s Thrush.....	87
Alpine (summits & tablelands above treeline) (UA)	88
American Pipit (Breeding).....	89
Shrub / Early Successional (incl. regen. forest) (US)	90
American Woodcock.....	92
Blue-gray Gnatcatcher.....	92
Blue-winged Warbler.....	93
Brown Thrasher.....	93
Chestnut-sided Warbler.....	93
Common Nighthawk.....	94
Eastern Kingbird.....	94
Eastern Towhee.....	95
Loggerhead Shrike (Non-breeding).....	95
Whip-poor-will.....	95
Grasslands / Agricultural / Old Field (shrubs <50%) (UG)	96
Bobolink.....	99

**Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.
Habitats (continued)**

UPLAND (continued)

Grasslands / Agricultural / Old Field (shrubs <50%) **(UG)** (continued)

Eastern Meadowlark	99
Field Sparrow	100
Grasshopper Sparrow	100
Horned Lark (Breeding)	100
Short-eared Owl	101

Urban / Suburban **(UU)**

Chimney Swift	103
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Cliff Face and Rocky Outcrop (incl. talus) **(UR)**

Golden Eagle	105
Peregrine Falcon	105

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

COASTAL

Associated Species:

SPECIES	PRIORITY	B	M	W	SPECIES	PRIORITY	B	M	W	SPECIES	PRIORITY	B	M	W
American Oystercatcher	1	X			Great Cormorant (breeding)	2	X		X	Atlantic Brant	3		X	
Least Tern	1	X			Great Egret	2	X			Black Guillemot	3	X		X
Piping Plover	1	X			Greater Scaup (non-breeding)	2		X	X	Black Scoter	3		X	X
Roseate Tern	1	X			Greater Shearwater	2		X		Black-bellied Plover	3		X	
Saltmarsh Sharp-tailed Sparrow	1	X			Greater Yellowlegs	2		X		Canada Goose (NAP) (non-breeding)	3		X	
Short-eared Owl	1	X	X	X	Harlequin Duck	2			X	Common Goldeneye	3	X	X	X
American Black Duck	2	X	X	X	Little Blue Heron	2	X			Eskimo Curlew	3		X	
Arctic Tern	2	X			Nelson's Sharp-tailed Sparrow	2	X			Great Black-backed Gull	3	X	X	X
Atlantic Puffin	2	X		X	Purple Sandpiper	2			X	Herring Gull	3	X	X	X
Bald Eagle	2	X		X	Razorbill	2	X		X	Horned Grebe	3			X
Barrow's Goldeneye	2		X	X	Red Knot	2		X		Killdeer	3	X	X	
Black-crowned Night Heron	2	X			Red-necked Phalarope	2		X		Laughing Gull	3	X		
Cattle Egret	2	X			Ruddy Duck	2	X	X	X	Leach's Storm-petrel	3	X		
Common Eider	2	X	X	X	Ruddy Turnstone	2		X		Lesser Scaup	3		X	
Common Loon	2		X	X	Sanderling	2		X		Long-tailed Duck	3			X
Common Murre	2		X		Semipalmated Sandpiper	2		X		Mallard	3	X	X	X
Common Tern	2	X			Snowy Egret	2	X			Red-throated Loon	3			X
Glossy Ibis	2	X			Tri-colored Heron	2	X			Short-billed Dowitcher	3		X	
Golden Eagle	2	X		X	Whimbrel	2		X		Surf Scoter	3		X	X
Great Blue Heron	2	X	X		Willet	2	X	X		White-winged Scoter	3		X	X

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

Marine Open Water (near shore and offshore) (CO)

Associated Species:

SPECIES	PRIORITY	B	M	W	SPECIES	PRIORITY	B	M	W	SPECIES	PRIORITY	B	M	W
Arctic Tern	2	X			Common Murre	2		X		Leach’s Storm-petrel	3	X		
Atlantic Puffin	2	X		X	Greater Shearwater	2		X		Red-throated Loon	3			X
Common Eider	2	X	X	X	Razorbill	2	X		X					
Common Loon	2		X	X	Red-necked Phalarope	2		X						

Threats:

- Climate change/sea level rise/Gulf Stream (or other currents) reorientation or diminution
- Oil spills /contamination
- Disease
- Prey availability / competition with commercial harvesters
- Entanglement (fishing lines and nets)
- Wind energy developments

Goal: Conserve, restore and enhance populations of focal species that may utilize marine open water habitat to ensure the overall conservation of all native species within this habitat.

General Objectives:

1. *Protect and maintain high priority habitats.*

Strategy	Task
Identify high priority habitats.	<ul style="list-style-type: none"> • Conduct surveys to determine significant wintering, foraging, molting, and staging areas. • Incorporate data into GIS database
Protect high priority habitats	<ul style="list-style-type: none"> • Protect seabird nesting islands and adjacent waters from further development, especially human dwellings, fishing piers, docks, and aquaculture facilities (Maine E&T Handbook) • Use voluntary agreements, conservation easements, conservation tax abatements and incentives, and acquisition to protect important seabird nesting habitat (Maine E&T Handbook) • Avoid over-fishing and polluting nursery areas for herring, hake, and other fish stocks important as food for seabirds (Maine E&T Handbook)

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

Strategy	Task
Plan for oil spill response	<ul style="list-style-type: none"> • Do not use gill nets near seabird nesting islands or known feeding areas (Maine E&T Handbook) • Continue Spill Response efforts and planning, including purchasing survey and hazing equipment (MDIFW Oil Spill Response Plan, NA Regional Shorebird Plan) • Identify and map significant habitat for Continue Spill Response efforts and planning, including purchasing survey and hazing equipment (MDIFW Oil Spill Response Plan, NA Regional Shorebird Plan) • Identify and map significant habitat for nesting, migrating, and wintering species • Document habitat quality and food resources prior to spill to serve as baseline for assessing direct and indirect effects of spills (NA Regional Shorebird Plan) • Implement post-spill surveys to accurately quantify spill damages. • Effects on birds should be minimized by increased enforcement of shipping activities, safe operational procedures, spill clean up and rehabilitation of oiled birds, migrating, and wintering species

2. *Maintain or enhance populations of focal species.*

Strategy	Task
Monitor breeding and non-breeding populations of focal species to determine population size, status, and trends.	<ul style="list-style-type: none"> • Monitor death & morbidity of seabirds. • Identify & monitor important foraging, wintering, and migrating areas. • Develop and implement strategy to monitor colonial birds. • Increase monitoring of seabird by catch and the role of commercial fisheries in seabird mortality. • Determine population level effects of oil and hazardous materials on birds. • Assess role of commercial fisheries on prey availability • Implement surveys to determine population size of all priority species.
Decrease human disturbance/threats.	<ul style="list-style-type: none"> • Develop partnerships with commercial fishery industry and commercial tour boat operators. • Partner with fishery planners to include reduced seabird mortality strategies in all future plans. • Implement increased enforcement of shipping activities, safe operational procedures, spill clean-up, and rehabilitation of oiled birds. • Enforce prohibition on dumping of debris, lines, and nets. • Develop non-persistent lines, nets and traps. • State agencies should fund incentives or measures to eliminate waterbird by catch; specific suggestion for mid-Atlantic is to buy out gill-net fisheries. (BCR 30 workshop) • Determine effects of commercial harvesting on seabird prey availability. • Develop Best Management Practices to assist agency review of aquaculture projects.

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

Species Specific Objectives:

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
Arctic Tern	See Rocky Coastline and Islands		
Atlantic Puffin	See Rocky Coastline and Islands		
Common Eider	See Rocky Coastline and Islands for breeding information / Estuaries and Bays for molting and wintering information		
Common Loon	See Estuaries and Bays for wintering information / Lakes and Ponds for breeding information		
Common Murre	See Rocky Coastline and Islands		
Greater Shearwater	<ul style="list-style-type: none"> • Status and distribution unknown • Non-breeding visitor between March - August • Threats: oil spills and contaminants, incidental harvest by commercial fisheries (by catch) 	<ul style="list-style-type: none"> • Implement monitoring program • Identify and map foraging habitat 	<ul style="list-style-type: none"> • Develop monitoring protocols • Evaluate significance of mortality associated with by catch from fisheries • Evaluate fidelity of birds using specific areas – How stable are areas of concentration? • Build partnerships with fisheries industry, eco-tour, and whale-watch companies
Razorbill	See Rocky Coastline and Islands		
Red-necked Phalarope	<ul style="list-style-type: none"> • Maine population: <1,000 individuals documented in 1990 • Bay of Fundy represents an important staging area • Listed as Species of Special Concern in Maine • Threats: decline in food availability, oil spills, predation, and storm events • Until the early 1980's, large concentrations of birds (250,000 – 1,000,000+) were observed near Quoddy head, Cobscook Bay, on the St Croix River, and Passamaquoddy Bay between Deer Island and Campobello Island. Recent surveys have documented fewer than 1,000 birds in Maine. Reason for decline may be lack of available food. 	<ul style="list-style-type: none"> • Surveys efforts should be initiated to document presence and abundance of phalaropes in Maine (MDIFW Species Assessment) 	<ul style="list-style-type: none"> • Research is needed on availability of marine plankton within Quoddy Bay (MDIFW Species Assessment) • International Shorebird Group identified Phalaropes as a focal species (US and Canada Shorebird Plan) • Evaluate factors, which may have contributed to decline of Red-necked Phalarope in Maine.

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

Estuaries and Bays (CE)

Associated Species:

SPECIES	PRIORITY	B	M	W	SPECIES	PRIORITY	B	M	W	SPECIES	PRIORITY	B	M	W
Least Tern	1	X			Great Cormorant	2	X		X	Herring Gull	3	X	X	X
Roseate Tern	1	X			Greater Scaup (non-breeding)	2		X	X	Horned Grebe	3			X
American Black Duck	2	X	X	X	Red-necked Phalarope	2		X		Laughing Gull	3	X		
Arctic Tern	2	X			Ruddy Duck	2	X	X	X	Leach’s Storm-petrel	3	X		
Bald Eagle	2	X		X	Atlantic Brant	3		X		Lesser Scaup	3		X	
Barrow’s Goldeneye	2		X	X	Black Guillemot	3	X		X	Long-tailed Duck	3			X
Common Eider	2	X	X	X	Black Scoter	3		X	X	Red-throated Loon	3			X
Common Loon	2		X	X	Canada Goose (NAP) (non-breeding)	3		X		Surf Scoter	3		X	X
Common Tern	2	X			Common Goldeneye	3	X	X	X	White-winged Scoter	3		X	X
Golden Eagle	2	X		X	Great Black-backed Gull	3	X	X	X					

Threats:

- Habitat loss, through development of adjacent upland habitat
- Aquaculture
- Human disturbance
- Oil spills / Contaminants

Goal: Conserve, restore and enhance populations of focal species that utilize estuaries and bays to ensure the overall conservation of all native species within this habitat.

General Objectives:

1. *Protect and maintain high priority habitats.*

Strategy	Task
Identify high priority habitats.	<ul style="list-style-type: none"> • Initiate standardized coast-wide surveys to determine key molting, wintering, and staging areas • Identify and map high priority for focal species

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

2. *Maintain or enhance populations of focal species.*

Strategy	Task
Monitor breeding and non-breeding populations of focal species to determine population size, status, and trends.	See Marine Open Water
Decrease human disturbance/threats.	See Marine Open Water

Species Specific Objectives:

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
American Black Duck (Wintering Population)	<ul style="list-style-type: none"> Maine breeding population estimate 32,300 individuals in 2003 Maine MWS index averaged 17,207 during 2001-2003 Maine harvest averaged 9,300 during 1996-2001; HIP estimate 9,717 birds in 2002 Year round presence in Maine Threats: competition with Mallards (has been suspected but not demonstrated), human disturbance of breeding habitat, and wintering habitat during severe winter weather, habitat loss and degradation, aquaculture, sea level rise, and contaminants. 	<ul style="list-style-type: none"> Planning Objective for wintering population: 65,169 ducks Need to protect inter-tidal wetlands from degradation (BCR 14 workshop) <p><u>Focus Areas (ACJV; N.A. Waterfowl Mgmt. Plan):</u></p> <ul style="list-style-type: none"> Cobscook Bay Merrymeeting Bay / Lower Kennebec River Downeast West Coast Southern Coast Inland Wetlands Planning Area 	<ul style="list-style-type: none"> Maintain or increase as necessary existing monitoring efforts of wintering population (BCR 14 Workshop) Expand population model to include habitat characteristics (BCR 14 Workshop) Expand survey efforts throughout BCR to cover areas currently not included in aerial surveys (BCR 14 Workshop)
	See Emergent Marsh and Wet Meadows for breeding information		
Arctic Tern	See Rocky Coastline and Islands		
Bald Eagle	See Rocky Coastline and Islands		
Barrow's Goldeneye	See Rivers and Streams		
Common Eider (Molting and Wintering Birds)	<ul style="list-style-type: none"> Maine population estimated at 29,000 pairs nesting on 320 islands; wintering population likely in excess of 100,000 ducks 	<ul style="list-style-type: none"> By 2016, increase the number of nesting pairs of eiders by 20% (Common Eider Assessment) Increase the number of Common 	<ul style="list-style-type: none"> Outreach Objective 1: In cooperation with partners, develop an outreach program to promote an understanding and appreciation of eiders and their

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
	<ul style="list-style-type: none"> Maine 2003 harvest level: 29,000 birds Threats: potential over-harvest, habitat loss, principle dietary items have high commercial value, human disturbance, aquaculture development, high susceptibility to disturbance and oil spills, avian cholera 	Eider nesting islands in conservation ownership by 1 per year until 2016. <ul style="list-style-type: none"> Working with partners, develop investigations to understand issues associated with (1) recreational use of Common Eider nesting islands and (2) commercial harvesting of resources in Common Eider feeding habitats. <u>Focus Areas (NAWMP):</u> <ul style="list-style-type: none"> West Coast Cobscook Bay Downeast Coast 	habitat requirements in Maine <ul style="list-style-type: none"> Outreach Objective 2: Document survival and recruitment of Maine birds Document seasonal distribution of eiders, particularly brood rearing and molting areas (Atlantic Coast Sea Duck Workshop / BCR 14 Workshop) Initiate research to evaluate significance of commercial harvesting of resources from eider molting and wintering habitats (MDIFW Species Assessment and Atlantic Coast Sea Duck Workshop) Improve collection of information from hunters, including level of take and age / sex ratios. Work with outfitters to improve reporting efforts; determine band reporting rate (Atlantic Coast Sea Duck Workshop / BCR 14 Workshop) Monitor effects of commercial aquaculture development on distribution and feeding rates of eiders (BCR 14 Workshop)
Common Eider (Breeding)	See Rocky Coastline and Islands		
Common Loon (Wintering and Non-breeding)	<ul style="list-style-type: none"> Wintering population is distributed along the coastline Threats: oil spills, contaminants, and by-catch in commercial fisheries, lead poisoning 		
Common Loon (Breeding)	See Lakes and Ponds		
Common Tern	See Rocky Coastline and Islands		
Golden Eagle	See Cliff Face and Rocky Outcrop		
Great Cormorant	See Rocky Coastline and Islands		
Greater Scaup (Non-	<ul style="list-style-type: none"> Counts during winter quite 	<ul style="list-style-type: none"> High continental priority because of 	<ul style="list-style-type: none"> The role of zebra mussels in contributing

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
breeding)	variable but recently less than 1,200. 2005 Midwinter Waterfowl Survey count only 160 birds in Maine. <ul style="list-style-type: none"> • Threats: sensitive to disturbance, overharvests, pesticides and other contaminants/toxins. 	rangewide declines. No population objective for Maine has been established	heavy metals and organochlorines to diet warrants investigation <ul style="list-style-type: none"> • Continue to monitor Maine population as part of the Midwinter Waterfowl Survey
Least Tern	See Unconsolidated Shore		
Red-necked Phalarope	See Marine Open Water		
Roseate Tern	See Rocky Coastline and Islands		
Ruddy Duck	<ul style="list-style-type: none"> • Recent breeding record in Maine • Regularly seen during spring and fall migration (e.g. Sabattus Pond, Sebasticook Lake) • Sometimes counted on the MWS and CBC in Maine (upper Penobscot Bay) • Continental population increasing during 1970-2002 • Population estimate is not available for the eastern survey area or the WBPHS survey area (breeds predominantly in emergent wetlands in the prairie pothole region) • During 1961-2001 constituted <1% of Maine's duck harvest • Wintered (300-600) in Fort Point Cove, Stockton Springs 	<ul style="list-style-type: none"> • No population objective has been established for the continental population • No population objectives have been established for ruddy duck in Maine 	<ul style="list-style-type: none"> • Monitor migrating/wintering population

**Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.
Rocky Coastline and Islands (CC)**

Associated Species:

SPECIES	PRIORITY	B	M	W	SPECIES	PRIORITY	B	M	W	SPECIES	PRIORITY	B	M	W
American Oystercatcher	1	X			Common Tern	2	X			Ruddy Turnstone	2		X	
Roseate Tern	1	X			Glossy Ibis	2	X			Semipalmated Sandpiper	2		X	
Arctic Tern	2	X			Great Blue Heron	2	X	X		Snowy Egret	2	X		
Atlantic Puffin	2	X		X	Great Cormorant (breeding)	2	X		X	Tri-colored Heron	2	X		
Bald Eagle	2	X		X	Great Egret	2	X			Black Guillemot	3	X		X
Black-crowned Night Heron	2	X			Harlequin Duck	2			X	Great Black-backed Gull	3	X	X	X
Cattle Egret	2	X			Little Blue Heron	2	X			Herring Gull	3	X	X	X
Common Eider	2	X	X	X	Purple Sandpiper	2			X	Laughing Gull	3	X		
Common Murre	2		X		Razorbill	2	X		X	Leach's Storm-petrel	3	X		

Threats:

- Predation, particularly from Great Black-backed and Herring Gulls
- Habitat loss, through development, erosion, and sea level rise
- Food availability
- Aquaculture development
- Human disturbance
- Contaminants/Oil Spill
- Wind power development

Goal: Conserve, restore and enhance populations of focal species that utilize Maine's rocky coastline and islands to ensure the overall conservation of all native species within this habitat.

General Objectives:

1. *Protect and maintain high priority habitats.*

Strategy	Task
Identify high priority habitats.	<ul style="list-style-type: none"> • All 3,500 coastal islands have been evaluated for current or historic use by seabirds, waterfowl,

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

Strategy	Task
	wading birds, and endangered or threatened species. During this process 350 islands have been identified as Nationally Significant for nesting seabirds, eagles, and wading birds. <ul style="list-style-type: none"> • MDIFW has identified priority seabird nesting islands as Significant Wildlife Habitat under the Natural Resource Protection Act in organized towns; Zoned P-FW or P-RP in LURC jurisdiction. • Entire dataset has been included in GIS database and is updated annually
Protect high priority habitats	<ul style="list-style-type: none"> • Protect seabird nesting islands and adjacent waters from further development, especially human dwellings, fishing piers, docks, and aquaculture facilities • Municipalities should identify seabird nesting islands during their comprehensive planning effort, and consider ¼ buffers around seabird nesting islands • Use voluntary agreements, conservation easements, conservation tax abatements and incentives, and acquisition to protect important seabird nesting habitat • Avoid over fishing and polluting nursery areas for herring, hake, and other fish stocks important as food for seabirds • Do not use gill nets near seabird nesting islands or known feeding areas
Plan for oil spill response.	<ul style="list-style-type: none"> • Continue Spill Response efforts and planning, including purchasing survey and hazing equipment (MDIFW Oil Spill Response Plan, North Atlantic Regional Shorebird Plan) • Identify and map significant habitat for nesting, migratory, and wintering species • Document habitat quality and food resources prior to spill to serve as baseline for assessing direct and indirect effects of spills (North Atlantic Regional Shorebird Plan) • Implement post spill surveys to accurately quantify spill damages. • Effects on birds should be minimized by increased enforcement of shipping activities, safe operational procedures, and spill clean up and rehabilitation of oiled birds.

2. Maintain or enhance populations of focal species.

Strategy	Task
Monitor breeding and non-breeding populations of focal species to determine population size, status, and trends.	<ul style="list-style-type: none"> • Continue surveying seabird nesting islands utilizing appropriate techniques and timing • Monitor mortality factors of seabirds including seabird by-catch. • Identify & monitor important foraging, wintering, and migrating areas. • Implement surveys to determine population size of all species. • Develop and implement strategies and protocols to monitor breeding and non-breeding species. • Determine population level effects of oil and hazardous materials on birds. • Investigate seabird “by-catch” as it relates to commercial fishing and aquaculture • Assess role of commercial fisheries on prey availability

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

Strategy	Task
Decrease human disturbance/threats.	<ul style="list-style-type: none"> • Maintain seasonal closures on all seabird nesting islands from April 1 – July 31 (eider and gull islands) or August 15 (alcid and tern islands) (Maine E&T Handbook) • Keep aquaculture facilities more than ¼ mile from seabird nesting islands and winter feeding areas (Maine E&T Handbook) • Keep boat activity more than 660’ from seabird nesting islands (Maine E&T Handbook) • Keep all pets off islands and do not introduce mammalian predators (Maine E&T Handbook) • Develop partnerships with fishery industries and commercial tour boat operators. • Develop partnerships with Maine Island Trail and other recreational and commercial users of Maine’s coastal islands to educate them about seabird ecology and disturbance concerns • Partner with fishery planners to include reduced seabird mortality strategies in all future plans. • Implement increased enforcement of shipping activities, safe operational procedures, spill clean-up, and rehabilitation of oiled birds. • Prohibit and enforce dumping of debris, lines, and nets. • Develop non-persistent lines, nets and traps.
Actively deter, reduce, or eliminate predators	<ul style="list-style-type: none"> • Implement predator control plans where they do not already exist. • Utilize predator control management techniques outlined in Tern Management Handbook. • Continue efforts to maintain seabird restoration islands as “gull free” habitat

Species Specific Objectives:

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
American Oystercatcher	<ul style="list-style-type: none"> • Recent breeding range expansion in the Northeast includes 4-6 pairs observed in Maine since 1994. Only 2 pairs have nested successfully. The first on Little Stratton Island, Saco Bay in 1995, the other pair on Green Island, Washington County in 1997. • North American breeding population estimated at 7,500 (US Shorebird Conservation Plan) • Coastal beach nesting habitat greatly reduced and at risk. 	<ul style="list-style-type: none"> • By 2009, develop objectives for maintaining or enhancing viable nesting shorebird populations (including American Oystercatcher) in Maine. (Migratory Shorebird Assessment) • Monitor east coast population (US Shorebird Conservation Plan) 	<ul style="list-style-type: none"> • Develop Research and Outreach Actions

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
	<p>Considered highly imperiled (USSCP)</p> <ul style="list-style-type: none"> • Threats include predation from gulls, competition for nesting sites with gulls and limited number and distribution of functional nesting sites 		
Arctic Tern	<ul style="list-style-type: none"> • Maine population: 3,445 pairs nesting on 11 islands in 2004 • 97% of Maine’s population nests on 4 islands • State Threatened (1997) • Threats include: predation from gulls, habitat loss, competition for nesting sites with gulls, changes in food availability, and limited number and distribution of colonies 	<ul style="list-style-type: none"> • Successful management techniques at nesting islands include: Restoration of historical sites using social attraction, vegetation control, predator control, nest shelters, seasonal closure of islands, sign posting, wardens, education programs, and law enforcement. (Tern Management Handbook) • Continue efforts to monitor occupied and historic nesting islands (BCR 14 Workshop) • Continue efforts to protect priority nesting islands through conservation ownership 	<ul style="list-style-type: none"> • Continue to research foraging habitat, migration routes, winter habitat use and distribution (USFWS Tern Plan) • Continue outreach efforts regarding effects of human disturbance on nesting colonies • Initiate research to determine association with commercial fisheries and climate change to food availability (USFWS Tern Plan) • Initiate research to determine factors influencing breeding success and productivity rates (BCR 14 Workshop)
Atlantic Puffin	<ul style="list-style-type: none"> • Maine population: 617 pairs at 4 colonies in 2004 • State Threatened (1997) • Threats include: predation from gulls, habitat loss, changes in food availability, oil spills, incidental take during fishing, and limited number and distribution of colonies • >80% nest on 2 islands (Seal Island and Matinicus Rock) 	<ul style="list-style-type: none"> • Increase and then maintain Maine population by 50% by 2015 • Identify and then prioritize islands with suitable nesting habitat for puffins and cultivate relationship with partners and landowners to facilitate management (MDIFW Species Assessment Process) • By 2015, increase the number of islands with nesting puffins to 6 islands, with one new site located in Penobscot Bay and one in downeast Maine (MDIFW Species Assessment 	<ul style="list-style-type: none"> • Initiate research efforts on: winter distribution, use of foraging habitat during breeding season, nesting habitat partitioning among seabird species, chick provisioning studies, predation rates, and chick survival rates (MDIFW Species Assessment Process) • Develop, expand and implement, in conjunction with partners, an outreach plan to promote an understanding and awareness of nesting seabirds, including Atlantic puffins in Maine (MDIFW Species Assessment Process)

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
		Process)	<ul style="list-style-type: none"> Continue participation in metapopulation study in Gulf of Maine
Bald Eagle	<ul style="list-style-type: none"> Maine population 309 pairs State Threatened species, Essential Habitat designated Maintain productivity level of 1.0 young / occupied nest Threats: loss of habitat, human disturbance, contaminants, declining water quality, human caused deaths and injuries 	<ul style="list-style-type: none"> By 2019, increase Bald Eagle Population to at least 600 pairs and allow population to naturally expand statewide (Bald Eagle Assessment) <p>The following objectives are all taken from the Maine E&T Handbook (McCollough et al. 2003):</p> <ul style="list-style-type: none"> Review Essential Habitat maps and guideline prior to development and forest harvesting near eagle nests. Consult with MDIFW and USFWS to assist with planning. Protect habitat within a ¼ mile radius of eagle nests. Maintain 330’ of nests as sanctuaries. Do not modify habitat unless approved by state or federal wildlife biologist. Avoid exterior construction, land clearing, timber harvesting, and major disturbances within 330-1,320’ of the nest during the sensitive nesting season (Feb 1 – Aug 31) Municipalities should follow Shoreland Zoning and LURC standards and strive to maintain areas adjacent to eagle nests and adjacent waterways in a low-density, rural setting. Identify these areas in comprehensive plans, and consider protecting waterways and a 250’ upland buffer as Resource Protection Districts. Consider various conservation 	

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
		strategies for land protection including easements, leases, management agreements, regulations, or acquisition • Report eagle nests to MDIFW • Avoid application of pesticides around nesting areas	
Black-crowned Night Heron	See Estuarine Emergent Saltmarsh		
Cattle Egret	<ul style="list-style-type: none"> Sporadic nesting species on Stratton Island. 2004 estimate: 0 pairs. Feeding areas and breeding sites are directly affected by human activities. Threats: pesticides, contaminants, degradation of habitat, disturbance of nest and food sites. 	<ul style="list-style-type: none"> None established but attempt to maintain species diversity at Stratton Island. 	<ul style="list-style-type: none"> Use of species as a bio-indicator of environmental contaminants.
Common Eider (Breeding Population Only)	<ul style="list-style-type: none"> Maine population estimated at 29,000 pairs nesting on 320 islands Maine 2003 harvest level: 29,000 birds Threats: Great Black-backed Gull predation on ducklings, bald eagle predation on adults and ducklings, potential over-harvest, habitat loss, avian cholera, principle dietary items have high commercial value, human disturbance on nesting islands, aquaculture development, high susceptibility to disturbance and oil spills during molt period 	<ul style="list-style-type: none"> By 2016, increase the number of nesting pairs of eiders by 20% (Common Eider Assessment) Successful management efforts have included island acquisition by conservation agency, seasonal closure of nesting islands, signage of nesting islands, gull control. Increase the number of eider nesting islands in conservation ownership at a rate of one island per year (MDIFW Species Assessment) Habitat conservation efforts should include nesting islands, brood rearing habitat, molting and feeding areas (BCR 14 Workshop) 	<ul style="list-style-type: none"> Continue banding efforts to evaluate survival and recruitment rates, movement rates and hunting mortality (MDIFW Species Assessment, Atlantic Coast Sea Duck Workshop, BCR 14 Workshop) Determine genetic composition of harvested population (MDIFW Species Assessment) Continue standardized surveys of breeding population, including determining relationship between May male counts and number of nesting females on islands which would allow population trends to be monitored (Atlantic Coast Sea Duck Workshop / BCR 14 Workshop) Document seasonal distribution of eider's significant habitats, particularly brood

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
			rearing and molting areas (Atlantic Coast Sea Duck Workshop / BCR 14 Workshop) <ul style="list-style-type: none"> • Initiate research to evaluate significance of recreational use of eider nesting islands (MDIFW Species Assessment) • Initiate research to evaluate significance of commercial harvesting of resources (e.g. rockweed) from eider brood rearing and feeding habitats (MDIFW Species Assessment and Atlantic Coast Sea Duck Workshop) • In cooperation with partners, develop an outreach program to promote an understanding and appreciation of eiders and their habitat requirements in Maine (MDIFW Species Assessment) • Improve collection of information from hunters, including level of take and age / sex ratios. Work with outfitters to improve reporting efforts and determine reporting rates. (Atlantic Coast Sea Duck Workshop / BCR 14 Workshop) • Monitor effects of commercial aquaculture development on distribution and feeding rates of eiders (BCR 14 Workshop) • Develop population model for eiders (BCR 14 Workshop) • Assess significance of gull predation on duckling survival rates (BCR 14 Workshop)
Common Eider (Molting & Wintering)	See Estuaries and Bays		
Common Murre	<ul style="list-style-type: none"> • Nested on Maine’s coastal islands 	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • Re-establish Murres as a breeder after

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
	<p>until the mid-1800s. Today, Murres occur in Maine as non-breeders but may nest soon on one of Maine's managed seabird colonies. National Audubon Society (NAS) is using calls and decoys to attract prospecting Murres.</p>	<ul style="list-style-type: none"> Will benefit from seabird restoration techniques (island closures, gull control, etc.) 	<p>150 year absence (NAS).</p>
Common Tern	<ul style="list-style-type: none"> Maine population: 5,547 pairs nesting on 22 islands in 2004 >90% of Maine's population nests on 8 islands Maine Species of Special Concern Threats include: predation from gulls and mink, habitat loss, competition for nesting sites with gulls, changes in food availability, human disturbance on nesting islands, and limited number and distribution of colonies 	<ul style="list-style-type: none"> Successful management techniques at nesting islands include: Restoration of historical sites using social attraction, vegetation control, predator control, nest shelters, seasonal closure of islands, sign posting, wardens, education programs, and law enforcement. (Tern Management Handbook) Increase the number of historic and currently occupied nesting islands in conservation ownership Continue efforts to monitor occupied and historic nesting islands (BCR 14 Workshop) 	<ul style="list-style-type: none"> Continue to research foraging habitat, migration routes, winter habitat use and distribution. (USFWS Tern Plan) Continue outreach efforts regarding effects of human disturbance on nesting colonies (USFWS Tern Plan) Initiate research to determine association with commercial fisheries and climate change to food availability (USFWS Tern Plan) Initiate research to determine factors influencing breeding success and productivity rates (BCR 14 Workshop)
Glossy Ibis	<ul style="list-style-type: none"> Breeding distribution is three coastal islands with mixed heronries in southern Maine. 2004 population estimate: 182 pairs (up from 75 pairs in 1976). Requires protected breeding sites near suitable foraging habitats. Threats: pesticides, contaminants, degradation of habitat, disturbance at nest & roost sites. 	<ul style="list-style-type: none"> None established but attempt to maintain species diversity at three nesting sites. 	<ul style="list-style-type: none"> Use of species as a bio-indicator of environmental contaminants. In general, this is an understudied species and aspects of breeding biology deserve particular attention as well as landscape scale habitat conservation.
Great Blue Heron	See Unconsolidated Shore		
Great Cormorant	<ul style="list-style-type: none"> Maine population: 150 pairs at 6 	<ul style="list-style-type: none"> Continue efforts to protect priority 	<ul style="list-style-type: none"> Need to develop strategies to monitor

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
	<p>locations in 2004, population decreasing in recent years</p> <ul style="list-style-type: none"> • >90% of North American population breeds in BCR 14 • Threats include: predation from gulls and eagles, habitat loss, competition for nesting sites with gulls, changes in food availability, human disturbance on nesting islands, and limited number and distribution of colonies 	<p>nesting islands through conservation ownership</p>	<p>productivity (BCR 14 Workshop)</p> <ul style="list-style-type: none"> • Continue annual surveys of colonies (BCR 14 Workshop) • Evaluate factors which may be limiting population growth • Identify key winter feeding sites • Monitor wintering birds at key sites
Great Egret	<ul style="list-style-type: none"> • Breeds in southern Maine on Stratton Island. 2004 population estimate: 5 pairs. • Threats: pesticides, contaminants, loss of habitat, disturbance at nest and roost sites. 	<ul style="list-style-type: none"> • None established but attempt to maintain species diversity at mixed-species heronry on Stratton Island. 	<ul style="list-style-type: none"> • Use of species as bio-indicator of environmental contaminants. Additional studies on disease, effects of pollutants, pesticides, and heavy metal are needed.
Harlequin Duck	<ul style="list-style-type: none"> • Maine wintering population estimated at 1,150 – 1,300 birds • State Threatened (1997) • Threats: low fecundity rates and high rate of non-breeding in female harlequins results in low reproductive potential, this increases significance of adult survival rates. Oil spills remain a particularly high risk due to limited winter distribution of North American wintering population. • Distribution within Maine is limited to a small number of islands including Isle au Haut and neighboring islands in Jericho and Penobscot Bays 	<ul style="list-style-type: none"> • Working cooperatively with Canadian Wildlife Service to increase the number of harlequins wintering in Maine by 20%, by 2016 (MDIFW Species Assessment) • By 2005, identify and map all important harlequin wintering sites in Maine (MDIFW Species Assessment) • Minimize activities such as dragging for shellfish and disturbance from bird watchers and waterfowl hunters at harlequin wintering sites (Maine E&T Handbook, MDIFW Species Assessment) 	<ul style="list-style-type: none"> • Continue research on survival rates, habitat use, and site fidelity (Maine T&E Handbook) • Initiate annual surveys at traditional wintering sites and periodic coast-wide surveys (MDIFW Species Assessment and BCR 14 Workshop) • Initiate research to determine factors limiting over-winter survival of harlequins (MDIFW Species Assessment) • Satellite and genetic studies are underway to determine relationship between Canadian and Greenland populations • Initiate research to evaluate significance of commercial harvesting of resources (e.g. rockweed) from harlequin feeding areas (MDIFW Species Assessment)

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
			<ul style="list-style-type: none"> • Continue efforts to educate public about ecology of harlequins and hunter identification “tips” to avoid incidental take during waterfowl harvest • In cooperation with partners, develop an outreach program to promote an understanding and appreciation of harlequins and their winter habitat requirements in Maine (MDIFW Species Assessment)
Little Blue Heron	<ul style="list-style-type: none"> • Eight pairs at 2 sites in 2004. Rare breeder on east coast north of New Jersey. • Threats: pesticides, contaminants, degradation of habitat, disturbance at nest and roost sites. 	<ul style="list-style-type: none"> • None established but maintain species diversity in mixed-heronries on southern Maine coastal islands. 	<ul style="list-style-type: none"> • Trend analysis of regional populations will be incomplete until reliable census techniques can be developed for this species.
Purple Sandpiper	<ul style="list-style-type: none"> • Maine population: 7,000 individuals were observed in 2004 in outer Penobscot and Jericho Bays • Wintering resident only • Threats: oil spills, human disturbance at feeding and roosting locations. Limited number and distribution of global populations. 	<ul style="list-style-type: none"> • Continue efforts to document winter abundance and distribution (PRISM and BCR 14 Workshop, MDIFW Species Assessment) • Continue efforts to identify and map Maine winter habitats 	<ul style="list-style-type: none"> • Expand efforts to document site fidelity and monitor population (MDIFW Species Assessment)
Razorbill	<ul style="list-style-type: none"> • Maine population: approximately 423 pairs nesting on 6 islands • State Threatened (1997) • Significant wintering population documented off Grand Manan Island • Threats include: predation from gulls, habitat loss, changes in food availability, oil spills, incidental 	<ul style="list-style-type: none"> • By 2015, increase and maintain population by 50% over level recorded in 2000 (MDIFW Species Assessment) • By 2005, identify and prioritize islands with suitable nesting habitat and cultivate relationships with partners and landowners to facilitate management (MDIFW Species 	<ul style="list-style-type: none"> • Develop and implement by 2005 a protocol to inventory and monitoring productivity rates of nesting razorbills (MDIFW Species Assessment) • Conduct surveys to determine winter distribution and habitat use of razorbills (BCR 14 Workshop) • Determine breeding locations for birds wintering in the Gulf of Maine (BCR 14

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
	<p>take during fishing, and limited number and distribution of colonies</p> <ul style="list-style-type: none"> • 55% on one island <p><u>Focus Areas:</u></p> <ul style="list-style-type: none"> • Wintering population near Grand Manan • Machias Seal Island, Seal Island, Matinicus Rock, and Petit Manan Island 	<p>Assessment)</p> <ul style="list-style-type: none"> • By 2015, increase the number of islands supporting nesting razorbills to 8, ensuring these islands are distributed between Penobscot Bay and downeast Maine. (MDIFW Species Assessment) • Maintain seasonal closure of nesting islands • Continue efforts to protect priority nesting islands through conservation ownership 	<p>Workshop)</p> <ul style="list-style-type: none"> • By 2005, develop and implement, in conjunction with partners, an outreach plan to promote an understanding and awareness of seabirds, including razorbills, in Maine. (MDIFW Species Assessment) • Evaluate need and ability to control gull populations on “un-staffed” nesting islands (MDIFW Species Assessment) • Initiate research on basic life history and ecology of razorbills, including breeding success and productivity, characteristics and location of foraging and chick rearing habitats, and survival rates of adult and immature birds. (MDIFW Species Assessment)
Roseate Tern	<ul style="list-style-type: none"> • Maine population: 170 pairs nesting on 8 islands in 2004 • Federal (1987)& State (1988) Endangered • Essential Habitat designated • 85% of Maine’s population nests on 2 islands • Threats include: predation from gulls and mink, habitat loss, human disturbance on nesting islands, changes in food availability, limited number and distribution of colonies, inclement weather, and oil spills 	<ul style="list-style-type: none"> • Increase breeding population size, distribution, and productivity • Based on recovery objectives in Federal Recovery Plan: establish and maintain two large colonies (>200 pairs) with high productivity (≥ 1.0 young /pair for 5 years) • Comply with Essential Habitat regulations requiring all projects funded, permitted, or carried out by a municipality or state agency to be reviewed by MDIFW. (Maine E&T handbook) • Successful management techniques at nesting islands include: Restoration of historical sites using social attraction, vegetation control, predator control, nest shelters, 	<ul style="list-style-type: none"> • Continue to research foraging habitat, migration routes, winter habitat use and distribution. (ROST Recovery Plan) • Continue outreach efforts regarding effects of human disturbance on nesting colonies • Initiate research to determine association with commercial fisheries and climate change on food availability • Continue participation in regional metapopulation project

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
		seasonal closure of islands, sign posting, wardens, education programs, and law enforcement. (Tern Management Handbook) <ul style="list-style-type: none"> • Continue efforts to monitor occupied and historic nesting islands (BCR 14 Workshop) • Increase the number of historic nesting islands in conservation ownership (ROST Recovery Plan) 	
Ruddy Turnstone	<ul style="list-style-type: none"> • Surveys along the Maine coast in 1994 documented 4,317 individuals • Threats: loss and degradation of habitat at staging areas from increasing coastal development and environmental contaminants. • Increasing human-related disturbances. Threats: <ul style="list-style-type: none"> • Contamination of feeding and roosting areas from oil spill. 	See general objectives pages 18-20	
Semipalmated Sandpiper	See Unconsolidated Shore		
Snowy Egret	<ul style="list-style-type: none"> • Southern and mid-coast coastal islands. 90 pass at 4 sites in 1976; 213 pairs at 5 sites in 2004. • Threats: pesticides and contaminants, degradation of habitat, disturbance of nest and roost sites. 	<ul style="list-style-type: none"> • None established but attempt to maintain species diversity at managed and unmanaged sites (coastal islands). 	<ul style="list-style-type: none"> • Research should focus on colony site dynamics; interactions with other wading birds; foraging requirements, and control measures at aquaculture facilities.
Tri-colored Heron	<ul style="list-style-type: none"> • One pair nested on Stratton Island in mid-1970s, none nesting in 2004. • Threats: pesticides, contaminants, 	<ul style="list-style-type: none"> • None established. 	<ul style="list-style-type: none"> • Potential use of species as bio-indicator of environmental contaminants.

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
	degradation of habitat, disturbance at nest and roost sites.		

Unconsolidated Shore (beach, sand, mudflats) (CU)

Associated Species:

SPECIES	PRIORITY	B	M	W	SPECIES	PRIORITY	B	M	W	SPECIES	PRIORITY	B	M	W
American Oystercatcher	1	X			Red Knot	2		X		Willet	2	X	X	
Least Tern	1	X			Ruddy Turnstone	2		X		Black-bellied Plover	3		X	
Piping Plover	1	X			Sanderling	2		X		Eskimo Curlew	3		X	
Great Blue Heron	2	X	X		Semipalmated Sandpiper	2		X		Killdeer	3	X	X	
Greater Yellowlegs	2		X		Whimbrel	2		X		Short-billed Dowitcher	3		X	

Threats:

- Recreational disturbance to nesting, foraging, and roosting birds
- Beach cleaning efforts
- Nuisance/predator species
- Loss of habitat
- Extraction of resources affecting prey availability
- Oil spills / contaminants
- Flooding
- Aquaculture

Goal: Conserve, restore and enhance populations of focal species that utilize unconsolidated shores (e.g. beaches and mudflats) to ensure the overall conservation of all native species within this habitat.

General Objectives:

1. *Protect and manage sufficient area of high priority habitats to support current populations of breeding, migrating, and wintering shorebirds and associated focal species*

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

Strategy	Task
Identify priority habitats for protection.	<ul style="list-style-type: none"> • Research best method of protection—acquisition, fee or easements from willing sellers • Develop coordinated state and federal satellite habitat mapping, delineating all important shorebird habitats (NA Regional Shorebird Plan) • Maintain and coordinate habitat protection of areas already owned by federal, state, local government or NGO’s. • Train land managers to manage habitat for shorebirds by increasing the number of Manomet habitat management workshops. (MANEM working group) • Research, assess, and implement control programs for mammalian and avian predators for high priority beach nesting birds (BCR 14 workshop) • Maintain or enhance vital shorebird staging and wintering habitats in Maine (MDIFW Species Assessment Process) • Maintain or enhance nesting, feeding, and roosting habitats to support viable breeding shorebird populations in Maine (MDIFW Species Assessment Process) • Use voluntary agreements, conservation easements, conservation tax abatements and incentives, and acquisition to protect important shoreland habitat (MDIFW E&T Handbook) • Avoid future residential development of beach and dune habitat (MDIFW E&T Handbook)
Restore degraded habitats.	<ul style="list-style-type: none"> • Continue to support state IBA Program • Dredge material has been successfully used in some instances to create new habitat, especially for terns and plovers, although all habitat alterations should be conducted with caution and after consultation with experts; new substrates should not be overly silty and depositions with over 20% shell material could interfere with nest construction. (PIF) • Utilize dredged material to implement erosion control efforts. (Tern Management Handbook) • Vegetation encroachment can degrade habitat for terns and should be prevented at important nesting sites. Addition of dredge spoils on vegetated beach areas may impede succession. (PIF) • Assess habitat quality for foraging shorebirds through resource or energetic studies in representative habitats throughout the BCR. (NAWCP workshop) • Continue or develop and implement invasive species removal program • Conduct vegetation studies and remove vegetation where it is deemed excessive with the appropriate tools (fire, hand-pulling, grazing, etc). (MANEM working Group and Tern Management Handbook)
Identify and protect adequate buffers (inland and offshore).	<ul style="list-style-type: none"> • Identify landowners of upland buffers • Determine the effects of disturbance and minimum protection buffers to maintain and enhance shorebird habitat use of foraging and roosting areas (North Atlantic Regional Shorebird Plan)

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

Strategy	Task
	<ul style="list-style-type: none"> • Determine best method of land conservation and protection—acquisition, fee, easement. • Initiate landowner contact.
Plan for oil spill response.	<ul style="list-style-type: none"> • Continue Spill Response efforts and planning, including purchasing survey and hazing equipment (NA Regional Shorebird Plan) • Identify and map significant habitat for nesting, migratory, and wintering species • Document habitat quality and food resources prior to spill to serve as baseline for assessing direct and indirect effects of spills (North Atlantic Regional Shorebird Plan) • Implement post spill surveys to accurately quantify spill damages. • Effects on birds should be minimized by increase enforcement of shipping activities, safe operational procedures, and spill clean up and rehabilitation of oiled birds.
Research Needs	<ul style="list-style-type: none"> • Identify prey resources in significant stopover and staging areas to determine optimal management techniques to promote these resources (North Atlantic Regional Shorebird Plan) • Determine the effects of environmental contaminants on shorebirds and their prey (North Atlantic Regional Shorebird Plan) • Determine length of stay (turnover rates) at stopovers to allow population estimates to be determined (North Atlantic Regional Shorebird Plan) • Determine limiting factors for priority shorebirds on breeding, migratory, or wintering grounds (North Atlantic Regional Shorebird Plan)

2. Maintain or enhance populations of high priority species.

Strategy	Task
Actively deter, reduce or eliminate predators.	<ul style="list-style-type: none"> • Use fences and other barriers to reduce predator impacts • Implement predator control plans where they do not already exist. • Trash disposal programs should be designed to minimize predator attraction to the site • Utilize predator control management techniques in Tern Management Handbook.
Reduce or eliminate human disturbance	<ul style="list-style-type: none"> • Restrict access to nesting beaches during mid April to late July (Piping Plover Recovery Plan). • Prohibit free-running dogs and cats (Maine E&T Handbook). • Post signs to alert and educate public to presence of nesting birds. (North Atlantic Regional Shorebird Plan) • Use fences and other barriers to reduce human impacts. (Maine E&T Handbook). • Protect breeding, foraging, and roosting sites from habitat alteration and disturbance from recreational and commercial activities, including nighttime activities. (North Atlantic Regional Shorebird Plan and MDIFW Species Assessment process)

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

Strategy	Task
	<ul style="list-style-type: none"> • Implement or utilize existing (partners) outreach opportunities to educate public about their impacts to wildlife (Maine Audubon). • Increase law enforcement at sites with high human disturbance. • Increase outreach activities to gain support for protection of species. (Tern Management Handbook).
<p>Monitor breeding and non-breeding populations of focal species to determine population size, status and trends.</p>	<ul style="list-style-type: none"> • Participate in the implementation of the Program for Regional and International Shorebird Monitoring, and identify shorebird distribution, abundance, and habitat relationships (PRISM). • Develop a targeted monitoring program for high priority shorebird species, including staging and migration sites (coordinate with PIF projects, PRISM and NA Regional Shorebird Plan). • Maintain or enhance shorebird populations, both abundance and species diversity, and monitor populations through reliable and cost-effective techniques (NA Regional Shorebird Plan). • Monitor shorebirds for responses to current management practices. • Analyze threats to priority shorebird sites. • Investigate possible negative impacts that rising ocean levels from global climate change could have species. (PIF) • Continue to evaluate factors that limit populations of the priority species from this habitat suite and impede recovery, including studies of (a) habitat requirements for breeding, foraging, and staging, (b) demographics, (c) causes of mortality, and (d) factors limiting growth and survival of young. • Investigate the behavior and population ecology of predators impacting the priority bird species to provide a better understanding of how to protect the birds from depredation. • Investigate potential threats from pesticide and heavy metal accumulation.

Species Specific Objectives:

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
American Oystercatcher	See Rocky Coastline and Islands		
Great Blue Heron	<ul style="list-style-type: none"> • 1994: 14 coastal island colonies with an estimated 644 pairs. Distributed statewide. • Threats: contaminants, disturbance by humans, predation by Bald Eagles. 	<ul style="list-style-type: none"> • None. 	<ul style="list-style-type: none"> • Effects of human disturbance (human visitation, road building, logging) on nesting colony abandonment. • Improve census reliability. Investigate relationship with burgeoning Bald Eagle population.

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
Greater Yellowlegs	<ul style="list-style-type: none"> • Surveys along the Maine coast in 1998 documented a minimum of 2,400 individuals. • Greater and Lesser Yellowlegs are often lumped into a single category – “yellowleg species” by surveyors thus the 1998 estimate is higher than the actual number of Greater Yellowlegs. • The North Atlantic Shorebird Habitat Working Group listed Greater Yellowlegs as a species of high concern due to its low relative abundance estimated at 100,000 individuals in North America. <p>Threats:</p> <ul style="list-style-type: none"> • Loss and degradation of habitat at staging areas from increasing coastal development and environmental contaminants. • Increasing human-related disturbances. • Contamination of feeding and roosting areas from oil spill. 	See general objectives pages 30-33	
Least Tern	<ul style="list-style-type: none"> • Maine population: 146 pairs nesting on 5 beaches in 2004 • Maine Endangered Species (1982) • Essential Habitat designated in 1995 <p>Threats:</p> <ul style="list-style-type: none"> • Habitat loss and degradation, human/dog disturbance, beach cleaning activities, and predation. • Over two-thirds of Maine’s 30 miles of beaches have been lost as nesting habitat for piping plover and least terns because of construction of jetties, 	<ul style="list-style-type: none"> • Increase the number of nesting pairs to at least 150 distributed over 7 areas by 2017 • Increase statewide average annual productivity to 1.0 Hedged chick per nesting female though 2017 • Maintain integrity of the nesting habitat at the 7 areas • Develop long-term management agreements to protect and manage habitat at all current sites in conservation ownership by 2005. 	<ul style="list-style-type: none"> • Continue efforts to educate public and municipal officials regarding the ecology and life history requirements of terns and plover. (MDIFW Species Assessment Process / Maine T&E Handbook) • Continue working with conservation partners to protect nesting areas and enforce “area closed” practices • Continue working with partners to contact landowners in the vicinity of nests about plover and tern

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
	seawalls, and high density housing.	<ul style="list-style-type: none"> • Develop long-term, non-regulatory habitat protection and management via management agreements. Conservation easements, or acquisition at Goose Rocks, and Seawall (MDIFW Species Assessment). <p>The following objectives were taken from the Maine E&T Handbook (McCollough et al. 2003):</p> <ul style="list-style-type: none"> • Avoid further residential development of beach and dune habitats • Continue existing management techniques including: fencing, predator control, sign posting, wardens and education programs • Prohibit or minimize the following activities on nesting beaches: driving on beaches, kite flying, fire works, residential development, jetty and seawall construction, unleashed dogs, construction activities occurring between April 1- August 31 • When possible, remove jetties and seawalls that adversely affect tern and plover habitat • Comply with Essential Habitat regulations requiring all projects funded, permitted, or carried out by a municipality or state agency to be reviewed by MDIFW. • Follow state and federal laws and regulations pertaining to sand dunes • Use voluntary agreements, conservation easements, conservation 	<ul style="list-style-type: none"> conservation issues (MDIFW Species Assessment Process / Maine T&E Handbook) • Continue to provide training sessions for volunteer beach monitors (MDIFW Species Assessment Process / Maine T&E Handbook) • If appropriate, continue efforts to develop Beach Management Plans for specific towns (MDIFW Species Assessment process)

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
		tax abatements and incentives, and acquisition to protect important habitat for threatened and endangered species	
Piping Plover	<ul style="list-style-type: none"> • Maine population: 55 pairs at 19 locations (2004) • Listed as Threatened by USFWS and Endangered by MDIFW (1986) • Essential Habitat designated for 12 nesting locations in 1995 Threats: <ul style="list-style-type: none"> • Loss and degradation of habitat at staging areas from increasing coastal development and environmental contaminants. • Increasing human-related disturbances. • Contamination of feeding and roosting areas from oil spill. 	<ul style="list-style-type: none"> • Increase the number of plovers by at least 20 pairs distributed at all available breeding sites • Increase the average annual productivity to at least 1.5 fledged chicks / pair at all sites, with long-term goal of 2.0 chicks /pair • Maintain nesting, and the integrity of the nesting habitat, at the 23 active nesting sites used by piping plovers between 1997-1999. • Increase the number of successful nest sites by 5 in at least 3 of the prior 5 years through 2017. • Develop long-term, non-regulatory habitat protection via management agreements, conservation easements or acquisition for 10 nesting sites by 2017 (MDIFW Species Assessment) • Physical habitat exists for approximately 75 pairs (excessive disturbance lowers functional carrying capacity to 30-60 pairs) • See Least Terns • See the Piping Plover Recovery Plan: • http://pipingplover.fws.gov/recplan/index.html 	See Least Terns
Red Knot	<ul style="list-style-type: none"> • Surveys along the Maine coast in 1993 documented 425 individuals • Maine represents edge of distribution range for the species Threats:	See general objectives pages 30-33	

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
	<ul style="list-style-type: none"> • Loss and degradation of habitat at staging areas from increasing coastal development and environmental contaminants. • Increasing human-related disturbances. • Contamination of feeding and roosting areas from oil spill. 		
Ruddy Turnstone	See Rocky Coastline and Islands		
Sanderling	<ul style="list-style-type: none"> • Surveys along the Maine coast in 1993 documented a minimum of 2,769 individuals at 30 different sites Threats: <ul style="list-style-type: none"> • Loss and degradation of habitat at staging areas from increasing coastal development and environmental contaminants. • Increasing human-related disturbances. • Contamination of feeding and roosting areas from oil spill. 	See general objectives pages 30-33	
Semipalmated Sandpiper	<ul style="list-style-type: none"> • Surveys along the Maine coast in 1994 documented 53,950 individuals Threats: <ul style="list-style-type: none"> • Loss and degradation of habitat at staging areas from increasing coastal development and environmental contaminants. • Increasing human-related disturbances. • Contamination of feeding and roosting areas from oil spill. 	See general objectives pages 30-33	
Whimbrel	Surveys along the Maine coast in 1995 documented 329 individuals. Maine represents edge of distribution	See general objectives pages 30-33	

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
	range for the species. Threats: <ul style="list-style-type: none"> • Loss and degradation of habitat at staging areas from increasing coastal development and environmental contaminants. • Increasing human-related disturbances. • Contamination of feeding and roosting areas from oil spill. 		
Willet	See Estuarine Emergent Saltmarsh		

Estuarine Emergent Saltmarsh (CS)

Associated Species:

SPECIES	PRIORITY	B	M	W	SPECIES	PRIORITY	B	M	W	SPECIES	PRIORITY	B	M	W
Least Tern	1	X			Glossy Ibis	2	X			Tri-colored Heron	2	X		
Saltmarsh Sharp-tailed Sparrow	1	X			Great Egret	2	X			Whimbrel	2		X	
Short-eared Owl	1	X	X		Greater Yellowlegs	2		X		Willet	2	X	X	
American Black Duck	2	X	X	X	Little Blue Heron	2	X			Mallard	3	X	X	X
Black-crowned Night Heron	2	X			Nelson’s Sharp-tailed Sparrow	2	X			Short-billed Dowitcher	3		X	
Cattle Egret	2	X			Snowy Egret	2	X							

Threats:

- Habitat loss and alteration
- Climate change/sea level rise
- Oil spills and contaminants
- Mosquito control efforts
- Human disturbance
- Marsh restoration/alteration not uniformly beneficial to all species

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

Goal: Conserve, restore and enhance populations of focal species in estuarine emergent saltmarsh habitat to ensure the overall conservation of all native species within this habitat.

General Objectives:

1. *Protect and maintain high priority habitats.*

Strategy	Task
Identify priority habitats for protection.	<ul style="list-style-type: none"> • Research best method of protection—acquisition, fee or easements from willing sellers • Maintain and coordinate habitat protection of areas already owned by federal, state, local government or NGO’s • Protect marshes from chemical contamination, siltation, eutrophication, and other forms of pollution. • Train land mangers to manage habitat for shorebirds. Increase the number of habitat management workshops.
Restore degraded habitat	<ul style="list-style-type: none"> • Assess habitat quality for foraging shorebirds through resource or energetic studies in representative habitats throughout the BCR. (BCR 30 workshop) • Develop guidelines for marsh restoration activities that acknowledge the competing habitat needs of focal species • Study how land-use practices such as ditching, impounding, dredging, open marsh water management, burning, and marsh restoration impact species in this suite (especially sparrows and rails) to determine optimal habitat management practices. (PIF) • Continue or develop and implement invasive species removal program
Plan for oil spill response.	<ul style="list-style-type: none"> • Implement planning and simulations or partner with those that are currently participating in these types of activities. (MANEM working group) • Monitor and quantify habitat and food resources prior to spill as preparation for quantifying the direct and indirect impacts of a spill. (MANEM working group) • Effects on birds should be minimized by increased enforcement of shipping activities, safe operational procedures, spill clean up and rehabilitation of oiled birds.
Secure adequate upland buffers (drier habitats adjoining wet marsh areas), especially for marshes near agricultural lands and human development. (PIF)	<ul style="list-style-type: none"> • Preserve water quality and wetland function, maintain contiguous, forested riparian habitat at least 250’ from saltmarsh (MDIFW E&T Handbook) • Identify landowners of upland buffers • Determine best protection—acquisition, fee, easement • Initiate landowner contact.

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

2. *Maintain or enhance populations of high priority species.*

Strategy	Task
<p>Monitor breeding and non-breeding populations of focal species to determine population size, status, and trends.</p>	<ul style="list-style-type: none"> • Participate in the implementation of the Program for Regional and International Shorebird Monitoring (PRISM) • Develop and implement a regional monitoring program targeting coastal marshes in order to track population trends and estimate population sizes for all groups of birds • Develop a targeted monitoring program for high priority shorebird species, including staging and migration sites (coordinate with PIF projects). • Monitor shorebirds for responses to current management practices. (BCR 30 workshop) • Analyze threats to priority shorebird sites. (BCR 30 workshop) • Study how land-use practices such as ditching, impounding, dredging, open marsh water management, burning, and marsh restoration impact species in this suite (especially sparrows and rails) to determine optimal habitat management practices. (PIF) • Conduct studies of productivity and survival of sparrow populations to understand factors regulating population size and persistence. (PIF) • Implement monitoring program for saltmarsh sparrows and rails in collaboration with other states and refuges in Northeast • Investigate possible negative impacts that rising ocean levels from global climate change could have on marsh-nesting species. (PIF) • Support existing studies on disease (BCR 30 workshop)
<p>Eliminate or reduce human disturbance.</p>	<ul style="list-style-type: none"> • Develop and implement outreach projects to reduce human disturbance (BCR 30 workshop) • Partner with existing organizations to enhance efforts • Increase law enforcement at protected sites. • Increase agency capacity focused on permit and technical assistance for shorebird, landbird, and waterbird species. • Encourage local planning (e.g., rolling setbacks and other tools) to ensure important breeding and non-breeding habitat is not affected by sea level rise due to climate change. (BCR 30 workshop)
<p>Incorporate protection of priority species into oil spill response plans.</p>	<ul style="list-style-type: none"> • Coordinate with appropriate partners.. • Identify key tern foraging sites, prey base and stocks (MANEM working group) • Effects on birds should be minimized by increased enforcement of shipping activities, safe operational procedures, spill clean up and rehabilitation of oiled birds. (Southern Atlantic Migratory Bird Initiative)

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

Species Specific Objectives:

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
American Black Duck	See Estuaries and Bays for wintering information / Emergent Marsh and Wet Meadows for breeding information		
Black-crowned Night Heron	<ul style="list-style-type: none"> Population estimated at 118 pairs at 7 colonies (mid 1990s) 2,500 breeding individuals in BCR-14 44% decrease in US population (MANEM) No acute threats or declines known, however likely to be influenced by habitat loss and human disturbance (BCR 14 Workshop) 	<ul style="list-style-type: none"> Protect integrity of existing breeding and foraging habitat 	<ul style="list-style-type: none"> Evaluate significance of heron predation on tern colonies (BCR 14 Workshop)
Cattle Egret	See Rocky Coastline and Islands		
Glossy Ibis	See Rocky Coastline and Islands		
Great Egret	See Rocky Coastline and Islands		
Greater Yellowlegs	See Unconsolidated Shore		
Least Tern	See Unconsolidated Shore		
Little Blue Heron	See Rocky Coastline and Islands		
Nelson's Sharp-tailed Sparrow	<ul style="list-style-type: none"> Maine population estimated at 10,000 individuals Stable or possibly increasing Possibly expanding range southward since 1940's >90% of eastern subspecies breeds in BCR 14 (50%? In Maine) <p>Threats:</p> <ul style="list-style-type: none"> Loss and degradation of saltmarsh habitat, sea level rise, oil spills, industrial discharge, and contaminants (mercury) Where sympatric with saltmarsh sharp-tailed sparrow interbreeds 	<ul style="list-style-type: none"> Maintain stable population 5,000 hectares of suitable habitat are necessary to support 10,000 individuals at an average density of 1.0 hectare per female Protect breeding habitat and surrounding upland habitat at all occupied sites (BCR 14 Workshop) Determine effects of saltmarsh restoration efforts on species (BCR 14 Workshop) Evaluate need to restore tidal flow to "historic" marsh habitat (i.e. remove tide gates / install larger culverts) (BCR 14 Workshop) 	<ul style="list-style-type: none"> Species is poorly covered by traditional BBS routes, and therefore requires specific monitoring efforts targeted at this and other saltmarsh species (BCR 14 Workshop) Coordinate with other states and refuges Inventory of New England saltmarshes has been completed, but now need to establish long-term monitoring program (BCR 14 Workshop) Continue contaminant investigations to evaluate significance to population (BCR 14 Workshop)

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
	<p>sharp-tailed sparrow interbreeds resulting in intermediate hybrid form</p>	<p><u>Focus Areas:</u></p> <ul style="list-style-type: none"> • Lower Kennebec River Marshes (marshes along Sprague, Morse, and Little Rivers, Atkins Bay, and behind Outer Head) with emergent vegetation at mouth of Kennebec River • Upper Sheepscot River Marshes (Dyer River and Deer Meadow Brook) • Roque Bluffs (saltmarsh on Englishman River) • Mendall Marsh • Weskeag River Saltmarsh • Bass Harbor Marsh • Downeast Saltmarsh Complex (saltmarshes associated with Pleasant, Mill, Harrington, and Narraguagus Rivers and Curtis Creek) • Scarborough Marsh • Saltmarshes of Rachel Carson NWR 	<ul style="list-style-type: none"> • Evaluate diet and diet overlap with SSTS to better understand apparent differences in contaminant vulnerability and potential impacts of oil spill, marsh restoration and key prey species
<p>Saltmarsh Sharp-tailed Sparrow</p>	<ul style="list-style-type: none"> • Maine Special Concern • Obligate saltmarsh species found at approximately 20 sites from Rockland to Kittery • No trend data for this species at any scale • Northeast Endemic (>95% of population breeds between Virginia and Maine) <p>Threats:</p> <ul style="list-style-type: none"> • Management activities in saltmarshes that manipulate hydrological conditions and consequently alter vegetation patterns 	<ul style="list-style-type: none"> • No formal population objectives have been developed by Partners in Flight, though at a minimum, maintaining current population with no loss of number of occupied sites nor range contraction (loss from northern sites) should be a priority • No specific habitat objectives have been identified for this species, however a moratorium should be placed on “ditch plugging” activities until effects on this species breeding habitat can be determined 	<ul style="list-style-type: none"> • Regional scale monitoring program is greatly needed • Need to understand relationships between site occupancy, breeding success, and habitat conditions (follow up on UNH studies) • Need to examine blood Hg levels at all sites and seek remediation at those that are especially high. Also needs tributary specific analysis to identify potential point sources of Hg. • Need to identify wintering areas for Maine’s sparrows as part of a regional, collaborative effort using stable isotope techniques • Need to better understand diet of

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
	<ul style="list-style-type: none"> • Contaminants especially methyl mercury • Oil spills • Genotype of nominate subspecies (in Maine) threatened by hybridization with Nelson’s Sharp-tailed Sparrow 		species, especially nestlings to better assess effects of contaminants (retrophic positions), competition with Nelson’s Sharp-tailed Sparrow (and Seaside Sparrow to South), and to understand potential habitat/diet effects from “restoration” techniques
Short-eared Owl	See Grasslands / Agricultural / Old Fields		
Snowy Egret	See Rocky Coastline and Islands		
Tri-colored Heron	See Rocky Coastline and Islands		
Whimbrel	See Unconsolidated Shore		
Willet	<ul style="list-style-type: none"> • Surveys along the Maine coast in 1997 documented 780 individuals. Most were documented breeders in 20 different saltmarshes located between Kittery and Georgetown. • The North Atlantic Shorebird Habitat working group listed willets as a species of high concern. Threats: <ul style="list-style-type: none"> • Loss and degradation of habitat at staging areas from increasing coastal development and environmental contaminants. • Increasing human-related disturbances. • Contamination of feeding and roosting areas from oil spill. 	See general objectives pages 38-40	

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.
FRESHWATER

Associated Species:

SPECIES	PRIORITY	B	M	W	SPECIES	PRIORITY	B	M	W	SPECIES	PRIORITY	B	M	W
Black Tern	1	X			Great Blue Heron	2	X	X		Common Yellowthroat	3	X		
Blue-winged Warbler	1	X			Greater Scaup (non-breeding)	2		X	X	Gadwall	3	X	X	
Sedge Wren	1	X			Least Bittern	2	X	X		Green Heron	3	X	X	
Short-eared Owl	1	X	X	X	Louisiana Waterthrush	2	X		X	Green-winged Teal	3	X	X	
American Bittern	2	X	X		Marsh Wren	2	X			Mallard	3	X	X	X
American Black Duck	2	X	X	X	Nelson's Sharp-tailed Sparrow	2	X			Northern Harrier	3	X		
American Coot (breeding)	2	X	X		Olive-sided Flycatcher	2	X			Northern Pintail	3	X	X	
American Woodcock	2	X	X		Pied-billed Grebe	2	X	X		Northern Rough-winged Swallow	3	X		
Bald Eagle	2	X		X	Purple Martin	2	X			Northern Shoveler	3	X	X	
Barn Swallow	2	X			Ruddy Duck	2	X	X	X	Palm Warbler	3	X		
Barrow's Goldeneye	2		X	X	Rusty Blackbird	2	X			Red-bellied Woodpecker	3	X		X
Black-crowned Night Heron	2	X			Sandhill Crane	2	X			Red-breasted Merganser	3	X		
Bobolink	2	X			Willow Flycatcher	2	X			Red-shouldered Hawk	3	X		
Bonaparte's Gull (breeding)	2	X			Yellow Rail	2	X	X		Ring-necked Duck	3	X	X	
Canada Warbler	2	X			Yellow-throated Vireo	2	X		X	Solitary Sandpiper	3	X	X	
Common Loon	2		X	X	American Widgeon	3	X	X		Sora	3	X	X	
Common Moorhen	2	X	X		Bank Swallow	3	X			Tennessee Warbler	3	X		
Common Tern	2	X			Blue-winged Teal	3	X	X		Virginia Rail	3	X	X	
Golden Eagle	2	X		X	Common Goldeneye	3	X	X	X	Yellow Warbler	3	X		

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat. Lakes and Ponds (WL)

Associated Species:

SPECIES	PRIORITY	B	M	W	SPECIES	PRIORITY	B	M	W	SPECIES	PRIORITY	B	M	W
Black Tern	1	X			Common Tern	2	X			Bank Swallow	3	X		
American Black Duck	2	X	X	X	Great Blue Heron	2	X	X		Blue-winged Teal	3	X	X	
Bald Eagle	2	X		X	Greater Scaup (non-breeding)	2		X	X	Common Goldeneye	3	X	X	X
Barn Swallow	2	X			Pied-billed Grebe	2	X	X		Northern Rough-winged Swallow	3	X		
Bonaparte's Gull (breeding)	2	X			Purple Martin	2	X			Ring-necked Duck	3	X	X	
Common Loon	2		X	X	Ruddy Duck	2	X	X	X					

Threats:

- Loss/alteration of habitat
- Contamination from various pollutants/siltation
- Invasive Species
- Human disturbance including boat traffic

Goal: Conserve, restore and enhance populations of focal species in the freshwater lake, river, and stream habitat suite to ensure the overall conservation of all native species within this habitat.

General Objectives:

1. *Protect and maintain high priority habitats.*

Strategy	Task
Identify priority habitats for protection.	<ul style="list-style-type: none"> • For sites that qualify as IBAs, encourage local citizen groups to serve as stewards • Preserve all large (> 10 ha) freshwater wetlands from development, draining, and other forms of habitat loss. (PIF) • Evaluate habitat requirements, including nest site characteristics, water quality, and minimum wetland area needed during both the breeding and non-breeding seasons. (PIF)
Maintain and manage priority habitats already protected.	<ul style="list-style-type: none"> • Coordinate habitat protection of areas owned by federal, state, local government or NGO's.

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

Strategy	Task
	<ul style="list-style-type: none"> • Continue to implement Wetland Protection regulations. • Investigate wetland management alternatives that can provide a variety of wetland habitat conditions that are suitable to the various needs of the priority species in this habitat suite. (PIF) • Evaluate habitat requirements, including nest site characteristics, water quality, and minimum wetland area needed during both the breeding and non-breeding seasons. (PIF) • Design a regional management program for these wetland species that continue to be threatened by habitat loss, including increased coordination among managers and biologists to prevent duplication of research efforts and to share current information. • Creation of new nesting habitat may be needed for some species in this physiographic area. Minor alterations to existing management activities for waterfowl, such as leaving some dense stands of cattail and bulrush for nesting sites and maintaining fairly stable water levels during the nesting season, should benefit many of these species. Complete drying of impoundments during draw downs should be avoided to prevent the die-off of small fish, amphibians, and dragonflies, which are a major food sources for many of these bird species. Slow drawdowns should benefit bitterns by providing suitable foraging habitat and encouraging dense stands of emergent vegetation for nesting. (PIF)
Reduce/eliminate wetland alteration and degradation.	<ul style="list-style-type: none"> • Implement new and existing outreach efforts to the general public to gain support for wetland protection. • Wetlands used as breeding sites should be protected from chemical contamination, siltation, eutrophication, and other forms of pollution/contamination that could directly harm breeding birds or their food supply. (PIF) • Hemi-marsh conditions favored by grebes and ducks need to be maintained by periodic reversal of vegetation succession to open up some of the extensive stands of emergent vegetation, but suitable habitat for nesting needs to be maintained in nearby areas during wetland management. (PIF)
Reduce/eliminate invasive species.	<ul style="list-style-type: none"> • Evaluate effects of invasive plants such as <i>Phragmites</i> and purple loosestrife. (PIF) • Work with partners to remove invasive species from infested priority habitats. • Coordinate with IPANE (http://invasives.eeb.uconn.edu/ipane) and other invasive species groups for guidance on removal.

2. Maintain and enhance populations of high priority species.

Strategy	Task
Monitor breeding and non-breeding populations of focal species to determine	<ul style="list-style-type: none"> • Develop a targeted monitoring program for high priority species. Coordinate with PIF projects. (BCR 30 workshop)

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

Strategy	Task
population size, status and trends.	(BCR 30 workshop) <ul style="list-style-type: none"> • Utilize standard methods for conducting point-counts tape-recorded vocalization playback, where appropriate (PIF) and under the guidelines of Coordinated Bird Monitoring whenever possible • Determine causes of breeding failure and mortality of young and adults. (PIF)

Species Specific Objectives:

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
American Black Duck	See Estuaries and Bays for wintering information / Emergent Marsh and Wet Meadows for breeding information		
Bald Eagle	See Rocky Coastline and Islands		
Black Tern	See Emergent Marsh and Wet Meadows		
Barn Swallow	<ul style="list-style-type: none"> • Occurs statewide • Steep, significant declines in Maine (1966-'03 -4.0%, P<0.01, n=59; 1980-'03 -5.6%, P<0.01, n=58) and throughout our region (Eastern Spruce Hardwood: '66-'03 -4.2%, P<0.01, n=270; '80-'03 -6.7%, P<0.01, n=253, and Northern New England '66-'03 -3.5%, P<0.01, n=54; '80-'03 -4.9%, P<0.01, n=52) • Rate of decline may be increasing in recent decades Threats: <ul style="list-style-type: none"> • Loss of open barns for nesting (though cannot explain the magnitude of decline) 	<ul style="list-style-type: none"> • PIF has not established population objectives for this species • Work to prevent conversion of farmland to other use 	<ul style="list-style-type: none"> • Role of loss of agricultural land on breeding grounds to decline is not well understood • Nesting structures under bridges would make excellent youth projects (4-H, Scouts, etc.) • Use/availability analysis with open structures (barns and sheds) could help explain current habitat use • Role of landscape change around abandoned farms/barns • Encourage tolerance of barn swallows nesting in buildings
Bonaparte's Gull (Breeding)	<ul style="list-style-type: none"> • Though common non-breeder along the coast at certain times of year, may breed at 1 or 2 sites in northern Maine 	<ul style="list-style-type: none"> • Breeding population may be as small as a few pairs • No specific habitat objectives though islands where species may breed should not be disturbed 	<ul style="list-style-type: none"> • Document breeding
Common Loon (Breeding)	<ul style="list-style-type: none"> • Maine population: approximately 4,000 individuals (96 	<ul style="list-style-type: none"> • Support Maine Audubon's effort to conduct long-term monitoring via 	<ul style="list-style-type: none"> • Continue efforts to evaluate significance of lead and mercury exposure on loons

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
	estimate; S. Gallo pers. Comm.) <ul style="list-style-type: none"> According to Maine Audubon Loon Count data: number adults increasing yet productivity remaining stable 	“Loon Count” <ul style="list-style-type: none"> Continue efforts to monitor effects of water level management associated with hydro-electric projects 	<ul style="list-style-type: none"> Continue outreach efforts to educate public about effects of lead sinkers and jigs, mercury contamination and disturbance via personal watercraft and other boats Encourage enforcement of no wake zones and horse-power restrictions Continue efforts to determine wintering areas for Maine’s breeding loons Evaluate relationship between loon productivity, shoreline development, and other habitat factors Continue long-term study of mortality of loons with Tufts University and other NGO’s
Common Tern	See Rocky Coastline and Islands		
Great Blue Heron	See Rocky Coastline and Islands		
Greater Scaup (non-breeding)	See Estuaries and Bays		
Pied-billed Grebe	<ul style="list-style-type: none"> Statewide though not abundant anywhere 	<ul style="list-style-type: none"> No specific population objectives assume stable population would be target Stabilize or increase suitable wetlands (Pub) Needs continued inventory work to identify occupied sites 	<ul style="list-style-type: none"> Effects of disturbance unknown Causes of mortality unknown (role of hunting – mistaken for duck could be locally significant for late migrants) – need for outreach? Site fidelity/population trend information needed (species is uncommon enough that a significant portion of population could be gone before it’s noticed)
Purple Martin	See Emergent Marsh and Wet Meadows		
Ruddy Duck	See Estuaries and Bays		

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat. Emergent Marsh and Wet Meadows (WM)

Associated Species:

SPECIES	PRIORITY	B	M	W	SPECIES	PRIORITY	B	M	W	SPECIES	PRIORITY	B	M	W
Black Tern	1	X			Great Blue Heron	2	X	X		Green-winged Teal	3	X	X	
Sedge Wren	1	X			Least Bittern	2	X	X		Mallard	3	X	X	X
Short-eared Owl	1	X	X	X	Marsh Wren	2	X			Northern Harrier	3	X		
American Bittern	2	X	X		Nelson's Sharp-tailed Sparrow	2	X			Northern Pintail	3	X	X	
American Black Duck	2	X	X	X	Pied-billed Grebe	2	X	X		Northern Shoveler	3	X	X	
American Coot	2	X	X		Purple Martin	2	X			Ring-necked Duck	3	X	X	
Barn Swallow	2	X			Sandhill Crane	2	X			Sora	3	X	X	
Black-crowned Night Heron	2	X			Yellow Rail	2	X	X		Virginia Rail	3	X	X	
Bobolink	2	X			American Widgeon	3	X	X						
Common Moorhen	2	X	X		Gadwall	3	X	X						

Threats:

- Habitat loss and degradation

Goals: Conserve, restore and enhance populations of focal species in Palustrine emergent marsh habitat to ensure the overall conservation of all native species within this habitat.

General Objectives:

1. *Protect and maintain high priority habitats.*

Strategy	Task
Identify priority habitats for protection.	<ul style="list-style-type: none"> • For sites that qualify as IBAs, encourage local citizen groups to serve as stewards • Preserve all large (> 10 ha) freshwater wetlands from development, draining, and other forms of habitat loss. (PIF) • Evaluate habitat requirements, including nest site characteristics, water quality, and minimum wetland area needed during both the breeding and non-breeding seasons. (PIF)
Reduce/eliminate wetland alteration and degradation.	<ul style="list-style-type: none"> • Implement new and existing outreach efforts to the general public to gain support for wetland protection.

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

Strategy	Task
	<ul style="list-style-type: none"> Wetlands used as breeding sites should be protected from chemical contamination, siltation, eutrophication, and other forms of pollution/contamination that could directly harm breeding birds or their food supply. (PIF)

2. *Maintain and enhance populations of high priority species.*

Strategy	Task
Monitor breeding and non-breeding populations of focal species to determine population size, status and trends.	<ul style="list-style-type: none"> Develop a targeted monitoring program for high priority species. Coordinate with PIF projects. Utilize standard methods for conducting point-counts using tape-recorded vocalization playback. (PIF) Determine causes of breeding failure and mortality of young and adults. (PIF)

Species Specific Objectives:

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
American Bittern	<ul style="list-style-type: none"> Breeds statewide Secure in state, however, anecdotal evidence of decline in southern Maine (York, Cumberland Counties) Believed to be declining (or has declined) in southern New England BBS data indicates stable long-term (+2.1%, P+0.79, n=36) and short-term (+2.5%, P=0.50, n=33) trends for Maine Threats: <ul style="list-style-type: none"> Invasive aquatic plants Significant encroachment into the riparian zone by development 	<ul style="list-style-type: none"> No population estimate available Monitoring program needed especially in southern Maine Complete survey as part of Ecoregional Survey Effects of agricultural practices (nests occasionally in uplands) unknown Importance of shrub wetlands not well understood 	<ul style="list-style-type: none"> Identifying limiting factors and testing if these are contributing to a “decline” in southern Maine Vocalizations of this bird could be used to interest school-age children in marshbird ecology and wetlands conservation Resurvey occurrences documented by Gibbs and Melvin and by Ecoregional Survey to determine site fidelity and suggest population status
American Black Duck (Breeding Population)	<ul style="list-style-type: none"> Maine breeding population shows no trend, 32,300 individuals in 2003 	<ul style="list-style-type: none"> Objectives being developed by NSST – continental breeding population objective 640,000 (NAWMP) 	<ul style="list-style-type: none"> Expand population model to include habitat characteristics (BCR 14 Workshop)

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
	individuals in 2003 <ul style="list-style-type: none"> • Harvested 9,717 birds in 2002 (HIP), 9,300/yr. During 1996-2001 • Year round presence in Maine Threats: <ul style="list-style-type: none"> • Competition with Mallards (has been suspected but not demonstrated), human disturbance, habitat loss and degradation, and contaminants. • Peatlands in northern part of BCR, outside of Maine, are threatened by peat extraction (BCR 14 Workshop) • Interior Wetlands Planning Area – all nontidal wetlands in the interior of Maine (Atlantic Coast Joint Venture) 	objective 640,000 (NAWMP)	Workshop) <ul style="list-style-type: none"> • Expand survey efforts throughout BCR to cover areas currently not included in aerial surveys (BCR 14 Workshop) • Re-inventory wetlands from previous black duck research projects for breeding/brood-rearing occupancy • Evaluate breeding season habitat use by black ducks and mallards in developed areas • Expand pre-season banding efforts to assess effects of 60-day hunting seasons, and to monitor harvest rate and harvest distribution of Maine-produced waterfowl.
American Black Duck (Wintering)	See Estuaries and Bays		
American Coot	<ul style="list-style-type: none"> • Breeding distribution restricted to just a few occurrences in central Maine • Common migrant statewide • Continentally secure species at edge of range • Status unknown though thought to be stable • Threats: Invasive aquatic plants 	<ul style="list-style-type: none"> • No population estimate though probably fewer than 20 pairs • Continue surveys for coots as part of Ecoregional Survey • Monitoring needed 	<ul style="list-style-type: none"> • Previously occupied sites need to be resurveyed to confirm presence, demonstrate site fidelity, and population status
Barn Swallow	See Lakes and Ponds		
Black Tern	<ul style="list-style-type: none"> • Maine population 2004: 112 pairs at 6 sites, latest 6-year average is 88 pairs, general trend is up since 1990 	The following objectives were taken from the Maine E&T handbook: <ul style="list-style-type: none"> • Prior to land development or forest harvesting near black tern wetlands, 	<ul style="list-style-type: none"> • Place interpretive signs near boat launches to inform the public of nesting terns and their conservation needs • Continue efforts to document

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
	<ul style="list-style-type: none"> • Maine Endangered (1997) • Threats: Fluctuating water levels, chick predation • Overwinter survival may be limited by declines in fish populations 	<ul style="list-style-type: none"> consult with MDIFW biologist to assist with planning • Use voluntary agreements, conservation easements, conservation tax abatements and incentives, and acquisition to protect important habitat. • Follow Shoreland Zoning and LURC standards • Maintain forested riparian habitats for 250’ from wetlands used by black terns • Avoid placing roads, pipelines, houses, yards, and other developments within 250’ of black tern wetlands, and adhere to forestry Best Management Practices • Avoid use of broad spectrum pesticides within ¼ mile of waterways providing habitat for E&T species • Conduct thorough review of dams and wastewater discharge proposals in an effort to improve water quality • Direct motorboat traffic at least 300’ away from nesting areas. Establish no-wake areas around vulnerable nesting areas. • Prevent introduction of new fish predators to watersheds supporting black terns • Manage impoundments for a stable water level, particularly during the incubation period from May 25 – July 15. • Support prevention and eradication of introduced aquatic plants like purple loosestrife 	<ul style="list-style-type: none"> significance of predation on black tern survival and recruitment levels • Investigate appropriate role of Maine population in the conservation of this species in the Northeast N. America

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
Black-crowned Night Heron	See Estuarine Emergent Saltmarsh		
Bobolink	See Grasslands/ Agricultural / Old Fields		
Common Moorhen	<ul style="list-style-type: none"> • Distributed among 10 or so emergent marshes in central and southern Maine • Trend unknown • Threats: <ul style="list-style-type: none"> • Water level fluctuations leading to vegetation change (prefers hemimarsch conditions) • Probably warrants threatened status 	<ul style="list-style-type: none"> • No official population estimate though fewer than 40 pair probably breed in Maine • Many occupied sites are in conservation ownership though others should receive some form of protection 	<ul style="list-style-type: none"> • All previously occupied sites need to be revisited • Continue Ecoregional Survey efforts for this species • Landowners where this species occurs should be contacted regarding maintaining stable water levels
Great Blue Heron	See Rocky Coastline and Islands		
Least Bittern	<ul style="list-style-type: none"> • Occurs in the southern 1/3 of state as far inland as southern Oxford and Piscataquis Counties as well as along the coast from York to Washington Counties though most occurrences are in the Central Interior and Midcoast Regions • No data on population trend though anecdotal evidence suggests at least local declines • Listed as Special Concern in Maine • Threats: loss of wetland habitat or a decline in habitat quality through either pollution of invasive species – especially Purple Loose Strife 	<ul style="list-style-type: none"> • No formal population estimate available though the State undoubtedly supports fewer than 50 pair • Developing a monitoring program for this and other wetland species should be a high priority • No specific habitat objectives are available, however, maintaining or enhancing hemimarsch conditions at all historic occurrences could help stabilize perceived declines 	<ul style="list-style-type: none"> • Need to revisit formerly occupied sites to examine potential declines • Need to examine detectability and estimate probability of detection during call-back surveys • Information on habitat selection would help explain why some sites seem suitable yet are unoccupied. Also, these data could suggest management actions that could be undertaken at many state-owned sites
Marsh Wren	<ul style="list-style-type: none"> • Occurs primarily in southern ½ of Maine; largely absent from the Northern Forest 	<ul style="list-style-type: none"> • Specific population estimate is unavailable, however, statewide population should be maintained at 	<ul style="list-style-type: none"> • Vocalizations and behavior of marsh wrens would make them an excellent species for getting people interested in

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
	<ul style="list-style-type: none"> • Locally abundant at occupied sites, however, total number of occurrences not known though perhaps fewer than 100 sites • BBS data insufficient for Maine, northern New England, and Northern Spruce Hardwood Regions; too few routes reporting 	<p>current levels until reliable population and trend estimates can be made</p> <ul style="list-style-type: none"> • Monitoring for this species is needed and could be done together with marshbirds if appropriate sites were involved • No quantitative habitat objectives are available although protecting wetland habitat, especially cattail-fringed marshes is an obvious first step. Efforts to conserve least bittern habitat should also benefit marsh wrens 	<p>bird ID, ornithology, and bird conservation</p> <ul style="list-style-type: none"> • Understanding long-term fidelity to sites would be useful in gauging management activities for occupied wetlands • Continue survey efforts for this species statewide
Nelson’s Sharp-tailed Sparrow	See Estuarine Emergent Saltmarsh		
Pied-billed Grebe	See Lakes and Ponds		
Purple Martin	<ul style="list-style-type: none"> • Southern, Eastern, and Northeastern 2/3 of the state • Probably declining, may warrant listing, certainly special concern status • BBS trend stable but unreliable based on only 5 routes with species 80-03 • BBS suggests may be declining at N. edge of range (N. Spruce/Hardwoods Region – 5.0% p=0.05 n=51; N. New England region and S. New England region too few data; Stable Region 5 0.7 p=0.53 n=210) 	<ul style="list-style-type: none"> • Inventory of breeding colonies badly needed • Local monitoring needed • Habitat relationships poorly understood – no objectives therefore 	<ul style="list-style-type: none"> • Outreach effort coupled with inventory could spark public interest and produce useful data at little cost • Limiting factors need to be explored • Any work on this species should be viewed with consideration of criteria for potential listing as threatened • Outreach piece on nesting structures and perceived suitable habitat could help
Sandhill Crane	<ul style="list-style-type: none"> • Believed to have reproduced at least irregularly for the past 10-15 years at a single site in central Maine 	<ul style="list-style-type: none"> • No specific population objectives though maintaining species as a breeder and whenever possible allowing natural population growth 	

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
	<ul style="list-style-type: none"> • A second site also in central Maine is possible • No trend data though numbers appear to be increasing with greater number of reports of birds in Maine well into the breeding season and afterward. As cranes do not breed until age 2-7, these may be young birds that will breed in Maine in the future Threats: <ul style="list-style-type: none"> • Water level fluctuations • Disturbance at nest site • Loss and degradation of wetland habitat 	<ul style="list-style-type: none"> • Monitoring status of breeders annually is needed • No specific habitat objectives 	
Sedge Wren	<ul style="list-style-type: none"> • Maine population: unknown – perhaps as few as 100 pairs • Maine Endangered Species • Threats: Habitat loss through development and succession, agricultural practices, wetland alteration, adverse weather during winter • Threats and limiting factors poorly understood in Maine 	<p>The following were taken from the Maine E&T Handbook (McCollough et al. 2003):</p> <ul style="list-style-type: none"> • When projects are proposed within 250’ of wetlands providing habitat for sedge wrens adhere to Best Management Practices • Conserve a diversity of grassy wetlands throughout Maine to provide alternate nesting areas • Avoid ditching or draining wet meadows. Maintain streams and associated sedge meadows in a natural state • Avoid disturbing wet areas within hayfields and pastures, exclude livestock from these areas, particularly during the breeding season (June 1 – August 31) • Maintain moist grasslands with 	<ul style="list-style-type: none"> • Conduct baseline surveys to determine status and distribution • Estimate population size if possible, develop techniques/approach to do so if needed

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
		vegetation at least 8-12 inches high. <ul style="list-style-type: none"> Use burning or mowing to prevent woody species from invading moist grasslands. Create a mosaic of burned and unburned areas, which will provide nesting and feeding areas. Burn only during non-breeding season 	
Short-eared Owl	See Grasslands / Agricultural / Old Fields		
Yellow Rail	<ul style="list-style-type: none"> Yellow Rails have been recorded at several sites in Maine, however a breeding record has never been confirmed. Most habitat for this species occurs in northern and eastern Maine No trend data available Threats: <ul style="list-style-type: none"> Yellow Rails breed in seasonally inundated sedge meadows, therefore, conditions effecting flow and consequently their habitat are important. Some sites where this species has been documented were formally dammed to assist with driving logs. Many water control structures have been abandoned resulting in succession to shrub-dominated habitat. Furthermore, spring drawdowns that facilitated driving logs may have fostered sedge-dominated patches within the impoundments. 	<ul style="list-style-type: none"> No population estimate is available No habitat objectives have been formally discussed. On a case-by-case basis, Yellow Rail habitat is an issue of concern regarding WHIP-sponsored projects to stabilize water levels on former impoundments 	<ul style="list-style-type: none"> Need definitive evidence of breeding Need to continue surveys for this species even if they only yield important stopover sites

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat. Forested Wetland (WF)

Associated Species:

SPECIES	PRIORITY	B	M	W	SPECIES	PRIORITY	B	M	W	SPECIES	PRIORITY	B	M	W
American Black Duck	2	X	X	X	Common Goldeneye	3	X	X	X	Solitary Sandpiper	3	X	X	
Canada Warbler	2	X			Palm Warbler	3	X			Tennessee Warbler	3	X		
Rusty Blackbird	2	X			Red-bellied Woodpecker		X		X					
Yellow-throated Vireo	2	X		X	Red-shouldered Hawk	3	X							

Threats:

- Habitat loss and degradation

Goals: Conserve, restore and enhance populations of focal species in Forested Wetland habitat to ensure the overall conservation of all native species within this habitat.

General Objectives:

1. *Protect and maintain high priority habitats.*

Strategy	Task
Identify priority habitats for protection.	<ul style="list-style-type: none"> • Preserve all large (> 10 ha) freshwater wetlands from development, draining, and other forms of habitat loss. (PIF) • Evaluate habitat requirements, including nest site characteristics, water quality, and minimum wetland area needed during both the breeding and non-breeding seasons. (PIF)
Reduce/eliminate wetland alteration and degradation.	<ul style="list-style-type: none"> • Implement new and existing outreach efforts to the general public to gain support for wetland protection. • Wetlands used as breeding sites should be protected from chemical contamination, siltation, eutrophication, and other forms of pollution/contamination that could directly harm breeding birds or their food supply. (PIF)

2. *Maintain and enhance populations of high priority species.*

Strategy	Task
Monitor breeding and non-breeding	<ul style="list-style-type: none"> • Develop a targeted monitoring program for high priority species. Coordinate with PIF projects.

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

Strategy	Task
populations of focal species to determine population size, status and trends.	(BCR 30 workshop) <ul style="list-style-type: none"> Utilize standard methods for conducting point-counts using tape-recorded vocalization playback. (PIF) Determine causes of breeding failure and mortality of young and adults. (PIF)

Species Specific Objectives:

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
American Black Duck	See Estuaries and Bays for wintering information / Emergent Marsh and Wet Meadows for breeding information		
Canada Warbler	See Deciduous and Mixed Forest		
Rusty Blackbird	See Shrub-scrub Wetland		
Yellow-throated Vireo	See Rivers and Streams		

Shrub-scrub Wetland (WS)

Associated Species:

SPECIES	PRIORITY	B	M	W	SPECIES	PRIORITY	B	M	W	SPECIES	PRIORITY	B	M	W
Blue-winged Warbler	1	X			Rusty Blackbird	2	X			Tennessee Warbler	3	X		
American Bittern	2	X			Willow Flycatcher	2	X			Yellow Warbler	3	X		
American Woodcock	2	X	X		Common Yellowthroat	3	X							
Olive-sided Flycatcher	2	X			Green Heron	3	X	X						

Threats:

- Habitat loss and degradation

Goals: Conserve, restore and enhance populations of focal species in Shrub-scrub Wetlands, to ensure the overall conservation of all native species within this habitat.

General Objectives:

- Protect and maintain high priority habitats.

Strategy	Task
Identify priority habitats for protection.	<ul style="list-style-type: none"> Inventory lands currently in conservation ownership; create database of proportion of habitats on

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

Strategy	Task
	these lands, current management activities, etc. <ul style="list-style-type: none"> • Preserve all large (> 10 ha) freshwater wetlands from development, draining, and other forms of habitat loss. (PIF) • Evaluate habitat requirements, including nest site characteristics, water quality, and minimum wetland area needed during both the breeding and non-breeding seasons. (PIF)
Reduce/eliminate wetland alteration and degradation.	<ul style="list-style-type: none"> • Implement new and existing outreach efforts to the general public to gain support for wetland protection. • Wetlands used as breeding sites should be protected from chemical contamination, siltation, eutrophication, and other forms of pollution/contamination that could directly harm breeding birds or their food supply. (PIF)

2. *Maintain and enhance populations of high priority species.*

Strategy	Task
Monitor breeding and non-breeding populations of focal species to determine population size, status and trends.	<ul style="list-style-type: none"> • Develop a targeted monitoring program for high priority species. Coordinate with PIF projects. • Utilize standard methods for conducting inventories at new areas and for long-term monitoring • Determine causes of breeding failure and mortality of young and adults. (PIF)

Species Specific Objectives:

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
American Bittern	See Emergent Marsh and Wet Meadows		
American Woodcock	See Shrub / Early Successional		
Blue-winged Warbler	See Shrub / Early Successional		
Olive-sided Flycatcher	See Coniferous Forest		
Rusty Blackbird	<ul style="list-style-type: none"> • Maine population estimated at 1,907 ± 793 individuals • Species of Special Concern • Uncertain BBS trend in BCR 14 • Threats: rapid declines associated with habitat loss throughout range, but trend in BCR is uncertain. May be vulnerable to competition from species favoring open habitat 	<ul style="list-style-type: none"> • Increase population 100% to 3,814 individuals • 19,070 hectares of suitable habitat are necessary to support 3,814 individuals at an average density of 10 hectares per pair • Conserve mosaics of forested wetlands within landscape level habitat management efforts (BCR 14 	<ul style="list-style-type: none"> • Need basic information on species distribution, demography, and limiting factors. (BCR 14 Workshop) • Determine population trends (BCR 14 Workshop) • Document habitat requirements and breeding needs for the species (BCR 14 Workshop)

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
	<ul style="list-style-type: none"> • BBs trend unreliable for Maine • BBS trend in N. Spruce Hardwoods region appears stable, 1980-2003 01%, P=0.97, n=39 • Species distribution does not coincide with BBS area well • Strong anecdotal evidence of significant, very long term decline 	Workshop)	<ul style="list-style-type: none"> • Develop/test monitoring and survey techniques and implement long-term monitoring for this species
Willow Flycatcher	<ul style="list-style-type: none"> • Probably statewide but more common in southern and central Maine • Trend is problematic as not separated from Alder Flycatcher 	<ul style="list-style-type: none"> • Increase statewide population from 2,100 individuals to 3,200 individuals over the next 30 years • Reverse decline of shrubland habitat especially in southern Maine • Need trend data specifically for Willow – not Trails Complex 	<ul style="list-style-type: none"> • Outreach – see Eastern Towhee • Research – need better understanding of what constitutes suitable habitat – why seemingly good patches are so often unoccupied

Peatlands (WP)

Associated Species:

SPECIES	PRIORITY	B	M	W	SPECIES	PRIORITY	B	M	W
Olive-sided Flycatcher	2	X			Palm Warbler	3	X		
Rusty Blackbird	2	X			Solitary Sandpiper	3	X	X	

Threats:

- Habitat loss and degradation

Goals: Conserve, restore and enhance populations of focal species in Peatlands, to ensure the overall conservation of all native species within this habitat.

General Objectives:

1. *Protect and maintain high priority habitats.*

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

Strategy	Task
Identify priority habitats for protection.	<ul style="list-style-type: none"> • Inventory lands currently in conservation ownership; create database of proportion of habitats on these lands, current management activities, etc. • Preserve all large (> 10 ha) freshwater wetlands from development, draining, and other forms of habitat loss. (PIF) • Evaluate habitat requirements, including nest site characteristics, water quality, and minimum wetland area needed during both the breeding and non-breeding seasons. (PIF)
Reduce/eliminate wetland alteration and degradation.	<ul style="list-style-type: none"> • Implement new and existing outreach efforts to the general public to gain support for wetland protection. • Wetlands used as breeding sites should be protected from chemical contamination, siltation, eutrophication, and other forms of pollution/contamination that could directly harm breeding birds or their food supply. (PIF)

2. Maintain and enhance populations of high priority species.

Strategy	Task
Monitor breeding and non-breeding populations of focal species to determine population size, status and trends.	<ul style="list-style-type: none"> • Develop a targeted monitoring program for high priority species. Coordinate with PIF projects. • Utilize standard methods for conducting inventories at new areas and for long-term monitoring • Determine causes of breeding failure and mortality of young and adults. (PIF)

Species Specific Objectives:

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
Olive-sided Flycatcher	See Coniferous Forest		
Rusty Blackbird	See Shrub-scrub Wetland		

Rivers and Streams (WR)

Associated Species:

SPECIES	PRIORITY	B	M	W	SPECIES	PRIORITY	B	M	W	SPECIES	PRIORITY	B	M	W
Bald Eagle	2	X		X	Louisiana Waterthrush	2	X		X	Northern Rough-winged Swallow	3	X		

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

SPECIES	PRIORITY	B	M	W	SPECIES	PRIORITY	B	M	W	SPECIES	PRIORITY	B	M	W
Barrow's Goldeneye	2		X	X	Yellow-throated Vireo	2	X		X	Red-bellied Woodpecker	3	X		X
Golden Eagle	2	X		X	Bank Swallow	3	X			Red-breasted Merganser	3	X		
Greater Scaup (non-breeding)	2		X	X	Common Goldeneye	3	X	X	X					

Threats:

- Habitat loss and degradation (road crossings, development in riparian zone, increasing amounts of impervious surface)

Goals: Conserve, restore, and enhance populations of focal species in Rivers and Streams, to ensure the overall conservation of all native species within this habitat.

General Objectives:

1. *Protect and maintain high priority habitats.*

Strategy	Task
Identify priority habitats for protection.	<ul style="list-style-type: none"> • Inventory lands currently in conservation ownership; create database of proportion of habitats on these lands, current management activities, etc. • Evaluate habitat requirements, including nest site characteristics and water quality needed during both the breeding and non-breeding seasons. (PIF)
Reduce/eliminate habitat alteration and degradation.	<ul style="list-style-type: none"> • Implement new and existing outreach efforts to the general public to gain support for riparian and riverine habitat conservation. • Protect against chemical contamination, siltation, eutrophication, and other forms of pollution/contamination that could directly harm breeding birds or their food supply. (PIF)

2. *Maintain and enhance populations of high priority species.*

Strategy	Task
Monitor breeding and non-breeding populations of focal species to determine population size, status, and trends.	<ul style="list-style-type: none"> • Develop a targeted monitoring program for high priority species. Coordinate with PIF projects. • Utilize standard methods for conducting inventories at new areas and for long-term monitoring • Determine causes of breeding failure and mortality of young and adults. (PIF)

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

Species Specific Objectives:

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
Bald Eagle	See Rocky Coastline and Islands		
Barrow’s Goldeneye	<ul style="list-style-type: none"> • Maine population size unknown, variable (~150 individuals at 5-6 locations?) • Maine Species of Special Concern • Migrant and winter resident • Threats: oil spills, displacement from foraging areas by aquaculture development, potential over harvest of low population 	<ul style="list-style-type: none"> • Maintain key wintering areas from development and disturbance (BCR 14 Workshop) 	<ul style="list-style-type: none"> • Initiate routine surveys of wintering birds (BCR 14 Workshop) • Initiate research on wintering ecology of the species, and potential effects of aquaculture development on traditional feeding habitat (BCR 14 Workshop); determine traditional feeding habitat, initiate research on wintering philopatry, seasonal movements, and potential effects of dam removal on habitat availability and population distribution • Develop outreach material to help differentiate between Barrow’s and common goldeneye (BCR 14 Workshop)
Golden Eagle	See Cliff Face and Rocky Outcrop		
Greater Scaup (non-breeding)	See Estuaries and Bays		
Louisiana Waterthrush	<ul style="list-style-type: none"> • A common species in appropriate habitat in southwestern Maine • Most frequently occupies head water streams with high water quality in mature forest in York, Cumberland, Oxford, and possibly Androscoggin Counties • No BBS data for Maine and limited elsewhere due to species patchy occurrences. Northern New England Region ('80-'02 – 2.5%, P=0.57, n=15) trend appears stable <p>Threats:</p> <ul style="list-style-type: none"> • Changes to water quality 	<ul style="list-style-type: none"> • Partners In Flight has not established population objectives for this species in Maine • At a minimum, Maine population should be stabilized • Develop monitoring program along streams to examine population trends • No quantitative habitat objectives are available, however, ensuring continued maintenance of high water quality in Headwater Streams is essential for this species 	<ul style="list-style-type: none"> • Continue survey efforts in southern Oxford County and northern Androscoggin County to establish range boundary • Relationship between impervious surfaces and species occurrence could explain species distribution in Coastal Maine.

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
	<ul style="list-style-type: none"> • Human development • Removal of large volumes of timber from the riparian zone 		
Yellow-throated Vireo	<ul style="list-style-type: none"> • Based on atlas data, this species occurs primarily south and west of Kennebec and Lincoln Counties. It inhabits edges of mature forest often along streams and rivers • Insufficient BBS data for Maine, and only marginal (n=15 routes) for all of Northern New England Region • For USFWS Region 5, stable both short (1980-2003 -0.5%, P=0.50, n=336) and long-term (1966-'03 -0.2%, P=0.76, n=391) <p>Threats:</p> <ul style="list-style-type: none"> • Area sensitive – may need large blocks of forest even though breeds along the edge • Requires closed canopy forest 	<ul style="list-style-type: none"> • Partners in Flight has not developed population objectives for this species, yet recommends maintaining current population over the next 30 years • No habitat objectives have been developed specifically for this species 	<ul style="list-style-type: none"> • Factors effecting habitat quality and consequently productivity are poorly understood especially with reference to timber harvesting • Species is likely a key beneficiary of Beginning with Habitat approach to conservation in Maine. Could be used as a test for success of program through a targeted monitoring program and as a flagship species through outreach (should YTVI occurrences therefore be tracked in biotics?)

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.
UPLAND

Associated Species:

SPECIES	PRIORITY	B	M	W	SPECIES	PRIORITY	B	M	W	SPECIES	PRIORITY	B	M	W
Bicknell's Thrush	1	X			Brown Thrasher	2	X			Prairie Warbler	2	X		
Blue-winged Warbler	1	X			Canada Warbler	2	X			Purple Finch	2	X		X
Peregrine Falcon	1	X	X		Cape May Warbler	2	X			Purple Martin	2	X		
Sedge Wren	1	X			Chestnut-sided Warbler	2	X			Red Crossbill	2	X		X
Short-eared Owl	1	X	X	X	Chimney Swift	2	X			Rose-breasted Grosbeak	2	X		
Upland Sandpiper	1	X			Common Nighthawk	2	X			Sandhill Crane	2	X		
American Bittern	2	X	X		Eastern Kingbird	2	X			Scarlet Tanager	2	X		
American Pipit (breeding)	2	X			Eastern Meadowlark	2	X			Veery	2	X		
American Three-toed Woodpecker	2	X		X	Eastern Screech Owl	2	X		X	Vesper Sparrow	2	X		
American Woodcock	2	X	X		Eastern Towhee	2	X			Whimbrel	2		X	
Baltimore Oriole	2	X			Field Sparrow	2	X			Whip-poor-will	2	X		
Barn Swallow	2	X			Golden Eagle	2	X		X	Willow Flycatcher	2	X		
Barred Owl	2	X			Grasshopper Sparrow	2	X			Wood Thrush	2	X		
Bay-breasted Warbler	2	X			Great-crested Flycatcher	2	X			Yellow-bellied Sapsucker	2	X		
Black and White Warbler	2	X			Horned Lark (breeding)	2	X			Yellow-throated Vireo	2	X		
Black-billed Cuckoo	2	X			Loggerhead Shrike (non-breeding)	2		X		American Redstart	3	X		
Blackburnian Warbler	2	X			Long-eared Owl	2	X		X	Bank Swallow	3	X		
Black-throated Blue Warbler	2	X			Louisiana Waterthrush	2				Black-backed Woodpecker	3	X		X
Black-throated Green Warbler	2	X			Northern Flicker	2	X			Blackpoll Warbler	3	X		
Blue-gray Gnatcatcher	2	X			Northern Parula	2	X			Boreal Owl	3		X	X
Bobolink	2	X			Olive-sided Flycatcher	2	X			Broad-winged Hawk	3	X		

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.
UPLAND (continued)

SPECIES	PRIORITY	B	M	W	SPECIES	PRIORITY	B	M	W	SPECIES	PRIORITY	B	M	W
Canada Goose (NAP) (non-breeding)	3		X		Least Flycatcher	3	X			Red-headed Woodpecker	3	X		X
Carolina Wren	3	X			Mallard	3	X	X	X	Red-shouldered Hawk	3	X		
Common Yellowthroat	3	X			Merlin	3	X			Ruffed Grouse	3	X		X
Cooper's Hawk	3	X			Northern Goshawk	3	X		X	Spruce Grouse	3	X		X
Eastern Wood-Pewee	3	X			Northern Harrier	3	X			Tennessee Warbler	3	X		
Eskimo Curlew	3		X		Northern Rough-winged Swallow	3	X			Tree Swallow	3	X		
Evening Grosbeak	3	X		X	Orchard Oriole	3	X			White-throated Sparrow	3	X		
Fox Sparrow	3	X			Ovenbird	3	X			White-winged Crossbill	3	X		X
House Wren	3	X			Pine Grosbeak (breeding)	3	X		X	Yellow Warbler	3	X		
Killdeer	3	X	X		Red-bellied Woodpecker	3	X		X	Yellow-billed Cuckoo	3	X		

Deciduous and Mixed Forest (UD)

Associated Species:

SPECIES	PRIORITY	B	M	W	SPECIES	PRIORITY	B	M	W	SPECIES	PRIORITY	B	M	W
American Woodcock	2	X	X		Northern Parula	2	X			Eastern Wood-Pewee	3	X		
Baltimore Oriole	2	X			Olive-sided Flycatcher	2	X			Evening Grosbeak	3	X		X
Barred Owl	2	X			Purple Finch	2	X		X	Least Flycatcher	3	X		
Black and White Warbler	2	X			Rose-breasted Grosbeak	2	X			Merlin	3	X		
Black-billed Cuckoo	2	X			Scarlet Tanager	2	X			Northern Goshawk	3	X		X
Black-throated Blue Warbler	2	X			Veery	2	X			Ovenbird	3	X		
Black-throated Green Warbler	2	X			Whip-poor-will	2	X			Red-bellied Woodpecker	3	X		X
Canada Warbler	2	X			Wood Thrush	2	X			Red-headed Woodpecker	3	X		X

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

SPECIES	PRIORITY	B	M	W	SPECIES	PRIORITY	B	M	W	SPECIES	PRIORITY	B	M	W
Chimney Swift	2	X			Yellow-bellied Sapsucker	2	X			Red-shouldered Hawk	3	X		
Eastern Screech Owl	2	X		X	Yellow-throated Vireo	2	X			Ruffed Grouse	3	X		X
Great-crested Flycatcher	2	X			American Redstart	3	X			Tree Swallow	3	X		
Long-eared Owl	2	X		X	Boreal Owl	3		X	X	Yellow Warbler	3	X		
Louisiana Waterthrush	2	X		X	Broad-winged Hawk	3	X			Yellow-billed Cuckoo	3	X		
Northern Flicker	2	X			Cooper’s Hawk	3	X							

Threats:

- Large-scale forestry operations that result in habitat fragmentation, change in over- and under-story species composition (stand conversion) and reduction in rotation length
- Habitat loss associated with development
- Predation and nest parasitism
- Contaminants
- Habitat loss on migration and wintering grounds

Goal: Conserve, restore and enhance populations of focal species in the mature deciduous/mixed forest to ensure the overall conservation of all native species within this habitat.

General Objectives

1. *Protect and maintain high priority habitats.*

Strategy	Task
Identify priority habitats for protection.	<ul style="list-style-type: none"> • Conduct land use analysis to identify all remaining large forest block (e.g., ≥ 350 ha) and landscapes with high % forest cover (e.g., > 70%). (PIF)
Target large forest blocks for protection. (PIF)	<ul style="list-style-type: none"> • Collect ownership/contact information. • Research best method of protection—acquisition, fee or easements from willing sellers
Maintain and manage priority habitats already protected.	<ul style="list-style-type: none"> • Inventory lands currently in conservation ownership; create database of proportion of habitats on these lands, current management activities, etc. • Coordinate habitat protection of areas already owned by federal, state, local government or NGO’s. (BCR 30 workshop) • Create and restore habitat in focus areas through manipulation, augmentation, connecting smaller

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

Strategy	Task
	forest blocks to create large patches, etc (PIF) <ul style="list-style-type: none"> • Assess vegetation structure to ensure that appropriate structural characteristics of the habitat are being maintained. (PIF) • If forest stands have reached a late-successional stage but have little shrub or mid-canopy vegetation and few breaks in the canopy, low-level management through selective cuts or thinning may improve habitat conditions. (PIF) • Assess the effects of various logging practices (especially selection and shelterwood cuts) on occurrence, breeding density, and nesting success of the priority species in this habitat suite. (PIF) • Develop specific forest management guidelines for high priority species. • Where appropriate in state, develop guidelines for recommended deer densities that are compatible with reversing declines of priority forest birds.

2. Maintain or enhance populations of high priority species.

Strategy	Task
Monitor populations of focal species and species from the suite to determine population sizes, status, and trends.	<ul style="list-style-type: none"> • Develop a targeted monitoring program for high priority species. Coordinate with PIF projects • Design and conduct targeted monitoring program to track population trends of forest interior species that are not well covered by BBS at the state or BCR scale. (PIF) • Monitor reproductive success of this suite of species at different locations throughout region to better understand where forest fragmentation causes problems and where it does not. (PIF) • Assess sensitivity of species in this habitat suite to pesticides currently being used to control insect pest species. (PIF) • Studies of prey population levels, habitat characteristics of nest sites and preferred foraging areas. (PIF) • Determine relative importance and use of other habitat types during the post-fledging period prior to migration. (PIF)

Species Specific Objectives:

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
American Woodcock	See Shrub / Early Successional		
Baltimore Oriole	<ul style="list-style-type: none"> • Distributed essentially statewide though uncommon in the 	<ul style="list-style-type: none"> • Increase statewide population roughly 1.5x from 41,000 individuals to 61,500 	

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
	northern forest <ul style="list-style-type: none"> • Stable in Maine (+1.5%, P=0.20, n=47), yet, significant declines at the northern edge of range (Eastern Spruce Hardwood Physiographic Region 1966-'03, -2.3%, P<0.01, n=162, 1980-'03, -4.3%, P<0.01, n=147) • Short-term declines in the Northern New England Physiographic Region as well (1980-'03, -2.2%, P=0.02, n=51) 	individuals over the next 30 years	
Barred Owl	See Coniferous Forest		
Black and White Warbler	<ul style="list-style-type: none"> • Abundant species distributed statewide • Significant long and short-term declines for Maine ('66-'03 -2.1%, P=0.06, n=64; '80-'03 -3.7%, P<0.01, n=63) and Northern New England ('66-'03 -1.7%, P=0.04, n=54; '80-'03 -2.4%, P<0.01, n=52) • Stable long-term ('66-'03 -0.1%, P=0.88, n=289) but significantly declining short-term ('80-'03 -1.0%, P=0.03, n=280) population trend for Eastern Spruce Hardwood Physiographic Region • Declines appear to be increasing in intensity 	<ul style="list-style-type: none"> • Maintain current population, estimated to be 500,000 individuals, over the next 30 years 	
Black-billed Cuckoo	<ul style="list-style-type: none"> • Statewide distribution though much less common in the northwest portion of the state • Population stable in Maine and 	<ul style="list-style-type: none"> • Maine population estimated to be 10,000 individuals • Increase population 1.5x to 15,000 individuals over the next 30 years 	<ul style="list-style-type: none"> • Need to test validity of PIF population estimated (detection probability could be very low for this species) • Examine relationship between tent

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
	<p>at regional scales though BBS reports significant short-term decline ('80-'03 -6.4%, P<0.01, n=40) for Northern New England Physiographic Region</p> <ul style="list-style-type: none"> Species closely tied to fluctuations in tent caterpillar populations 	<ul style="list-style-type: none"> Need to track tent caterpillar populations 	<p>caterpillar populations, BBCU populations, weather, and habitat</p> <ul style="list-style-type: none"> Are there habitat features that are selected for at the landscape scale
Black-throated Blue Warbler	<ul style="list-style-type: none"> Maine population estimated at 173,062 ± 19,768 individuals Significant long-term ('66-'03) +5.9%, P=0.10, n=57 and short-term ('80-'03) increase +3.1%, P=0.02, n=55 	<ul style="list-style-type: none"> Maintain current population 216,328 hectares of suitable habitat are necessary to support 173,062 individuals at an average density of 2.5 hectares per pair 	
Black-throated Green Warbler	<ul style="list-style-type: none"> Widespread and abundant in Maine; occurs statewide Population is increasing both long-term (+3.4%, P=0.02, n=64) and short-term (+2.6%, P=0.04, n=64) in Maine and in recent decades (since 1980) for Northern New England (+3.6%, P<0.01, n=50) and Northern Spruce Hardwood (+2.2%, P<0.01, n=265) Physiographic Regions 	<ul style="list-style-type: none"> Partners In Flight estimates Maine’s population to be 380,000 individuals Maintain statewide population at 380,000 individuals over the next 30 years Maintain sufficient habitat to support 190,000 pairs of Black-throated Green Warbler 	<ul style="list-style-type: none"> Determine what proportion of state population occurs on lands either in conservation ownership or conservation easement
Canada Warbler	<ul style="list-style-type: none"> Maine population estimated at 46,000 ± 5,294 individuals Declining BBS trend (-3.80% / year between 1980-2003) for BCR 14 (P=0.03 n=54) Threats: Habitat loss, and forest management practices which reduce availability of understory vegetation 	<ul style="list-style-type: none"> Increase BCR population by 50%, increase ME population to 69,020 individuals 86,276 hectares of suitable habitat are necessary to support 69,020 individuals at an average density of 2.5 hectares per pair 	<ul style="list-style-type: none"> Expand network of forest bird monitoring sites (BCR 14 Workshop) to include Maine Evaluate limiting characteristics of breeding habitat, and generate basic information on demography of population. (BCR 14 Workshop)

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
Chimney Swift	See Urban / Suburban		
Eastern Screech Owl	<ul style="list-style-type: none"> • Species probably only breeds regularly in York and Cumberland (S. Oxford?) Counties but heard annually at scattered locations mostly in central and eastern Maine • No trend data available for Maine and the limited data for NE Region (FWS R5) suggesting a stable population is based on too few routes to be reliable 	<ul style="list-style-type: none"> • No formal population estimates are available for this species. However, based on recent survey data Maine’s breeding population probably numbers fewer than 100 pairs • No specific habitat objectives exist for this species, though ensuring sufficient opportunities (mature forest) for nesting cavities should be an overall goal for conserving its habitat 	<ul style="list-style-type: none"> • Need a means to estimate population and monitor its trend
Great-crested Flycatcher	<ul style="list-style-type: none"> • Distributed essentially statewide though more sparsely distributed in the more boreal portions of far northern and eastern Maine • Maine trend is significantly increasing long-term ('66-'03 +1.4%, P=0.14, n=54) • Regional trends differ characterized by declines in the north (Northern Spruce Hardwood Region '80-'03 – 2.7%, P<0.01, n=184) and stable to the south (Northern New England '80-'03 +1.0%, P=0.15, n=51) <p>Threats:</p> <ul style="list-style-type: none"> • Loss of natural cavities (obligate cavity nester but prefers natural ones) • Potential competition for nest sites with other cavity nesters (especially starlings) 	<ul style="list-style-type: none"> • Partners In Flight estimates 65,000 individuals in Maine • Maintain the current population over the next 30 years • Approximately 13,650 hectares of habitat would be needed to maintain a suitable habitat to support 32,500 pairs @ .42 pairs/ha 	<ul style="list-style-type: none"> • Function of territory (portions of territory) throughout breeding season not clear and could lead to forestry recommendations that benefit (e.g. foraging areas) for this species

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
	<ul style="list-style-type: none"> NOTE: species likely benefits from fragmenting forests 		
Long-eared Owl	See Coniferous Forest		
Louisiana Waterthrush	See Rivers and Streams		
Northern Flicker	<ul style="list-style-type: none"> Abundant species, distributed statewide BBS data indicate a stable population in Maine (1980-'03 +1.0%, P=0.34, n=63) and the Northern Spruce Hardwood Region (1980-'03 -0.5%, P=0.19, n=286) but significantly declining in Northern New England Region (1980-'03 - 2.9%, P<0.01, n=51) and overall for FWS Region 5 (1980-'03 - 0.6%, P=0.07, n=583) <p>Threats:</p> <ul style="list-style-type: none"> Loss of mature trees for nesting Competition for nest sites with starlings 	<ul style="list-style-type: none"> Partners In Flight estimates Maine's Northern Flicker population to be 95,000 individuals and recommends increasing the population to 140,000 individuals over the next 30 years Habitat objectives have not been developed as the species territorial behavior is complex with an inner (defended) territory near the nest and an outer home range for foraging, etc. 	<ul style="list-style-type: none"> Understanding the benefits of snag retention practices on this species (and the host of others that rely on it to create cavities) would be useful for forest management planning on state-owned lands as well as others
Northern Parula	<ul style="list-style-type: none"> Species occurs statewide though more infrequent in southern Counties (York, Cumberland, S. Oxford) Two disjunct populations breed in N. America; one in New England to the Great Lakes and a second from S. New York southwest to Texas and south to Florida According to BBS data, breeding season densities are highest in Maine (especially Washington County) and New Brunswick for 	<ul style="list-style-type: none"> Partners in Flight estimates the statewide population at 550,000 individuals and recommends maintaining the population at that level for the next 30 years No specific habitat objectives have been developed, however, at a density of 2.5/ha (0.4 ha/pr) for mainland populations, 90,000 ha of habitat would be needed to support 225,000 pairs 	<ul style="list-style-type: none"> Need to determine if northern populations exhibit area sensitivity that has been reported for southern populations At what stand age do conditions (epiphyte growth) become favorable for successful reproduction by the species?

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
	all of Northern population <ul style="list-style-type: none"> Increasing in Maine both long-term (1966-'03 +4.0%, P=0.03) and short-term (1980-'03 +3.6%, P=0.10) Threats: <ul style="list-style-type: none"> Requires epiphytes (lichen) for nest construction therefore shorter harvest rotations could result in insufficient growth to support populations at current levels May be area sensitive though more data needed 		
Olive-sided Flycatcher	See Coniferous Forest		
Purple Finch	See Coniferous Forest		
Rose-breasted Grosbeak	<ul style="list-style-type: none"> Common species statewide Population trend stable in Maine according to BBS (1966-'03 +2.4%, P=0.18, n=65; 1980-'03 +1.8%, P=0.50, n=64) Threats: <ul style="list-style-type: none"> Limiting factors largely unknown Loss of edge and young forest conditions 	<ul style="list-style-type: none"> Partners In Flight estimates Maine's population to be 81,000 individuals and recommends the population be increased to 120,000 individuals over the next 30 years At a breeding density of 1.3 pairs/ha, 78,00 ha of suitable habitat would be required to support 60,000 pairs 	<ul style="list-style-type: none"> Limiting factors for this species need much attention Investigation of how forest management practices affect habitat quality also is warranted
Scarlet Tanager	<ul style="list-style-type: none"> Common species distributed statewide, though probably less abundant in the far north where coniferous forest is extensive Significantly increasing in Maine according to BBS data (1966-'03 +3.01%, P=0.01, n=60; 1980-'03 -1.3%, P=0.05, n=51) and Northern Spruce Hardwood Regions (1980-'03 -1.8%, 	<ul style="list-style-type: none"> Partners In Flight estimated 48,000 individuals occur in Maine and recommends the population remain stable at that level for the next 30 years At a density of .22 pairs/ha approximately 5,280 ha of suitable habitat would be needed to support 24,000 pairs of Scarlet Tanagers 	<ul style="list-style-type: none"> Population estimate and density estimates need to be tested with Maine data Beauty of bird could be useful to initiatives targeting protection of large forest blocks

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
	<p>P<0.01, n=182)</p> <ul style="list-style-type: none"> • Threats: forest interior species therefore chief threats associated with forest fragmentation 		
Veery	<ul style="list-style-type: none"> • Maine population estimated at 566,300 ± 47,000 individuals • Declining BBS trend (-2.1% / year between 1966-2003) for Maine (P<0.01, n=65) • 16% of population breeds in BCR 14 • Threats: Loss of vegetation understory in maturing forests 	<ul style="list-style-type: none"> • Increase population by 50% to 849,450 individuals; 552,142 hectares of suitable habitat are necessary to support target population at an average density of 1.3 hectares per pair • Increase habitat quality by increasing availability of understory vegetation in maturing forests 	<ul style="list-style-type: none"> • Continue monitoring through BBS (BCR 14 Workshop) • Investigate reasons for population decline associated with breeding grounds (BCR 14 Workshop)
Whip-poor-will	See Shrub / Early Successional		
Wood Thrush	<ul style="list-style-type: none"> • Maine population estimated at 320,000 ± 38,000 individuals • Declining BBS trend (-2.50% / year between 1966-2003) for Maine (p<0.01, n=62) • 9% of population breeds in BCR 14 • Threats: Not clearly understood, but may include loss of habitat (scrub understory layer), Ca⁺ depletion via acid rain, contaminants, and loss of wintering habitat 	<ul style="list-style-type: none"> • Increase BCR population by 50%, increase ME population to 480,000 individuals; 792,000 hectares of suitable habitat are necessary to support 480,000 individuals at an average density of 3.3 hectares per pair • Develop forest management guidelines which would result in improving habitat quality and quantity (BCR 14 Workshop) • Develop regional integrated forest management plan (BCR 14 Workshop) 	<ul style="list-style-type: none"> • Continue monitoring through BBS (BCR 14 Workshop) • Initiate research on population decline, focusing on reproductive success rates in relation to condition of forest (BCR 14 Workshop) • Once forest guideline have been developed, work with forest mangers to ensure measures are considered during management (BCR 14 Workshop)
Yellow-bellied Sapsucker	<ul style="list-style-type: none"> • Maine population estimated at 380,000 ± 37,000 individuals • Increasing trend in Maine ('66-'03 +5.2%, P=0.01, n=60; '80-'03 +5.5%, P<0.01, n=60) • 11% of population breeds in 	<ul style="list-style-type: none"> • Maintain population at 380,000 individuals • 570,000 hectares of suitable habitat are necessary to support 421,636 individuals at an average density of 3 hectares per pair 	<ul style="list-style-type: none"> • Need to determine causes of population declines (BCR 14 Workshop)

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
	BCR 14 • Threats: loss of nesting habitat (cavities)	• Increase habitat quality for the species by leaving suitable cavity trees after timber harvest operations (BCR 14 Workshop)	
Yellow-throated Vireo	See Rivers and Streams		

Coniferous Forest (UC)

Associated Species:

SPECIES	PRIORITY	B	M	W	SPECIES	PRIORITY	B	M	W	SPECIES	PRIORITY	B	M	W
American Three-toed Woodpecker	2	X		X	Northern Flicker	2	X			Evening Grosbeak	3	X		X
Barred Owl	2	X			Olive-sided Flycatcher	2	X			Least Flycatcher	3	X		
Bay-breasted Warbler	2	X			Purple Finch	2	X		X	Merlin	3	X		
Black-billed Cuckoo	2	X			Red Crossbill	2	X		X	Northern Goshawk	3	X		X
Blackburnian Warbler	2	X			Black-backed Woodpecker	3	X		X	Pine Grosbeak (breeding)	3	X		X
Black-throated Green warbler	2	X			Blackpoll Warbler	3	X			Red-bellied Woodpecker	3	X		X
Cape May Warbler	2	X			Boreal Owl	3		X	X	Spruce Grouse	3	X		X
Long-eared Owl	2	X		X	Broad-winged Hawk	3	X			Tennessee Warbler	3	X		
Louisiana Waterthrush	2	X		X	Cooper's Hawk	3	X			White-winged Crossbill	3	X		X

Threats:

- Large-scale forestry operations that result in habitat fragmentation, change in over- and under-story species composition (stand conversion) and reduction in rotation length
- Habitat loss associated with development
- Contaminants
- Habitat loss on migration and wintering grounds

Goal: Conserve, restore and enhance populations of focal species in Coniferous Forests to ensure the overall conservation of all native species within this habitat.

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

General Objective:

1. *Protect and maintain high priority habitats.*

Strategy	Task
Identify priority habitats for protection.	<ul style="list-style-type: none"> • Conduct land use analysis to identify all remaining large forest block (e.g., ≥ 350 ha) and landscapes with high % forest cover (e.g., $> 70\%$). (PIF)
Target large forest blocks for protection. (PIF)	<ul style="list-style-type: none"> • Collect ownership/contact information. • Research best method of protection—acquisition, fee or easements from willing sellers
Maintain and manage priority habitats already protected.	<ul style="list-style-type: none"> • Inventory lands currently in conservation ownership; create database of proportion of habitats on these lands, current management activities, etc. • Coordinate habitat protection of areas already owned by federal, state, local government or NGO’s. (BCR 30 workshop) • Create and restore habitat in focus areas through manipulation, augmentation, connecting smaller forest blocks to create large patches, etc (PIF) • Assess vegetation structure to ensure that appropriate structural characteristics of the habitat are being maintained. (PIF) • If forest stands have reached a late-successional stage but have little shrub or mid-canopy vegetation and few breaks in the canopy, low-level management through selective cuts or thinning may improve habitat conditions. (PIF) • Assess the effects of various logging practices (especially selection and shelterwood cuts) on occurrence, breeding density, and nesting success of the priority species in this habitat suite. (PIF) • Develop specific forest management guidelines for high priority species. • Where appropriate in state, develop guidelines for recommended deer densities that are compatible with reversing declines of priority forest birds.

2. *Maintain or enhance populations of high priority species.*

Strategy	Task
Monitor populations of focal species and species from the suite to determine population sizes, status, and trends.	<ul style="list-style-type: none"> • Develop a targeted monitoring program for high priority species. Coordinate with PIF projects • Design and conduct targeted monitoring program to track population trends of forest interior species that are not well-covered by BBS at the state or BCR scale. (PIF) • Monitor reproductive success of this suite of species at different locations throughout region to better understand where forest fragmentation causes problems and where it does not. (PIF)

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

Strategy	Task
	<ul style="list-style-type: none"> • Assess sensitivity of species in this habitat suite to pesticides currently being used to control insect pest species. (PIF) • Studies of prey population levels, habitat characteristics of nest sites and preferred foraging areas. (PIF) • Determine relative importance and use of other habitat types during the post-fledging period prior to migration. (PIF)

Species Specific Objectives:

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
American Three-toed Woodpecker	<ul style="list-style-type: none"> • Maine Special Concern • Occurs in the extensive conifer forests (spruce-dominated) of northern Maine. Found in smaller numbers in eastern Maine and the Western Mountains • No population trend data available, though anecdotal evidence suggests a decline; perhaps a cyclical response to declines in prey availability <p>Threats:</p> <ul style="list-style-type: none"> • Specialist with diet focusing on bark beetles • Therefore: a lack of natural disturbance (burns, other insect outbreaks) detrimental • Salvage logging removes potential beetle habitat • Shorter rotations may result in more control over insect outbreaks 	<ul style="list-style-type: none"> • No population estimates available • No formal habitat objectives exist though policies regarding salvage logging, insect control, rotation length on state lands should consider the needs/status of this species • Hagan et al. (1997, J. Wildl. Manage. 61:718-735) found this species at a density of 0.08 birds/ha in North Central Maine 	<ul style="list-style-type: none"> • Need better information on abundance and diversity • Are there local areas which support numbers of these birds annually. If so, are there three unique features of that habitat that can be mimicked elsewhere? • Outreach regarding diet specialization is needed
Barred Owl	<ul style="list-style-type: none"> • Distributed statewide • No population trend data 	<ul style="list-style-type: none"> • Population objectives have not been developed 	<ul style="list-style-type: none"> • Need detectability correction factors to estimate population

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
	available – assumed to be stable	<ul style="list-style-type: none"> Monitoring needed – efforts by Maine Audubon should be supported 	<ul style="list-style-type: none"> Need thorough analysis of existing Barred owl data to determine best methods for monitoring this and other nocturnal species Determine causes of occasional die-offs of Barred owls (prey cycles, age-structure, migratory status) Continue outreach to owl volunteers to facilitate future monitoring Conduct power analysis for population monitoring based on data from owl study
Bay-breasted Warbler	<ul style="list-style-type: none"> Maine population estimated at 56,000 ± 11,500 individuals Stable BBS trend for Maine ('66-'03 +3.3%, P=0.34, n=38; '80-'03 +0.3%, P=0.94, n=36) 9.3% of population breeds in BCR 14 (mostly in Canada) Threats: loss of mature spruce-fir habitat due to shortened harvest rotations, spruce budworm suppression efforts, forest fragmentation, loss of wintering habitat, and perhaps global climate change Population is naturally cyclic with spruce budworm outbreaks 	<ul style="list-style-type: none"> Increase population by 50% to 84,602 individuals 104,250 hectares of suitable habitat are necessary to support 84,000 individuals at an average density of 2.5 hectares per pair Maintain existing large contiguous tracks of mature spruce-fir forest (BCR 14 Workshop) 	<ul style="list-style-type: none"> Investigate effects of spruce budworm suppression efforts on the population, and determine if current population level continues to reflect natural population fluctuations associated with budworm outbreaks (BCR 14 Workshop)
Black-billed Cuckoo	See Deciduous and Mixed Forest		
Blackburnian Warbler	<ul style="list-style-type: none"> Statewide distribution Population trend data are mixed. Stable in Maine ('80-'03 -2.7%, P=0.12, n=44), and increasing in Northern Spruce Hardwood Physiographic Region ('80-'03 +1.5%, P=0.02, n=244) 	<ul style="list-style-type: none"> Statewide population estimated to be 180,000 individuals Maintain current population over the next 30 years Maintain sufficient mature coniferous woodland (across the landscape) to support 90,000 pairs 	<ul style="list-style-type: none"> Evaluate limiting factors in light of looming threats to coniferous forest in southern Maine via Hemlock Woolly Adelgid

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
	<ul style="list-style-type: none"> • At least in parts of range, closely associated with Hemlock stands • Threats: chiefly, death of Hemlock due to Hemlock Woolly Adelgid 		
Black-throated Green Warbler	See Deciduous and Mixed Forest		
Cape May Warbler	<ul style="list-style-type: none"> • Maine population estimated at 44,000 ± 9,200 individuals • Population stable at both State ('66-'03 +5.6%, P=0.63, n=33) region and N. Spruce/Hardwood region ('66-'03 +0.7%, P=0.58, n=156) scale • Threats: loss of mature conifer forest perhaps through climate change, shortened rotations, spruce budworm suppression efforts 	<ul style="list-style-type: none"> • Maintain current population • 27,500 hectares of suitable habitat are necessary to support 44,000 individuals at an average density of 1.25 hectares per pair • Maintain existing patches of mature conifer forest and incorporate plans for older growth patches into forest management plans whenever possible (BCR 14 Workshop) • Work with industrial foresters to ensure long-term availability of mature conifer forest (BCR 14 Workshop) 	<ul style="list-style-type: none"> • Continue monitoring through BBS (BCR 14 Workshop) • Evaluate relationship to spruce budworm cycles (BCR 14 Workshop)
Long-eared Owl	<ul style="list-style-type: none"> • Status and distribution in Maine is unknown • Species is speculated to occur statewide at very low densities 		<ul style="list-style-type: none"> • Conduct baseline surveys to document status and distribution in Maine.
Louisiana Waterthrush	See Rivers and Streams		
Northern Flicker	See Deciduous and Mixed Forest		
Olive-sided Flycatcher	<ul style="list-style-type: none"> • Maine population estimated at 5,450 ± 1,307 individuals • Declining BBS trend in BCR (-3.65% / year between 1966-1999) • Listed as Species of Special Concern in Maine 	<ul style="list-style-type: none"> • Increase population by 100% to 10,900 individuals • 54,500 hectares of suitable habitat are necessary to support 10,900 individuals at an average density of 10 hectares per pair 	<ul style="list-style-type: none"> • Need to initiate targeted monitoring efforts, such as a species atlas project, particularly in bog habitats (BCR 14 Workshop) • Need to confirm population trend (BCR 14 Workshop) • Initiate research on limiting factors,

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
	<ul style="list-style-type: none"> Threats: not clearly understood, increased predation rates at edge habitats, habitat loss on wintering grounds 		<p>absence of landscape scale wild fire, effects of silvicultural practices (i.e snag removal), and reproductive success rates in artificial or managed habitats (BCR 14 Workshop)</p> <ul style="list-style-type: none"> Educate landowners and managers regarding the threats to, and associated decline of the species (BCR 14 Workshop) Need to identify key breeding locations and assess site fidelity and current habitat conditions and potential threats at those sites (BCR 14 Workshop) Investigate experimental habitat manipulations to enhance local populations (BCR 14 Workshop)
Purple Finch	<ul style="list-style-type: none"> Maine population estimated at 81,250 ± 7,000 individuals Declining BBS trend for BCR (-2.43% / year for 1966 –1999) Stable in Maine ('66-'03 –0.7%, P=0.64, n=64) yet long-term Significant decline for N. New England ('66-'03 –2.08%, P<0.01, n=53) and N. Spruce/Hardwood regions ('66-'03 –2.06%, P<0.01 n=276) 11% of breeding population in BCR 14 Threats: generally unknown, but may be adversely effected by changes in forest structure and harvesting practices 	<ul style="list-style-type: none"> Increase population by 50% to 122,000 individuals 305,000 hectares of suitable habitat are necessary to support 121,754 individuals at an average density of 5 hectares per pair Enhance nesting habitat for the species by promoting management practices that provide greater structural diversity within the forest (BCR 14 Workshop) 	<ul style="list-style-type: none"> Continue monitoring population trends, especially monitoring in managed forests (BCR 14 Workshop) Gather information on habitat associations, including forest structure, for this species (BCR 14 Workshop) Develop outreach material promoting structural diversity within the forest, and provide to industrial forest managers (BCR 14 Workshop)
Red Crossbill	<ul style="list-style-type: none"> Among the most specialized Passerines found in Maine 	<ul style="list-style-type: none"> No population or habitat objectives have been developed for this species 	<ul style="list-style-type: none"> Some form of monitoring needed as well as a better understanding which “call

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
	<ul style="list-style-type: none"> Probably occurs statewide, though nomadic and highly localized depending on coniferous seed crop Species inadequately monitored by the BBS at state or regional scale Threats: <ul style="list-style-type: none"> Forest fragmentation Shortening of rotation length Exotic pests of conifers such as Hemlock Woolly Adelgid 		types" make up Maine's population

Dry Woodland and Barrens (<60% canopy cover) (UB)

Associated Species:

SPECIES	PRIORITY	B	M	W	SPECIES	PRIORITY	B	M	W	SPECIES	PRIORITY	B	M	W
Short-eared Owl	1	X	X	X	Eastern Towhee	2	X			Carolina Wren	3	X		
Upland Sandpiper	1	X			Grasshopper Sparrow	2	X			Eskimo Curlew	3		X	
Black-billed Cuckoo	2	X			Prairie Warbler	2	X			Merlin	3	X		
Bobolink	2	X			Vesper Sparrow	2	X			Northern Harrier	3	X	X	
Brown Thrasher	2	X			Whimbrel	2		X						
Common Nighthawk	2	X			Whip-poor-will	2	X							

Threats:

- Land management activities (e.g., fire suppression, certain harvest techniques) that results in changes in forest structure and composition
- Habitat loss associated with development
- Contaminants
- Habitat loss on migration and wintering grounds

Goal: Conserve, restore and enhance populations of focal species in Dry Woodlands and Barrens to ensure the overall conservation of all native species within this habitat.

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

General Objective:

1. Protect and maintain high priority habitats.

Strategy	Task
Identify priority habitats for protection.	<ul style="list-style-type: none"> • Conduct land use analysis to identify all remaining large blocks of this habitat (e.g., ≥ 350 ha) and landscapes with high % of this cover type.
Target large forest blocks for protection. (PIF)	<ul style="list-style-type: none"> • Collect ownership/contact information. • Research best method of protection—acquisition, fee or easements from willing sellers
Maintain and manage priority habitats already protected.	<ul style="list-style-type: none"> • Inventory lands currently in conservation ownership; create database of proportion of habitats on these lands, current management activities, etc. • Coordinate habitat protection of areas already owned by federal, state, local government or NGO’s. (BCR 30 workshop) • Create and restore habitat in focus areas through manipulation, augmentation, connecting smaller blocks to create large patches, etc (PIF) • Assess vegetation structure to ensure that appropriate structural characteristics of the habitat are being maintained. (PIF) • If forest stands have reached a late-successional stage encourage management to improve habitat conditions. (PIF) • Assess the effects of various logging (and prescribed burning) practices on occurrence, breeding density, and nesting success of the priority species in this habitat suite. (PIF) • Develop specific forest management guidelines for high priority species. • Where appropriate in state, develop guidelines for recommended deer densities that are compatible with reversing declines of priority forest birds.

2. Maintain or enhance populations of high priority species.

Strategy	Task
Monitor populations of focal species and species from the suite to determine population sizes, status, and trends.	<ul style="list-style-type: none"> • Develop a targeted monitoring program for high priority species. Coordinate with PIF projects • Design and conduct targeted monitoring program to track population trends of forest interior species that are not well covered by BBS at the state or BCR scale. (PIF) • Monitor reproductive success of this suite of species at different locations throughout region to better understand if forest fragmentation causes problems in this habitat type. (PIF) • Assess sensitivity of species in this habitat suite to pesticides currently being used to control insect

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

Strategy	Task
	pest species. (PIF) <ul style="list-style-type: none"> • Study prey population levels, habitat characteristics of nest sites and preferred foraging areas. (PIF) • Determine relative importance and use of other habitat types during the post-fledging period prior to migration. (PIF)

Species Specific Objectives:

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
Black-billed Cuckoo	See Deciduous and Mixed Forest		
Bobolink	See Grassland / Agricultural / Old Fields		
Brown Thrasher	See Shrub / Early Successional		
Common Nighthawk	See Shrub / Early Successional		
Eastern Towhee	See Shrub / Early Successional		
Grasshopper Sparrow	See Grassland / Agricultural / Old Fields		
Prairie Warbler	<ul style="list-style-type: none"> • Common in suitable habitat in York and Cumberland Counties, species is distributed sparsely northward only to the Greater Merrymeeting Bay area • Insufficient data from BBS for Maine and northern New England to estimate trend • Long-term decline (1966-2003 –1.5%, P=0.03, n=333) yet stable short-term trend (1980-2003 – 0.9%, P=0.22, n=296) for USFWS Region 5 	<ul style="list-style-type: none"> • Partners In Flight estimates Maine’s population to be 1900 individuals and recommends increasing the population to 2,900 individuals within 30 years • Quantitative • Habitat objectives for this species have not been developed 	<ul style="list-style-type: none"> • Estimates of density in dry woodland habitat needed to “calculate” habitat objectives based on PIF population objective
Upland Sandpiper	<ul style="list-style-type: none"> • State population is unknown – 148 or more pairs occupied 59 grassland-barrens and airports in 1999 • Threats: largely unknown, habitat loss, adult survival rates, habitat quality and quantity on migratory 	<ul style="list-style-type: none"> • Vegetation management efforts have included: periodic mowing or burning (every 1-3 years) to promote bunch grasses and forbs, while discouraging encroachment by woody vegetation (MDIFW Species Assessment) 	<ul style="list-style-type: none"> • Initiate effort to estimate population size, monitor population trends, assess habitat quality, determine survival rates and productivity (MDIFW Species Assessment) • Need to evaluate effects of vegetation management actions

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
	<p>routes and wintering grounds, and food availability</p> <ul style="list-style-type: none"> • Agricultural practices (especially lowbush blueberry cultivation) contribute the greatest area of habitat for this species in Maine 	<ul style="list-style-type: none"> • Increase population to 200 pairs at 70 sites • Recommended Management Actions Include: (MDIFW Species Assessment) • -Avoid mowing and grazing between May 1 – August 5 • Maintain approx. 40% of vegetation at a height of 8-12”, with minimum litter and grass cover. Maintain some patches of bare ground, scattered tall forbs (8-25”), and short shrubs for song perches • Blueberry barrens in Hancock and Washington Counties provide primary breeding habitat in Maine. Future availability of this habitat will depend on commercial demand for blueberries <p><u>Focus Areas:</u></p> <ul style="list-style-type: none"> • Downeast Blueberry Barrens • Kennebunk Plains • Loring/Aroostook NWR 	<p>(intensity, technique, and frequency) on population (BCR 14 Workshop)</p> <ul style="list-style-type: none"> • Need basic demographic and habitat studies at key sites in Maine (Downeast Barrens, Loring, K-plains) to better understand limiting factors
Vesper Sparrow	<ul style="list-style-type: none"> • Maine Special Concern • Patchy distribution statewide except absent from northern forest of NW Maine • Common species in blueberry barrens downeast and along coast to Southern Maine • BBS data insufficient for Maine and Northern New England Region. Significant long-term and short-term declines for Northern Spruce Hardwood 	<ul style="list-style-type: none"> • No formal population objectives have been developed by Partners in Flight. However, ensuring species remains at all currently occupied sites is an obvious first step • No habitat objectives have been outlined specifically for this species, however, conservation efforts targeting Upland Sandpiper and Grasshopper Sparrow will benefit this species • Developed monitoring program for 	<ul style="list-style-type: none"> • Continue grassland project initiated by Habitat Group in 2004 • Actively work with NRCS staff to develop WHIP projects that encompass habitat for this and other species • Basic productivity and survival data are needed for Vesper Sparrow in Maine, especially in blueberry barren habitat

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
	Forest Region (1966-'03 -2.6%, P=0.05, n=127; 1980-'03 -3.9%, P=0.03, n=99) Threats: <ul style="list-style-type: none"> Chiefly, human activities that remove significant amount of vegetative cover such as intensive graying, tillage, and mowing 	species	
Short-eared Owl	See Grasslands / Agricultural / Old Fields		
Whimbrel	See Unconsolidated Shore		
Whip-poor-will	See Shrub / Early Successional		

Mountaintop Forest (incl. Krummholz) (UM)

Associated Species:

SPECIES	PRIORITY	B	M	W	SPECIES	PRIORITY	B	M	W	SPECIES	PRIORITY	B	M	W
Bicknell's Thrush	1	X			Purple Finch	2	X		X	Blackpoll Warbler	3	X		

Threats:

- Global climate change
- Acid precipitation
- Recreational and other development
- Contaminants
- Habitat loss on migration and wintering grounds

Goal: Conserve, restore and enhance populations of focal species that utilize mountaintop forest to ensure the overall conservation of all native species within this habitat.

General Objectives

1. *Protect and maintain high priority habitats.*

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

Strategy	Task
Identify priority habitats for protection.	<ul style="list-style-type: none"> • Identify and characterize (habitat size, quality, and ownership) of all potential habitat patches, using GIS (PIF Plan for Physiographic Area 28) and prioritize these • Designate important breeding areas under Important Bird Area program (PIF Plan for Physiographic Area 28) for core sites • Identify specific threats at core breeding sites (PIF Plan for Physiographic Area 28) • If declines in habitat availability or Bicknell’s Thrush populations are documented, strictly adhere to habitat protection strategies such as LURC PMA designation • Initiate efforts to “officially” recognize Bicknell’s Thrush and mountaintop habitat as a high conservation priority in public agency and private land-use planning efforts (PIF Plan for Physiographic Area 28)

2. *Maintain or enhance populations of high priority species.*

Strategy	Task
Monitor populations of focal species and species from the suite to determine population sizes, statuses, and trends.	<ul style="list-style-type: none"> • Complete on-the-ground inventories to determine numbers of breeding Bicknell’s Thrush at all occupied sites (PIF Plan for Physiographic Area 28) • Initiate research on reproductive success of focal species into ongoing studies of forest health, in relation to pollution and development (PIF Plan for Physiographic Area 28)

Species Specific Objectives:

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
Bicknell’s Thrush	<ul style="list-style-type: none"> • Documented at 60 mountaintops in Maine (157 discrete habitat units) • >90% of population breeds in BCR 14 • Species of Special Concern in Maine • Threats: global climate change, environmental contaminants (mercury), breeding habitat loss (communication towers, ski areas, wind power turbines), 	<ul style="list-style-type: none"> • Increase population within BCR (35,000 individuals) by 10% to 38,500 individuals • 26,130 ha of potential habitat exists in Maine, with 40% in conservation ownership (Dan Lambert pers. Com) • Maintain existing range of breeding habitat (BCR 14 Workshop) • Identify and secure habitat protection for core breeding areas in Maine, secure stewardship and management agreements with 	<ul style="list-style-type: none"> • Expand existing monitoring practices for high elevation species, including monitoring natal dispersal of BITH (BCR 14 Workshop) • Analyze existing data to evaluate population changes (BCR 14 Workshop) • Evaluate significance of contaminant exposure (mercury) on BITH (BCR 14 Workshop) • Initiate a Population Viability Analysis for BITH (BCR 14 Workshop) • Model potential consequences of climate change (BCR 14 Workshop) • Determine demographics and reproductive

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
	winter habitat loss, and industrial forest practices	industrial forest managers (PIF Plan for Physiographic Area 28 and BCR 14 Workshop) <ul style="list-style-type: none"> • Develop mitigation policies and measures that would protect and enhance wintering habitat, to offset development projects in the US (BCR 14 Workshop) 	success rates within industrial forest landscape (BCR 14 Workshop) <ul style="list-style-type: none"> • Use BITH as an umbrella species to educate public about conservation needs of migratory species and international conservation issues (BCR 14 Workshop) • Educate recreational users of montane forests about BITH conservation (BCR 14 Workshop) • Determine effects of high elevation timber harvesting on BITH populations • Evaluate BITH use of regenerating hardwood stands as breeding habitat • Continue support for Project Mountain Birdwatch
Purple Finch	See Coniferous Forest		

Alpine (summits & tablelands above treeline) (UA)

Associated Species:

SPECIES	PRIORITY	B	M	W
American Pipit (breeding)	2	X		

Threats:

- Global climate change
- Acid precipitation
- Recreational use
- Contaminants

Goal: Conserve, restore and enhance populations of focal species that utilize mountaintop forest to ensure the overall conservation of all native species within this habitat.

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

General Objectives

1. *Protect and maintain high priority habitats.*

Strategy	Task
Identify priority habitats for protection.	<ul style="list-style-type: none"> • Identify and characterize (patch size, quality, and ownership) of all potential habitat patches, using GIS (PIF Plan for Physiographic Area 28) and prioritize these • Designate important breeding areas under Important Bird Area program (PIF Plan for Physiographic Area 28) as key sites • Identify specific threats at core breeding site (PIF Plan for Physiographic Area 28)

2. *Maintain or enhance populations of high priority species.*

Strategy	Task
Monitor populations of focal species and species from the suite to determine population sizes, statuses, and trends.	<ul style="list-style-type: none"> • Complete on-the-ground inventories to develop statewide population estimate • Initiate surveys at other potential breeding sites (Mt. Abraham).

Species Specific Objectives:

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
American Pipit (breeding)	<ul style="list-style-type: none"> • One occurrence on Mt. Katahdin • Trend/stability of population unknown although recently colonized Mt. Washington in New Hampshire – expanding? 	<ul style="list-style-type: none"> • Stabilize population at current levels • Habitat is protected at site though receives much use by hikers 	<ul style="list-style-type: none"> • Develop population estimate of means to generate one • Work on outreach piece with Baxter State Park to encourage hikers to stay on trail to benefit this species and Katahdin Arctic Butterfly

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat. Shrub / Early Successional (incl. regen. forest) (US)

Associated Species:

SPECIES	PRIORITY	B	M	W	SPECIES	PRIORITY	B	M	W	SPECIES	PRIORITY	B	M	W
Blue-winged Warbler	1	X			Eastern Towhee	2	X			Fox Sparrow	3	X		
American Woodcock	2	X	X		Field Sparrow	2	X			House Wren	3	X		
Blue-gray Gnatcatcher	2	X			Loggerhead Shrike (non-breeding)	2		X		Orchard Oriole	3	X		
Brown Thrasher	2	X			Whip-poor-will	2	X			Ruffed Grouse	3	X		X
Chestnut-sided Warbler	2	X			Willow Flycatcher	2	X			White-throated Sparrow	3	X		
Common Nighthawk	2	X			Carolina Wren	3	X			Yellow Warbler	3	X		
Eastern Kingbird	2	X			Common Yellowthroat	3	X			Yellow-billed Cuckoo	3	X		

Threats:

- Urban/suburban development
- Habitat fragmentation
- Lack of adequate disturbance events in remaining forested areas to keep in early successional condition
- Habitat loss on migration and wintering grounds

Goal: Conserve, restore and enhance populations of focal species in shrub / early successional habitat to ensure the overall conservation of all native species within this habitat.

General Objectives:

1. Protect and maintain high priority habitats. (Refer to PIF Physiographic Area 9 plan for a comprehensive discussion on management and implementation strategies.)

Strategy	Task
Identify and protect high priority habitat.	<ul style="list-style-type: none"> • Research best method of protection—acquisition, fee or easements from willing sellers • Identify power line rights-of-way to be managed to provide habitat for shrubland birds. (PIF); work with utilities to identify suitable areas/techniques • Maintain and enhance sufficient amount of high quality habitat to prevent and reverse population declines of shrubland passerines in Maine (MDIFW Shrubland Passerine Management System)
Maintain, manage and monitor priority	<ul style="list-style-type: none"> • Sustain habitat through collaborative management of areas that already are subjected to frequent

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

Strategy	Task
habitats already protected.	human disturbance from agriculture, forestry, or the maintenance of roads and rights-of-way. (PIF) <ul style="list-style-type: none"> • Coordinate habitat protection of areas already owned by federal, state, local government or NGO’s. (BCR 30 workshop) • Compare early successional habitats resulting from natural disturbances vs. forestry practices vs. power line rights-of-way with regard to suitability for high-priority species, including breeding densities and nesting success. (PIF) • Determine if there is relationship between patch size and nesting success for shrubland birds, and between patch size and breeding density for the more area sensitive species. (PIF) • Continue clearcutting as a management as a means of providing shrub habitat on state forests. (PIF) • Implement careful planning of rotational harvest schedules. (PIF) • Maintain right-of-ways by selectively spraying herbicide on the base of tall-growing trees. (PIF)

2. *Maintain or enhance populations of high priority species.*

Strategy	Task
Utilize existing programs to increase populations of early successional species.	<ul style="list-style-type: none"> • Increase utilization of Farm Bill programs to benefit priority grassland and shrubland birds. • Expand management of early successional habitats to include both game and nongame bird priorities and objectives; including evaluation of effects of habitat management on priority nongame and game species
Monitor species to determine population size, status and trends.	<ul style="list-style-type: none"> • Develop a targeted monitoring program for high priority species. Coordinate with PIF projects. (BCR 30 workshop) • Improve BBS coverage by increasing participation rate and length of commitment from participants (MDIFW Shrubland Passerine Management System) • Review BBS and CBC trend estimates for all priority species, monitor trend estimates annually, and specifically target monitoring efforts at species not sufficiently covered by existing surveys (MDIFW Shrubland Passerine Management System) • Identify shrubland passerines whose populations in Maine are declining, and stabilize and begin to reverse the decline by 2017. Priority should be given to species that have greater than 5% of their global populations breeding in Maine (MDIFW Shrubland Passerine Management System) • Through 2017, maintain and monitor shrubland passerines whose populations have been stable or increasing since 1980. (MDIFW Shrubland Passerine Management System) • Research/monitoring is needed on extent of effects of cowbird parasitism on shrubland birds. (PIF) • Develop targeted monitoring/research program on demographics and habitat-area relationships for

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

Strategy	Task
	priority grassland birds building on and expanding the techniques developed by Massachusetts Audubon.

Species Specific Objectives:

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
American Woodcock	<ul style="list-style-type: none"> • Estimated state spring population of 523,000 individuals • Maine SGS index declined 2.3% / year during 1968-2004; 2004 Maine SGS index 2.62 males per route • Threats: habitat loss and degradation on breeding, migrating, and wintering grounds, forest maturation, egg and chick mortality influenced by weather and predation, adult mortality rates (catastrophic weather, migration barriers, and contaminants) 	<ul style="list-style-type: none"> • MDIFW Population Objective: By 2017, increase SGS index to 3.5 males per route and maintain • Halt population decline by 2012 and see increase by 2022 to levels documented in 1970's (measured by singing ground surveys) • Intensive forest management to promote early successional hardwoods and forest openings enhances habitat for woodcock (Sepik et al. 1981) 	<ul style="list-style-type: none"> • Need to continue monitoring recruitment levels using harvest surveys (BCR 14 Workshop) • Need to assess singing ground surveys for accuracy, but continue monitoring effort (BCR 14 Workshop) • Evaluate effects of contaminant exposure (BCR 14 Workshop) • Provide technical assistance to landowners (industrial and non-industrial) on habitat management and life history requirements of woodcock (BCR 14 Workshop)
Blue-gray Gnatcatcher	<ul style="list-style-type: none"> • At edge of range in Maine, distributed sparsely through southern, central, and midcoast Maine • Status unknown as too few occurrences to result in adequate monitoring by BBS for either Maine or Northern New England Physiographic Region • Trend for entire NE region (i.e., Region 5) appears stable ('66-'03 +0.9%, P=0.29, n=350; 1980-'03 +0.6%, P=0.42, n=329) • Threats: wetland loss especially 	<ul style="list-style-type: none"> • There are no official population estimates for this species though probably fewer than 500 pair are found in Maine • There are no specific habitat objectives for this species 	<ul style="list-style-type: none"> • Detailed inventory of species distribution in Maine is needed • Fine-scale habitat selection poorly documented and may warrant investigation in Maine

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
	degradation to forested/shrub by riparian areas		
Blue-winged Warbler	<ul style="list-style-type: none"> Spotted in York and Cumberland counties Probably expanded into Maine since the 1970s Probably fewer than 25 occurrences Largest population center in Eliot and S. Berwick Significant declines in S. New England Region and in Region 5. Too few data for N. New England Region. Likely stable in Massachusetts 1980-2003 	<ul style="list-style-type: none"> Occur at average nest density of 2.0 hectares per pair Population probably fewer than 500 individuals Increase population by 1.5x over 30 years Increase suitable shrubland habitat Additional survey effort should target shrub wetlands in York county 	<ul style="list-style-type: none"> Determine population size in Maine Why is this shrubland obligate apparently increasing while most others are in significant decline?
Brown Thrasher	<ul style="list-style-type: none"> Probably statewide though rare in Boreal landscape of N. Maine Population trend – significant long-term decline '66-'03 –3.7%, P=0.08, n=35 Stable (but on margin) short-term trend '80-'03 –5.1%, P=0.12, n=27 Steep, significant declines among most other neighboring states and provinces 	<ul style="list-style-type: none"> Increase statewide population 1.5x from 5,400 individuals to 8,100 individuals within the next 30 years Increase shrubland habitat 	<ul style="list-style-type: none"> See outreach actions for Eastern Towhee
Chestnut-sided Warbler	<ul style="list-style-type: none"> Maine population estimated at 274,614 ± 22,364 individuals Decreasing BBS trend (-1.54% / year between 1966-1999) but still widespread 12.8% of population breeds in BCR 14 Threats: habitat loss due to development and declining 	<ul style="list-style-type: none"> Increase population by 50% to 411,921 individuals 205,961 hectares of suitable habitat are necessary to support 411,921 individuals at an average density of 1.0 hectares per pair Maintain and increase early successional habitat, on private and industrial forest lands (BCR 14 	<ul style="list-style-type: none"> Investigate population demographics in different early successional habitats (edge vs. clearcut), including evaluation of reproductive success for birds nesting in these areas (BCR 14 Workshop) Determine minimum patch size required for stable population (BCR 14 Workshop)

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
	<p>availability of early successional habitat, and predation</p>	<p>Workshop)</p>	<ul style="list-style-type: none"> • Develop management prescriptions for maintaining suitable early successional habitat for species dependent on this serial stage in the context of ecosystem management (BCR 14 Workshop) • Educate public about role of natural disturbances in forest management, and the dependency of certain species on this process (BCR 14 Workshop)
<p>Common Nighthawk</p>	<ul style="list-style-type: none"> • Maine population estimated at 3,500 ± 1,983 individuals • Non-urban habitat: Downeast blueberry barrens 	<ul style="list-style-type: none"> • Increase population by 50% to 5,250 individuals • Identify key breeding locations (rooftops, blueberry barrens, etc.) for immediate action • Make landowner (building owner) contacts to encourage proper management • Develop urban public education in schools to aid in the monitoring and assessment of populations 	<ul style="list-style-type: none"> • Develop standardized survey methods for species, as BBS routes do not adequately census this species (BCR 14 Workshop) • Distribute information on use of rooftops to landowners
<p>Eastern Kingbird</p>	<ul style="list-style-type: none"> • Abundant species, distributed statewide • Species in significant decline in Maine based on short-term BBS data (1980-'03 -2.7%, P=0.02, n=53) yet stable long-term ('66-'03 -1.2%, P=0.16, n=54) • Significant declines at the regional scale: Northern Spruce Hardwood ('66-'03 -1.7%, P<0.01, n=240; 1980-'03 -4.4%, P<0.01, n=220) and Northern New England regions (1966-'03 -1.2%, P=0.02, n=54; 1980-'03 -2.6%, P<0.01, n=52) 	<ul style="list-style-type: none"> • Partners In Flight estimates Maine's population to be 64,000 individuals • Increase statewide population from 64,000 to 96,000 individuals over the next 30 years • Habitat objectives have not yet been developed 	

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
	<ul style="list-style-type: none"> Regional scales declines may be increasing in intensity Threats: maturation (reforestation) of abandoned farmland 		
Eastern Towhee	<ul style="list-style-type: none"> Southern 1/3 and coastal BBS indicated significant long and short-term decline in Maine and may be increasing in intensity '66-'03 -5.9%, P<0.01, n=21; '80-'03 -7.0%, P=0.01, n=18 Significant decline throughout region as well 	<ul style="list-style-type: none"> Statewide population estimated at 26,000 individuals Continental objective is 50% increase over 30 years – 26,000 x 1.5 = 39,000 individuals In general, reverse decline of shrubland habitat is southern and coastal Maine 	<ul style="list-style-type: none"> Outreach – balance the needs of grassland vs. shrubland habitat Develop outreach piece similar to Massachusetts Audubon's grassland handbooks Research – is just habitat loss the primary cause for decline? – need to investigate limiting factors at edge of range Occurs as small, isolated populations along mid-coast and eastern Maine thus presents opportunity for studying local extinction, site fidelity, colonization, etc.
Field Sparrow	See Grassland / Agricultural / Old Field		
Loggerhead Shrike (Non-breeding)	<ul style="list-style-type: none"> Not considered a regular breeder in Maine. Only a few recent records of either birds during migration of possible breeding Declined throughout the NE and Maritimes to the point where populations remain mainly in the southern part of the region <p>Threats:</p> <ul style="list-style-type: none"> Habitat loss through reforestation of abandoned agricultural lands Competition with other species more tolerant of changes in land use patterns 	<ul style="list-style-type: none"> No specific population objectives exist for this species No specific habitat objectives exist, however, maintenance of large patches of shrub and shrub/savannah habitat is the most likely management practice 	<ul style="list-style-type: none"> Is species area sensitive? At this time, possibly only additional survey efforts targeted to appropriate habitat would be warranted
Whip-poor-will	<ul style="list-style-type: none"> Maine population estimated at 	<ul style="list-style-type: none"> Increase population by 50% to 5,435 	<ul style="list-style-type: none"> Need to explore causes of

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
	3,623 ± 1,394 individuals <ul style="list-style-type: none"> Believed to be in long-term decline though unreliable data for Maine Population trend for Region 5 '66-'03 -4.0%, P<0.01, n=147 	individuals <ul style="list-style-type: none"> 9,049 hectares of suitable habitat are necessary to support 5,435 individuals at an average density of 3.33 hectares per pair <u>Focus Areas:</u> <ul style="list-style-type: none"> Downeast blueberry barrens in vicinity of Great Heath? Southern Maine pitch pine/scrub oak woodlands for example <ul style="list-style-type: none"> Kennebunk Plains Shapleigh Need targeted monitoring for this species (PIF) Species likely warrants inventory of key breeding areas followed by targeted acquisition/management 	decline/limiting factors <ul style="list-style-type: none"> Are state/federal-owned lands with appropriate habitat being managed to benefit this species Outreach – see Blue-winged Warbler
Willow Flycatcher	See Shrub-scrub Wetlands		

Grasslands / Agriculture / Old Field (shrubs <50%) (UG)

Associated Species:

SPECIES	PRIORITY	B	M	W	SPECIES	PRIORITY	B	M	W	SPECIES	PRIORITY	B	M	W
Sedge Wren	1	X			Field Sparrow	2	X			Canada Goose (NAP) (non-breeding)	3		X	
Short-eared Owl	1	X	X	X	Grasshopper Sparrow	2	X			Killdeer	3	X	X	
Upland Sandpiper	1	X			Horned Lark (breeding)	2	X	X	X	Mallard	3	X	X	X
American Bittern	2	X	X		Purple Martin	2	X			Northern Harrier	3	X		
Barn Swallow	2	X			Sandhill Crane	2	X			Northern Rough-winged Swallow	3	X		
Bobolink	2	X			Vesper Sparrow	2	X			Tree Swallow	3	X		
Eastern Meadowlark	2	X			Bank Swallow	3	X							

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

Threats:

- Loss of open land associated with decline in farming resulting in residential development and reversion to forest.
- Habitat fragmentation
- Certain agricultural practices
- Contaminants
- Habitat loss on migration and wintering grounds

Goal: Conserve, restore and enhance populations of focal species in grasslands and agricultural fields to ensure the overall conservation of all native species within this habitat.

General Objectives:

1. Protect and maintain high priority habitats. (Refer to PIF Physiographic Area 9 plan for a comprehensive discussion on management and implementation strategies.)

Strategy	Task
Identify high priority habitats for protection.	<ul style="list-style-type: none"> • Identify and protect priority areas, especially large grasslands, for immediate conservation efforts (PIF, Grassland Passerine Management System) • Collect ownership/contact information. • Research best method of protection—acquisition, fee or easements from willing sellers • Develop a system to prioritize (rank) individual grasslands with regard to their importance to grassland birds (Grassland Passerine Management System)
Maintain, manage and monitor priority habitats	<ul style="list-style-type: none"> • Coordinate with other states to develop and implement a comprehensive grassland management plan for the entire New England region. (PIF) • Improve habitat quality at 50% of priority sites by 2007 (Grassland Passerine Management System) • By 2017, improve management practices to enhance grassland bird populations on at least 100 additional grassland sites (Grassland Passerine Management System) • Consider consolidation of adjacent grassland fields, through the elimination of hedgerows, stone fences, or tree lines, in areas where open land occupies a considerable amount of the surrounding landscape and grassland management can be identified as a reasonable management alternative. (PIF) • Determine if current mixtures of warm season grasses have failed to provide adequate habitat for grassland breeding birds. Focus on cool season grasslands if needed. (PIF) • Continue monitoring grassland habitats within the physiographic area as part of a regional effort

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

Strategy	Task
	<p>within New England to better assess grassland bird population trends. (PIF)</p> <ul style="list-style-type: none"> • Develop and implement integrated management plans for grasslands on civilian and military airfields. (BCR 30 workshop) • When managing grasslands, employ best management practices using guidelines in Massachusetts Audubon Society’s <i>Conserving Grassland Birds</i> publication (www.massaudubon.org) (MDIFW E&T Handbook) until better guidelines are determined • Conduct research to examine the benefits of mowing vs. haying vs. burning on Grassland bird diversity and productivity • Manage multiple, contiguous fields to provide a mosaic of grassland types by mowing, burning, or late-season grazing. Mow every 2-5 years to inhibit establishment of shrubs and trees (MDIFW E&T Handbook) • Burn fields every 5-10 years after September 1 or before May 1. Do not burn more than 50% of a grassland within a year. (MDIFW E&T Handbook) • Delay mowing until after August 1 and encourage alternate year mowing over annual mowing • Avoid or minimize herbicide and pesticide applications, or employ integrated pest management techniques (MDIFW E&T Handbook) • Use voluntary agreements, conservation easements, conservation tax abatements and incentives, and acquisition to protect important habitat for grassland nesting species (MDIFW E&T Handbook) • Further research on different management techniques is needed to understand the appropriateness of prescribed burning, mowing, and other methods for maintaining suitable habitat for Northeastern grassland birds. (PIF)

2. *Maintain or enhance populations of high priority species.*

Strategy	Task
<p>Study populations of focal species to determine population size, status, and trends.</p>	<ul style="list-style-type: none"> • Stabilize and begin to reverse declining trends by 2017 (Grassland Passerine Management System) • Through 2017, maintain and monitor grassland passerines whose populations have been stable or increasing since 1980 (Grassland Passerine Management System) • Conduct demographic studies (productivity, survival, dispersal) of priority species to provide information needed for determining causes of population declines and understanding metapopulation dynamics • Determine if differences exist in grassland breeding bird diversity and abundance in the Northeast between warm season and cool season grass types. (PIF)

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

Species Specific Objectives:

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
American Bittern	See Emergent Marsh and Wet Meadows		
Barn Swallow	See Lakes and Ponds		
Bobolink	<ul style="list-style-type: none"> • Maine population estimated at 215,600 ± 42,000 individuals • Stable population trend for Maine ('80-'03 -2.6%, P=0.29, n=48) and Region 5 ('80-'03 -0.5%, P=0.39, n=308) though significant long and short-term declines for N. Spruce Hardwood Region '66-'03 -2.5%, P<0.01, n=221; '80-'03 -5.7%, P<0.01, n=209 • Threats: agricultural practices that involve intensive grazing and early morning loss of habitat, increasing predation rates due to habitat fragmentation (?) 	<ul style="list-style-type: none"> • Increase population by 50% to 323,400 individuals • 162,000 hectares of suitable habitat are necessary to support 323,400 individuals at an average density of 1.0 hectares per pair • Maintain suitable habitat distributed across the landscape to support viable metapopulation structure (BCR 14 Workshop) • Continue efforts to develop grassland management protocol to maintain and enhance nesting habitat for grassland nesting species (BCR 14 Workshop) 	<ul style="list-style-type: none"> • Need to conduct Population viability Analysis, investigate metapopulation structure and dynamics (BCR 14 Workshop) • Develop outreach materials which promote grassland management techniques that benefit grassland nesting birds (BCR 14 Workshop) • Research effects of mowing, haying, and burning practices on reproductive success and predation rates (PIF)
Eastern Meadowlark	<ul style="list-style-type: none"> • Typically a species of southern, central, and eastern Maine, with few scattered occurrences in southern and central Aroostook County • Experiencing one of the steepest declines of any species in Maine (1980-'03 -5.7%, P=0.02, n=26) • Significant declines at regional scale both long and short-term > -2.4%, P<0.02, n>39 Threats: <ul style="list-style-type: none"> • See threats facing Grassland, Agricultural, and Old Field habitats • Species is especially sensitive to 	<ul style="list-style-type: none"> • No quantitative population or habitat objectives have been developed for this species. However, stabilizing and reversing the trend for this species as well as improving habitat quality and abundance are widely accepted as conservation goals for this and other grassland species 	<ul style="list-style-type: none"> • Research needs to be conducted on best management practices for maintaining early successional habitat suitable to meadowlarks • Outreach campaign needed to inform small landowners of the best methods for keeping fields open for grassland wildlife

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
Field Sparrow	<p>disturbance at nest site</p> <ul style="list-style-type: none"> Southern ½ of state Trend in Maine currently stable ‘80-‘03 –3.6%, P=0.20, n=16 but may have “recovered” from steep decline ‘66-‘79 –17.8%, P=0.01, n=19 	<ul style="list-style-type: none"> PIF has not generated population estimate Double statewide population over next 30 years Increase suitable shrubland habitat 	<ul style="list-style-type: none"> See outreach objectives for Eastern Towhee Need simultaneous study of demographics and habitat use for the 3 shrubland obligates EATO, BRTH, FISP to better understand limiting factors
Grasshopper Sparrow	<ul style="list-style-type: none"> Maine population: 50-80 territorial males at 4 breeding locations in York and Cumberland Counties Maine Endangered Species Threats: Habitat loss and fragmentation, succession, herbicide use during intensive blueberry management, absence of fire, frequent mowing, and pesticides Area sensitive 	<p>The following were taken from Maine E&T Handbook (McCollough et al. 2003):</p> <ul style="list-style-type: none"> Double the number of pairs to 130 distributed among 6 sites over the next 30 years Maintain known nesting areas in native grasses, little bluestem, or low-growing shrubs like lowbush blueberry and do not develop or convert to other land uses Keep grazing animals off known nesting fields during the critical nesting period (May 1-August 5) Maintain approximately 40% of the vegetation cover at a height of 8-12”, with minimal litter and grass cover. Maintain some patches of bare ground, scattered tall forbs (8-25”), and short shrubs for song perches Limit commercial gravel and sand mining in grasslands and blueberry barrens of suitable site for this species. Restore old gravel pits and agricultural fields to grasslands and low shrubs 	<ul style="list-style-type: none"> Research needed on: population status, productivity levels, limiting factors in various habitats, and an assessment of management techniques (Maine E&T Handbook) Need landscape analysis to determine potential for other sites for this species, what management would be necessary, and ownership issues Support TNC’s effort to monitor at Kennebunk plains and expand targeted monitoring to other site with priority grassland birds for which BBS trends are unreliable
Horned Lark (breeding)	<ul style="list-style-type: none"> A classic example of a species that expanded eastward with clearing of forest for agriculture but now declining as a result of farm abandonment and reforestation 	<ul style="list-style-type: none"> No specific population objectives have been developed though improved monitoring seems warranted No specific habitat objectives have been developed. However, efforts to conserve other grassland/early successional species 	<ul style="list-style-type: none"> Linking habitat at occupied sites (potato fields, bean fields) to trends in crop production (land area in various crops) could allow an assessment of future habitat for this species

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
	<ul style="list-style-type: none"> • An uncommon breeder in Maine with scattered breeding records mostly in agricultural landscapes. Highest density probably reached in Aroostook County • Anecdotal evidence suggest a decline especially for central Maine breeding population. Insufficient BBS data for Maine to reliably estimate trend • BBS for Northern Spruce Hardwood indicates steep significant declines (1980-'03 – 9.6%, P<0.01, n=38) though ever at that scale, trends are based on few routes • Threats: habitat loss chiefly reforestation of formally agricultural lands 	<p>could benefit this species if specific habitat needs (bare ground) can be accommodated</p>	
Purple Martin	See Emergent Marsh and Wet Meadows		
Sandhill Crane	See Emergent Marsh and Wet Meadows		
Sedge Wren	See Emergent Marsh and Wet Meadows		
Short-eared Owl	<ul style="list-style-type: none"> • Rare Breeder with few confirmed records. Uncommon migrant and probably overwriters in coastal areas or when/where snow depths are minimal. • Despite habitat availability in much of state, known to breed only in central Aroostook and eastern Washington Counties. Reported annually from central and coastal Maine during spring migration. • Population trend unknown 	<ul style="list-style-type: none"> • No formal population estimates exist but statewide breeding population probably numbers fewer than 10 pairs • Partners In Flight recommends doubling population over the next 30 years • No specific habitat objectives exist though conservationists should be alert to changes in agricultural policies (CRP) that potentially benefit this species. 	<ul style="list-style-type: none"> • Need more survey information during breeding season targeted to blueberry barrens (Washington County) and agricultural fields (Aroostook County) • How decline in habitat patch size (is species area sensitive) has affected decline of species could provide insight to potential for recovery. A historical analysis at regional scale using past breeding records and past and

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
	though widely believed to have declined (possibly still) in Northeast United States Threats: <ul style="list-style-type: none"> • Loss of open habitat to reforestation • As a ground-nester, vulnerable to mammalian predation 		present land use/land cover maps could be useful.
Upland Sandpiper	See Dry Woodlands and Barrens		
Vesper Sparrow	See Dry Woodlands and Barrens		

Urban / Suburban (UU)

Associated Species:

SPECIES	PRIORITY	B	M	W	SPECIES	PRIORITY	B	M	W	SPECIES	PRIORITY	B	M	W
Barn Swallow	2	X			Northern Flicker	2	X			Merlin	3	X		
Chimney Swift	2	X			Purple Finch	2	X		X	Tree Swallow	3	X		
Common Nighthawk	2	X			Carolina Wren	3	X			Yellow Warbler	3	X		
Eastern Screech Owl	2	X		X	House Wren	3	X							

Threats:

- Changes in modern building construction
- Use of pesticides for mosquito control

Goal: Conserve, restore and enhance populations of focal species in urban and suburban areas to ensure the overall conservation of all native species within this habitat.

General objectives

1. *Maintain and enhance populations of high priority species.*

Strategy	Task
Monitor populations of focal species to determine population size, status & trends.	<ul style="list-style-type: none"> • Participate/establish a network of managers, biologists, and researchers are needed across northern New England to more effectively address the needs and coordinate conservation efforts

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

Strategy	Task
	for the high priority urban/suburban birds. (PIF) <ul style="list-style-type: none"> • Survey effort, identification of significant breeding locations, and public education/outreach should be coordinated on a regional basis. (PIF) • Develop an appropriate survey method for tracking populations of Chimney Swifts and Common Nighthawks and conduct a thorough status assessment of these species. (PIF) • Understand impacts of pesticides (e.g., urban/suburban mosquito spraying) on this suite of species, including links to the current outbreak of West Nile virus. (PIF) • Compile better life history information on these species, such as kinds of nest predators and levels of nest depredation, breeding longevity and reproductive effort over time, characteristics of preferred nesting requirements, fidelity to breeding and wintering sites, and better assessment of migration routes and destinations. (PIF)

Species Specific Objectives:

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
Barn Swallow	See Lakes and Ponds		
Chimney Swift	<ul style="list-style-type: none"> • Maine population estimated at 80,000 ± 10,000 individuals • Significant long-term decline '66-'03 -2.7%, P=0.01, n=58 and marginal recent short-term decline '80-'03 -2.4%, P=0.15, n=55 • Threats: Loss of habitat (chimneys and large hollow trees), potential decline in prey availability due to pesticides, contaminants 	<ul style="list-style-type: none"> • Increase population by 50% to 120,000 individuals • Work with industrial forest industry to increase number of large trees left after harvesting operations (BCR 14 Workshop) • Identify key breeding locations for immediate conservation efforts. (PIF) • Landowner contacts should be made at each site to encourage proper management (PIF) 	<ul style="list-style-type: none"> • Determine causes of population declines (BCR 14 Workshop) • Distribute information materials on the use of chimneys and roosts as nesting sites. (PIF) • Develop urban public education in schools to aid in the monitoring and assessment of populations (PIF)
Common Nighthawk	See Shrub / Early Successional		
Eastern Screech Owl	See Deciduous and Mixed Forest		
Northern Flicker	See Deciduous and Mixed Forest		
Purple Finch	See Coniferous Forest		

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat. Cliff Face and Rocky Outcrop (incl. talus) (UR)

Associated Species:

SPECIES	PRIORITY	B	M	W	SPECIES	PRIORITY	B	M	W
Peregrine Falcon	1	X	X		Golden Eagle	2	X		X

Threats:

- Human disturbance at nest sites
- Contaminants
- Lack of suitable foraging areas
- Habitat loss on migration and wintering grounds

Goal: Conserve, restore and enhance populations of focal species that utilize cliff face habitat to ensure the overall conservation of all native species within this habitat.

General Objectives

1. *Protect and maintain high priority habitats.*

Strategy	Task
Identify and protect priority habitats.	<ul style="list-style-type: none"> • Use voluntary agreements, conservation easements, conservation tax abatements and incentives, and acquisition to protect important nesting habitat (Maine E&T Handbook) • Avoid applications of pesticides around occupied eyeries during the nesting season (Maine E&T Handbook)
Protect important habitats from human disturbance	<ul style="list-style-type: none"> • Avoid construction of permanent access roads within ¼ mile of eyeries (Maine E&T Handbook)

2. *Maintain or enhance populations of high priority species.*

Strategy	Task
Monitor populations of focal species to determine population sizes, statuses, and trends.	<ul style="list-style-type: none"> • Continue efforts to monitor historic and current nesting locations for both species

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

Species Specific Objectives:

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
Golden Eagle	<ul style="list-style-type: none"> • Maine population: last known nesting attempt in Maine was a single pair in 1999 • Maine Endangered Species • Threats: contaminants, availability of suitable foraging habitat 	<p>The following were taken from the Maine E&T handbook:</p> <ul style="list-style-type: none"> • Prior to land development or forest harvesting near eagle nesting areas, consult with MDIFW biologists • Birders, photographers, and others should stay away from nests during the nesting season. Avoid human activity within ¼ mile of a known nest during the breeding season • Avoid construction of permanent access roads within ¼ mile of a golden eagle nest, and possibly farther in areas of high visibility • Forestry is compatible during the non-nesting season after consultation with MDIFW. Single tree harvest or small patch cuts are acceptable within 660’ of the nest, as long as the structural character of the area is maintained. Manage for large white pines that extend above the canopy, these can provide potential nest trees 	<ul style="list-style-type: none"> • Report golden eagle sightings and suspected nest locations to MDIFW
Peregrine Falcon	<ul style="list-style-type: none"> • Maine population: 16 pairs • Maine Endangered Species • Threats: human disturbance at nest sites, contaminants 	<p>The following were taken from the Maine E&T handbook (McCollough et al. 2003):</p> <ul style="list-style-type: none"> • Prohibit climbing on the cliff and hiking near the cliff rim within ¼ mile of eyeries • Prior to land development near nesting sites, consult with MDIFW biologists • Maintain trail closures until five weeks after the last bird has fledged • Avoid logging within ¼ mile of an active eyerie during the nesting season • Aircraft should not approach closer than 1,500’ above the nest • Route powerlines and other wires away from eyeries to avoid collisions and electrocution 	<ul style="list-style-type: none"> • Continue efforts to educate recreational users of cliffs about the conservation needs of peregrines

Table 30. Goals, Objectives, Threats, and Strategies for Priority Birds by Habitat.

SPECIES	STATUS, DISTRIBUTION, & THREATS	POPULATION & HABITAT ACTIONS	RESEARCH & OUTREACH ACTIONS
		hazards <ul style="list-style-type: none"> • Wetlands, especially intertidal mudflats, estuaries, and coastal marshes are key feeding areas. Protect these wetlands from filling, development, or other disturbance that could alter prey abundance and habitat quality • Maintain large trees and snags in areas where peregrines nest and feed. These are important perches used for roosting and hunting. 	

Table 31. Goals, Objectives, Threats, and Strategies for Priority Herpetofauna by Habitat.

Featured Species

Reptiles

Blanding’s Turtle 113
 Eastern Box Turtle 119
 Northern Black Racer 121
 Spotted Turtle 114
 Timber Rattlesnake 124
 Wood Turtle 116

Amphibians

Blue-spotted Salamander 114

Habitats

FRESHWATER 109
 Lakes and Ponds **(WL)** 111
 Emergent Marsh and Wet Meadows **(WM)** 111
 Forested Wetland **(WF)** 112
 Shrub-scrub Wetland **(WS)** 113
 Blanding’s Turtle 113
 Spotted Turtle 114
 Blue-spotted Salamander 114
 Peatlands **(WP)** 115
 Rivers and Streams **(WR)** 115
 Wood Turtle 116

UPLAND 117
 Deciduous and Mixed Forest **(UD)** 119
 Eastern Box Turtle 119
 Coniferous Forest **(UC)** 120
 Dry Woodland and Barrens (<60% canopy cover) **(UB)** 121

Table 31. Goals, Objectives, Threats, and Strategies for Priority Herpetofauna by Habitat.

Habitats (continued)

UPLAND (continued)

Dry Woodland and Barrens (<60% canopy cover) **(UB)** (continued)

Northern Black Racer.....	121
Shrub / Early Successional (incl. regen. forest) (US)	122
Grasslands / Agricultural / Old Field (shrubs <50%) (UG)	123
Urban / Suburban (UU)	123
Cliff Face and Rocky Outcrop (incl. talus) (UR)	124
Timber Rattlesnake.....	124

Table 31. Goals, Objectives, Threats, and Strategies for Priority Herpetofauna by Habitat.

FRESHWATER

Associated Species:

SPECIES	PRIORITY
REPTILES	
Blanding's Turtle	1
Eastern Box Turtle	1
Spotted Turtle	2
Wood Turtle	2
Common Musk Turtle	3
Eastern Ribbon Snake	3
Northern Ribbon Snake	3

SPECIES	PRIORITY
AMPHIBIANS	
Blue-spotted Salamander	2
Four-toed Salamander	3
Northern Leopard Frog	3
Northern Spring Salamander	3

Freshwater Species Threats:

- Habitat loss/alteration from development of wetlands, riparian zones, and adjacent uplands
- Impacts to hydrology (e.g. impoundments, ditching, draining)
- Invasive aquatic plants
- Roadkill
- Collection for personal use and commercial pet trade
- Aquatic pollution
- Predation of nests and juveniles
- Intensive forestry practices
- Commercial resource extraction (e.g. peat mining, gravel mining)
- Cold temperatures near edge of range

Goal: Identify, protect, and enhance populations of priority species in freshwater habitats.

Freshwater Species Objectives:

1. *Identify and protect high priority habitats.*

Strategy	Task
Identify high-value freshwater habitats	<ul style="list-style-type: none"> • Continue statewide surveys to identify freshwater habitats hosting rare amphibians and reptiles.

Table 31. Goals, Objectives, Threats, and Strategies for Priority Herpetofauna by Habitat.

Strategy	Task
	<ul style="list-style-type: none"> • Combine field survey and research to identify specific characteristics of freshwater wetlands important to priority amphibians and reptiles. • Using guidance from the Natural Heritage Program (NatureServe), refine element occurrence documentation and map representation (i.e. using taxa-specific polygons versus generic buffers) for priority herptiles.
Protect high-value freshwater habitats	<ul style="list-style-type: none"> • Develop regulatory habitat protection provisions for projects subject to review under the Maine Endangered Species Act (MESA) and other regulations protecting Maine’s wildlife (e.g. Natural Resources Protection Act, Site Location Law). • Develop nonregulatory habitat management guidelines for priority habitats (e.g. vernal pools) and species (e.g. rare turtles) for distribution to landowners, towns, landtrusts, and others. • Cooperate with The Nature Conservancy, local landtrusts, municipalities and other partners to conserve habitat for priority herptiles using fee acquisition, purchase of development rights, and improved comprehensive planning. • Implement existing and new public outreach efforts to gain support for priority amphibians, reptiles and their freshwater habitats.

2. Monitor and enhance populations of high priority species.

Strategy	Task
Monitor priority species to determine population size, status and trends.	<ul style="list-style-type: none"> • Establish baseline wetland locations for monitoring rare turtle population trends using intensive binocular survey and trapping techniques. • Resurvey historical wetlands to reconfirm rare turtle presence and status. • Coordinate specific herptile population monitoring objectives and methods with regional partners (e.g. PARC, NAMP, USFWS, NatureServe, neighboring state wildlife agencies).
Enhance populations of priority species	<ul style="list-style-type: none"> • Consider intensive population management as a means of enhancing survival (e.g. reducing roadkill) and/or recruitment (e.g. head-starting hatchlings, protecting nest sites,) of rare turtles. • Work with state (e.g. TNC, MAS, MDOT) and national (e.g. USFWS, PARC) partners to implement pilot projects addressing population enhancement at select focus areas.

Table 31. Goals, Objectives, Threats, and Strategies for Priority Herpetofauna by Habitat.

Lakes and Ponds (WL)

Associated Species:

SPECIES	PRIORITY
REPTILES	
Blanding's Turtle	1
Spotted Turtle	2
Common Musk Turtle	3
Eastern Ribbon Snake	3
Northern Ribbon Snake	3

SPECIES	PRIORITY
AMPHIBIANS	
Northern Leopard Frog	3

Species Specific Objectives:

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
REPTILES				
Blanding's Turtle	See Shrub-scrub Wetlands			
Spotted Turtle	See Shrub-scrub Wetlands			

Emergent Marsh and Wet Meadows (WM)

Associated Species:

SPECIES	PRIORITY
REPTILES	
Blanding's Turtle	1
Eastern Box Turtle	1
Spotted Turtle	2

SPECIES	PRIORITY
AMPHIBIANS	
Northern Leopard Frog	3

Table 31. Goals, Objectives, Threats, and Strategies for Priority Herpetofauna by Habitat.

Species Specific Objectives:

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
REPTILES				
Blanding's Turtle	See Shrub-scrub Wetlands			
Eastern Box Turtle	See Deciduous and Mixed Forest			
Spotted Turtle	See Shrub-scrub Wetlands			

Forested Wetland (WF)

Associated Species:

SPECIES	PRIORITY
REPTILES	
Blanding's Turtle	1
Eastern Box Turtle	1
Spotted Turtle	2
Wood Turtle	2
Eastern Ribbon Snake	3
Northern Ribbon Snake	3

SPECIES	PRIORITY
AMPHIBIANS	
Blue-spotted Salamander	2
Four-toed Salamander	3

Species Specific Objectives:

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
REPTILES				
Blanding's Turtle	See Shrub-scrub Wetland			
Eastern Box Turtle	See Deciduous and Mixed Forest			
Spotted Turtle	See Shrub-scrub Wetland			
Wood Turtle	See Rivers and Streams			
AMPHIBIANS				
Blue-spotted Salamander	See Shrub-scrub Wetland			

Table 31. Goals, Objectives, Threats, and Strategies for Priority Herpetofauna by Habitat.

Shrub-scrub Wetland (WS)

Associated Species:

SPECIES	PRIORITY
REPTILES	
Blanding's Turtle	1
Spotted Turtle	2
Wood Turtle	2
Eastern Ribbon Snake	3
Northern Ribbon Snake	3

SPECIES	PRIORITY
AMPHIBIANS	
Blue-spotted Salamander	2
Four-toed Salamander	3

Species Specific Objectives:

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
REPTILES				
Blanding's Turtle	<ul style="list-style-type: none"> Restricted primarily to 6 focus areas in York and Cumberland Co's. Total of ~115 wetland locations (only ~32 wetlands w/ >1 turtle). Total population = ~1000-2,000 turtles (4.7/sq mi / 4)? Federal Special Concern State Endangered Northeast Regional Concern 	<ul style="list-style-type: none"> Habitat loss/degradation Roadkill Predation of nests and juveniles Pollution Intensive forestry Illegal collection (?) Cool incubation temperatures near range edge <p>Note: Frequents pocket swamps and vernal pools not adequately protected by existing MDEP regulations.</p>	<ul style="list-style-type: none"> Develop regulatory habitat protection provisions for projects subject to review under the Maine Endangered Species Act (MESA). Consider implementing Essential Habitat (MESA) provisions for high-value wetland occurrences. Distribute existing habitat management guidelines to landowners, towns, landtrusts, and others. Cooperate with The Nature Conservancy, local landtrusts, municipalities and other partners to conserve habitat within 6 key focus areas. Increase public awareness of threats and concerns using posters, factsheets, press 	<ul style="list-style-type: none"> Coordinate research objectives with state (TNC, MDOT, USFWS) and regional (PARC, Northeast Blanding's Turtle Working Group) partners. Investigate extent and significance of road mortality and options for mitigation. Develop a spatially-explicit statewide population viability analysis incorporating recent data on road mortality and movement ecology. Establish baseline wetlands for monitoring population trends using intensive binocular survey and trapping techniques. Continue de novo and historical surveys of wetlands across

Table 31. Goals, Objectives, Threats, and Strategies for Priority Herpetofauna by Habitat.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
			releases, and public talks.	southern Maine. Correlate presence and relative abundance with patterns of landscape development and habitat loss.
Spotted Turtle	<ul style="list-style-type: none"> • Restricted primarily to 7-8 focus areas in York and Cumberland Co’s. • Total of ~167 wetland locations (most based on single turtle records). • Total population = ~5,000-6,000 turtles (21/sq mi / 4)? • State Threatened • Northeast Regional Concern 	<ul style="list-style-type: none"> • Habitat loss/degradation • Roadkill • Predation of nests and juveniles • Illegal collection • Pollution • Intensive forestry • Cool incubation temperatures near range edge • Note: Frequents pocket swamps and vernal pools not adequately protected by existing MDEP regulations. 	<ul style="list-style-type: none"> • Develop regulatory habitat protection provisions for projects subject to review under the Maine Endangered Species Act (MESA). • Distribute existing habitat management guidelines to landowners, towns, landtrusts, and others. • Cooperate with The Nature Conservancy, local landtrusts, municipalities and other partners to conserve habitat within 7-8 key focus areas. • Increase public awareness of threats and concerns using posters, factsheets, press releases, and public talks. 	<ul style="list-style-type: none"> • Coordinate research objectives with state (TNC, MDOT) and regional (PARC) partners. • Investigate extent and significance of road mortality and options for mitigation. • Develop a spatially explicit statewide population viability analysis incorporating recent data on road mortality and movement ecology. • Continue de novo and historical surveys of wetlands across range in Maine. Correlate presence and relative abundance with patterns of landscape development and habitat loss. • Establish baseline wetlands for monitoring population trends using intensive binocular survey and trapping techniques.
Wood Turtle	See Rivers and Streams			
AMPHIBIANS				
Blue-spotted Salamander	<ul style="list-style-type: none"> • Statewide distribution (spotty) • State listed in VT, MA, and CT. • State Special Concern 	<ul style="list-style-type: none"> • Habitat loss/degradation • Roadkill • Pollution • Intensive forestry 	<ul style="list-style-type: none"> • Work with MDEP to develop improved regulatory protections for Significant Vernal Pools under NRPA. • Distribute vernal pool Best Development Practices (Calhoun 	<ul style="list-style-type: none"> • Coordinate research objectives with state (e.g. UMaine) and regional (PARC) partners. • Determine whether Maine hosts genetically pure diploid “laterale” salamanders

Table 31. Goals, Objectives, Threats, and Strategies for Priority Herpetofauna by Habitat.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
	<ul style="list-style-type: none"> Northeast Regional Concern 	Note: Frequents pocket swamps and vernal pools not adequately protected by existing MDEP regulations.	and Klemens 2002) and Habitat Management Guidelines (Calhoun and deMaynadier 2004) to landowners, towns, landtrusts, and others. <ul style="list-style-type: none"> Cooperate with The Nature Conservancy, local landtrusts, municipalities and other partners to conserve areas with productive vernal pool habitat. Increase public awareness of threats and concerns using posters, factsheets, press releases, and public talks. 	<ul style="list-style-type: none"> Develop a database and mapping methodology for tracking Significant Vernal Pools (NRPA) statewide Investigate extent and significance of wetland and upland habitat loss due to development. Establish baseline wetlands for monitoring population trends using egg mass counts and/or drift-fence counts.

Peatlands (WP)

Associated Species:

SPECIES	PRIORITY
REPTILES	
Eastern Ribbon Snake	3
Northern Ribbon Snake	3

SPECIES	PRIORITY
AMPHIBIANS	
Four-toed Salamander	3

Rivers and Streams (WR)

Associated Species:

SPECIES	PRIORITY
REPTILES	
Blanding's Turtle	1
Eastern Box Turtle	1
Spotted Turtle	2
Wood Turtle	2
Common Musk Turtle	3

SPECIES	PRIORITY
AMPHIBIANS	
Northern Spring Salamander	3

Table 31. Goals, Objectives, Threats, and Strategies for Priority Herpetofauna by Habitat.

Species Specific Objectives:

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
REPTILES				
Blanding’s Turtle	See Shrub-scrub Wetlands			
Spotted Turtle	See Shrub-scrub Wetlands			
Eastern Box Turtle	See Deciduous and Mixed Forest			
Wood Turtle	<ul style="list-style-type: none"> Statewide distribution; records for all counties and major watersheds. ~160 tracked occurrences Documented declines throughout range outside of Maine. State Special Concern Northeast Regional Concern 	<ul style="list-style-type: none"> Habitat loss/degradation Roadkill Predation of nests and juveniles Illegal collection Nest loss to dam releases Pollution Cool incubation temperatures near range edge 	<ul style="list-style-type: none"> Develop habitat management guidelines for distribution to towns, landtrusts, hydropower and timber companies, and others. Cooperate with The Nature Conservancy, local landtrusts, municipalities, and other partners to conserve important riverine and riparian habitats. Increase public awareness of threats and concerns using posters, factsheets, press releases, and public talks. 	<ul style="list-style-type: none"> Coordinate research objectives with state (TNC, USFWS) and regional (PARC) partners. Combine active field survey with analysis of incidental records to identify priority river segment populations. Perform a population viability analysis using recent population parameters from Maine and elsewhere.

Table 31. Goals, Objectives, Threats, and Strategies for Priority Herpetofauna by Habitat.
UPLAND

Associated Species:

SPECIES	PRIORITY
REPTILES	
Blanding’s Turtle	1
Eastern Box Turtle	1
Northern Black Racer	2
Spotted Turtle	2
Timber Rattlesnake	2
Wood Turtle	2
Eastern Ribbon Snake	3
Northern Brown Snake	3
Northern Ribbon Snake	3

SPECIES	PRIORITY
AMPHIBIANS	
Blue-spotted Salamander	2
Four-toed Salamander	3
Northern Spring Salamander	3

Upland Species Threats:

- Habitat loss/alteration from development
- Habitat fragmentation
- Gravel mining
- Roadkill
- Collection for personal use and commercial pet trade
- Predation of nests and juveniles
- Intensive forestry practices
- Loss of shrubland and grassland to succession
- Persecution
- Cold temperatures near edge of range

Goal: Identify, protect and enhance populations of priority species in upland habitats.

Upland Species Objectives:

1. *Identify and protect high priority habitats*

Table 31. Goals, Objectives, Threats, and Strategies for Priority Herpetofauna by Habitat.

Strategy	Task
Identify high-value upland habitats	<ul style="list-style-type: none"> • For priority upland species (black racers, box turtles, and timber rattlesnakes) resurvey historical locales to reconfirm status and identify likely activity areas, nesting sites, and hibernacula. • For priority wetland species, identify extent of upland buffer and life zone needed to protect inter-wetland movements, nesting areas, and aestivation areas. • Using guidance from the Natural Heritage Program (NatureServe), refine element occurrence documentation and map representation (i.e. using taxa-specific polygons versus generic buffers) for priority herptiles.
Protect high-value upland habitats	<ul style="list-style-type: none"> • Develop regulatory habitat protection provisions for projects subject to review under the Maine Endangered Species Act (MESA) and other regulations protecting Maine’s wildlife (e.g. Natural Resources Protection Act, Site Location Law). • For priority upland species (black racers, box turtles, and timber rattlesnakes) develop nonregulatory habitat management guidelines for protecting sensitive habitats (e.g. nesting areas, hibernacula) for distribution to landowners, towns, landtrusts, and others. • Cooperate with The Nature Conservancy, local landtrusts, municipalities and other partners to conserve habitat for priority herptiles using fee acquisition, purchase of development rights, and improved comprehensive planning. • Implement existing and new public outreach efforts to gain support for priority amphibians, reptiles and their upland habitats.

2. Monitor and enhance populations of high priority species.

Strategy	Task
Monitor priority species to determine population size, status and trends.	<ul style="list-style-type: none"> • Monitor select black racer population locations using cover boards and mark recapture methods to establish baseline population estimates and trends. • Coordinate specific population monitoring objectives and methods with regional partners (e.g. PARC, USFWS, NatureServe, neighboring state wildlife agencies).
Enhance populations of priority species	<ul style="list-style-type: none"> • Consider intensive population management as a means of enhancing survival (e.g. reducing roadkill) and/or recruitment (e.g. head-starting hatchlings, protecting nest sites, creating artificial hibernacula, etc.) of rare upland reptiles. • Work with state (e.g. TNC, MAS, MDOT) and national (e.g. USFWS, PARC) partners to implement pilot projects addressing population enhancement at select focus areas.

Table 31. Goals, Objectives, Threats, and Strategies for Priority Herpetofauna by Habitat.

Deciduous and Mixed Forest (UD)

Associated Species:

SPECIES	PRIORITY
REPTILES	
Blanding's Turtle	1
Eastern Box Turtle	1
Spotted Turtle	2
Timber Rattlesnake	2
Wood Turtle	2
Eastern Ribbon Snake	3
Northern Brown Snake	3
Northern Ribbon Snake	3

SPECIES	PRIORITY
AMPHIBIANS	
Blue-spotted Salamander	2
Four-toed Salamander	3
Northern Spring Salamander	3

Species Specific Objectives:

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
REPTILES				
Blanding's Turtle	See Shrub-scrub Wetlands			
Spotted Turtle	See Shrub-scrub Wetlands			
Wood Turtle	See Rivers and Streams			
Eastern Box Turtle	<ul style="list-style-type: none"> Only 20 documented occurrences over 20 yr period – mainly across southern and central ME Several reports may be released pets. No viable populations identified; possibly extirpated. State Endangered Northeast Regional Concern 	<ul style="list-style-type: none"> Habitat loss/degradation Roadkill Predation of nests and juveniles Illegal collection Degradation of native gene pool by release of non-native pets Cold temperatures near range edge reducing nesting and hibernation success 	<ul style="list-style-type: none"> Develop regulatory habitat protection provisions for projects subject to review under the Maine Endangered Species Act (MESA). Distribute habitat management guidelines to landowners, towns, landtrusts, and others. Cooperate with The Nature Conservancy, local landtrusts, municipalities, and other partners to conserve open space habitat surrounding reported locations. 	<ul style="list-style-type: none"> Coordinate research objectives with state (TNC, USFWS) and regional (PARC) partners. Initiate surveys of most promising occurrences using trained dogs and other intensive methods to attempt documentation of one or more viable populations.

Table 31. Goals, Objectives, Threats, and Strategies for Priority Herpetofauna by Habitat.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
	Concern	hibernation success (?) Note: Threats aggravated by low population densities near edge of range.	<ul style="list-style-type: none"> Increase public awareness of threats and concerns using posters, factsheets, press releases, and public talks. 	
Timber Rattlesnake	See Cliff Face and Rocky Outcrop			
AMPHIBIANS				
Blue-spotted Salamander	See Shrub-scrub Wetlands			

Coniferous Forest (UC)

Associated Species:

SPECIES	PRIORITY
REPTILES	
Blanding's Turtle	1
Spotted Turtle	2
Wood Turtle	2
Eastern Ribbon Snake	3
Northern Ribbon Snake	3

SPECIES	PRIORITY
AMPHIBIANS	
Blue-spotted Salamander	2
Four-toed Salamander	3
Northern Spring Salamander	3

Species Specific Objectives:

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
REPTILES				
Blanding's Turtle	See Shrub-scrub Wetlands			
Spotted Turtle	See Shrub-scrub Wetlands			
Wood Turtle	See Rivers and Streams			
AMPHIBIANS				
Blue-spotted Salamander	See Shrub-scrub Wetlands			

Table 31. Goals, Objectives, Threats, and Strategies for Priority Herpetofauna by Habitat.

Dry Woodland and Barrens (<60% canopy cover) (UB)

Associated Species:

SPECIES	PRIORITY
REPTILES	
Blanding's Turtle	1
Northern Black Racer	2
Spotted Turtle	2
Eastern Ribbon Snake	3
Northern Ribbon Snake	3

Species Specific Objectives:

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
REPTILES				
Blanding's Turtle	See Shrub-scrub Wetlands			
Northern Black Racer	<ul style="list-style-type: none"> Restricted distribution to York, Cumberland, and S. Oxford Co's.; evidence of considerable range contraction in Maine. Only ~40 (nonhistoric) occurrences documented. State Endangered 	<ul style="list-style-type: none"> Habitat loss/degradation Roadkill Shrub & grassland succession Predation of nests and juveniles Illegal killing/persecution Cold temperatures near range edge affecting nesting and hibernation success (?) <p>Note: Threats aggravated by low population densities near edge of range.</p>	<ul style="list-style-type: none"> Develop regulatory habitat protection provisions for projects subject to review under the Maine Endangered Species Act (MESA). Distribute existing habitat management guidelines to landowners, towns, landtrusts, and others. Cooperate with The Nature Conservancy, local landtrusts, municipalities and other partners to conserve likely habitat surrounding reported locations. Increase public awareness of threats and concerns using posters, factsheets, press 	<ul style="list-style-type: none"> Coordinate research objectives with state (TNC, USFWS) and regional (PARC) partners. Follow-up incidental reports from the public (e.g. roadkills, rockwalls, etc.) with on-site surveys of relative abundance and habitat extent. Establish intensive monitoring protocols at 2 or 3 locations using cover boards and mark recapture methods to establish population estimates and trends. Initiate research on basic natural history and limiting factors near edge of range. Consider construction of artificial hibernacula as a means of enhancing over-wintering survival at

Table 31. Goals, Objectives, Threats, and Strategies for Priority Herpetofauna by Habitat.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
			releases, and public talks.	select locations.
Spotted Turtle	See Shrub-scrub Wetlands			

Shrub / Early Successional (incl. regen. forest) (US)

Associated Species:

SPECIES	PRIORITY
REPTILES	
Blanding's Turtle	1
Eastern Box Turtle	1
Northern Black Racer	2
Spotted Turtle	2
Timber Rattlesnake	2
Wood Turtle	2
Eastern Ribbon Snake	3
Northern Brown Snake	3
Northern Ribbon Snake	3

SPECIES	PRIORITY
AMPHIBIANS	
Blue-spotted Salamander	2

Species Specific Objectives:

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
REPTILES				
Blanding's Turtle	See Shrub-scrub Wetlands			
Eastern Box Turtle	See Deciduous and Mixed Forest			
Northern Black Racer	See Dry Woodland and Barrens			
Spotted Turtle	See Shrub-scrub Wetlands			
Timber Rattlesnake	See Cliff Face and Rocky Outcrop			
Wood Turtle	See Rivers and Streams			
AMPHIBIANS				
Blue-spotted Salamander	See Shrub-scrub Wetlands			

Table 31. Goals, Objectives, Threats, and Strategies for Priority Herpetofauna by Habitat.

Grasslands / Agricultural / Old Field (shrubs <50%) (UG)

Associated Species:

SPECIES	PRIORITY
REPTILES	
Blanding's Turtle	1
Eastern Box Turtle	1
Northern Black Racer	2
Spotted Turtle	2
Timber Rattlesnake	2
Wood Turtle	2
Eastern Ribbon Snake	3
Northern Brown Snake	3
Northern Ribbon Snake	3

Species Specific Objectives:

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
REPTILES				
Blanding's Turtle	See Shrub-scrub Wetlands			
Eastern Box Turtle	See Deciduous and Mixed Forest			
Northern Black Racer	See Dry Woodland and Barrens			
Spotted Turtle	See Shrub-scrub Wetlands			
Timber Rattlesnake	See Cliff Face and Rocky Outcrop			
Wood Turtle	See Rivers and Streams			

Urban / Suburban (UU)

Associated Species:

SPECIES	PRIORITY
REPTILES	
Northern Brown Snake	3

Table 31. Goals, Objectives, Threats, and Strategies for Priority Herpetofauna by Habitat.

Cliff Face and Rocky Outcrop (incl. talus) (UR)

Associated Species:

SPECIES	PRIORITY
REPTILES	
Northern Black Racer	2
Timber Rattlesnake	2

Species Specific Objectives:

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
REPTILES				
Northern Black Racer	See Dry Woodland and Barrens			
Timber Rattlesnake	<ul style="list-style-type: none"> Considered extirpated; historic records from SW Maine. Severe population declines throughout New England. Northeast Regional Concern State endangered in NH 	<ul style="list-style-type: none"> Persecution Roadkill Habitat loss/degradation Over-collection (?) Cold temperatures near range edge reducing nesting and hibernation success (?) <p>Note: Threats aggravated by low population densities near edge of range.</p>	<ul style="list-style-type: none"> Increase public awareness of the ecological value of snakes and the issue of species extinction generally. Most of the public is unaware that rattlesnakes formerly occurred in Maine. 	<ul style="list-style-type: none"> Coordinate research objectives with state (TNC, USFWS) and regional (PARC, NH Fish and Game) partners. Initiate spring and fall surveys of historic hibernacula to attempt documentation of one or more cryptic populations.

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

Featured Species

Beetles
 American Burying Beetle (*Nicrophorus americanus*)..... 184

Butterflies
 Clayton’s Copper (*Lycaena dorcas claytoni*) 157
 Cobweb Skipper (*Hesperia metea*)..... 198
 Coral Hairstreak (*Satyrium titus*)..... 198
 Crowberry Blue (*Plebejus idas empetri*) 158
 Early Hairstreak (*Erora laeta*) 183
 Edwards’ Hairstreak (*Satyrium edwardsii*)..... 188
 Frigga Fritillary (*Boloria frigga*) 159
 Greenish Blue (*Plebejus saepiolus amica*) 198
 Hessel’s Hairstreak (*Callophrys hesseli*) 151
 Juniper Hairstreak (*Callophrys gryneus*) 199
 Katahdin Arctic (*Oeneis polixenes katahdin*)..... 196
 Leonard’s Skipper (*Hesperia leonardus*) 199
 Purple Lesser Fritillary (*Boloria chariclea grandis*) 185
 Sleepy Duskywing (*Erynnis brizo*) 189
 Spicebush Swallowtail (*Papilio troilus*) 183

Caddisflies
 A Caddisfly (*Hydroptila tomah*)..... 165

Damselflies & Dragonflies
 Arrow Clubtail (*Stylurus spiniceps*)..... 172
 Arrowhead Spiketail (*Cordulegaster obliqua*) 173
 Big Bluet (*Enallagma durum*)..... 144
 Boreal Snaketail (*Ophiogomphus colubrinus*) 174
 Canada Whiteface (*Leucorrhinia patricia*) 160
 Citrine Forktail (*Ischnura hastata*)..... 133
 Cobra Clubtail (*Gomphus vastus*)..... 175
 Dusky Dancer (*Argia translata*)..... 145
 Pygmy Snaketail (*Ophiogomphus howei*)..... 175

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

Featured Species (continued)

Damselflies & Dragonflies (continued)

Quebec Emerald (*Somatochlora brevicincta*) 160
 Rambur’s Forktail (*Ischnura ramburii*) 146
 Rapids Clubtail (*Gomphus quadricolor*) 172
 Ringed Boghaunter (*Williamsonia lintneri*) 154
 Scarlet Bluet (*Enallagma pictum*) 146
 Sedge Darner (*Aeshna juncea*) 149
 Southern Pygmy Clubtail (*Lanthus vernalis*) 176
 Spatterdock Darner (*Rhionaeschna mutata*) 143
 Swamp Darner (*Epiaeschna heros*) 152
 Tule Bluet (*Enallagma carunculatum*) 147

Freshwater Mussels

Brook Floater (*Alasmidonta varicosa*) 164
 Tidewater Mucket (*Leptodea ochracea*) 141
 Yellow Lampmussel (*Lampsilis cariosa*) 163

Mayflies

A Mayfly (*Baetisca rubescens*) 167
 A Mayfly (*Nixe horrida*) 168
 A Mayfly (*Nixe rusticalis*) 169
 A Mayfly (*Plauditus veteris*) 169
 A Mayfly (*Procloeon mendax*) 170
 A Mayfly (*Procloeon ozburni*) 170
 A Mayfly (*Procloeon simplex*) 171
 A Mayfly (*Siphonurus demaryi*) 142
 A Mayfly (*Siphonurus securifer*) 142
 Roaring Brook Mayfly (*Epeorus frisoni*) 166
 Tomah Mayfly (*Siphonisca aerodromia*) 167

Moths

A Moth (*Cucullia speyeri*) 190
 A Moth (*Nepytia pellucidaria*) 190

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

Featured Species (continued)

Moths (continued)

A Noctuid Moth (*Chaetagnlaea cerata*) 191

Barrens Itame (*Itame sp. 1*)..... 191

Graceful Clearwing (*Hemaris gracilis*) 192

Pine Barrens Zale (*Zale sp. 1 nr. Lunifera*)..... 192

Pine Barrens Zanclognatha (*Zanclognatha martha*)..... 193

Pine Devil (*Citheronia sepulcralis*)..... 186

Pine Pinion (*Lithophane l. lepida*)..... 194

Pink Sallow (*Psectraglaea carnosae*)..... 194

Precious Underwing (*Catocala p. pretiosa*) 152

The Buckmoth (*Hemileuca m. maia*) 195

Twilight Moth (*Lycia rachelae*)..... 189

Snails

A Spire Snail (*Amnicola decisus*)..... 162

Bigmouth Pondsnaill (*Stagnicola mighelsi*) 140

Deep-Throat Vertigo (*Vertigo nylanderi*)..... 156

Great Lakes Physa (*Physella magnalacustris*)..... 140

Lamellate Supercoil (*Paravitrea lamellidens*) 182

Mystery Vertigo (*Vertigo paradoxa*)..... 182

Pleistocene Catinella (*Catinella exile*) 156

Six-whorl Vertigo (*Vertigo morsei*)..... 157

Stoneflies

A Stonefly (*Neoperla mainensis*)..... 164

**Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.
Habitats**

COASTAL	131
Estuarine Emergent Salt Marsh (CS)	133
Citrine Forktail (<i>Ischnura hastata</i>)	133
FRESHWATER	135
Lakes and Ponds (WL)	139
Bigmouth Pondsnail (<i>Stagnicola mighelsi</i>)	140
Great Lakes Physa (<i>Physella magnalacustris</i>)	140
Tidewater Mucket (<i>Leptodea ochracea</i>)	141
A Mayfly (<i>Siphonurus demaryi</i>)	142
A Mayfly (<i>Siphonurus securifer</i>)	142
Spatterdock Darner (<i>Rhionaeschna mutata</i>)	143
Big Bluet (<i>Enallagma durum</i>)	144
Dusky Dancer (<i>Argia translata</i>)	145
Rambur’s Forktail (<i>Ischnura ramburii</i>)	146
Scarlet Bluet (<i>Enallagma pictum</i>)	146
Tule Bluet (<i>Enallagma carunculatum</i>)	147
Emergent Marsh and Wet Meadows (WM)	148
Sedge Darner (<i>Aeshna juncea</i>)	149
Forested Wetland (WF)	150
Hessel’s Hairstreak (<i>Callophrys hesseli</i>)	151
Precious Underwing (<i>Catocala p. pretiosa</i>)	152
Swamp Darner (<i>Epiaeschna heros</i>)	152
Shrub-scrub Wetland (WS)	153
Ringed Boghaunter (<i>Williamsonia lintneri</i>)	154
Peatlands (WP)	155
Deep-Throat Vertigo (<i>Vertigo nylanderi</i>)	156
Pleistocene Catinella (<i>Catinella exile</i>)	156
Six-whorl Vertigo (<i>Vertigo morsei</i>)	157
Clayton’s Copper (<i>Lycaena dorcas claytoni</i>)	157
Crowberry Blue (<i>Plebejus idas empetri</i>)	158
Frigga Fritillary (<i>Boloria frigga</i>)	159
Canada Whiteface (<i>Leucorrhinia patricia</i>)	160
Quebec Emerald (<i>Somatochlora brevicincta</i>)	160

**Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.
Habitats (continued)**

FRESHWATER (continued)

Rivers and Streams (**WR**)..... 161

 A Spire Snail (*Amnicola decisus*)..... 162

 Yellow Lampmussel (*Lampsilis cariosa*)..... 163

 Brook Floater (*Alasmidonta varicosa*)..... 164

 A Stonefly (*Neoperla mainensis*)..... 164

 A Caddisfly (*Hydroptila tomah*)..... 165

 Roaring Brook Mayfly (*Epeorus frisoni*)..... 166

 Tomah Mayfly (*Siphonisca aerodromia*)..... 167

 A Mayfly (*Baetisca rubescens*)..... 167

 A Mayfly (*Nixe horrida*)..... 168

 A Mayfly (*Nixe rusticalis*)..... 169

 A Mayfly (*Plauditus veteris*)..... 169

 A Mayfly (*Procloeon mendax*)..... 170

 A Mayfly (*Procloeon ozburni*)..... 170

 A Mayfly (*Procloeon simplex*)..... 171

 Rapids Clubtail (*Gomphus quadricolor*)..... 172

 Arrow Clubtail (*Stylurus spiniceps*)..... 172

 Arrowhead Spiketail (*Cordulegaster obliqua*)..... 173

 Boreal Snaketail (*Ophiogomphus colubrinus*)..... 175

 Cobra Clubtail (*Gomphus vastus*)..... 175

 Pygmy Snaketail (*Ophiogomphus howei*)..... 175

 Southern Pygmy Clubtail (*Lanthus vernalis*)..... 176

Unknown (**W?**)..... 177

UPLAND..... 179

Deciduous and Mixed Forest (**UD**)..... 182

 Lamellate Supercoil (*Paravitrea lamellidens*)..... 182

 Mystery Vertigo (*Vertigo paradoxa*)..... 182

 Early Hairstreak (*Erora laeta*)..... 183

 Spicebush Swallowtail (*Papilio troilus*)..... 183

 American Burying Beetle (*Nicrophorus americanus*)..... 184

**Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.
Habitats (continued)**

UPLAND (continued)

Coniferous Forest (**UC**).....185

 Purple Lesser Fritillary (*Boloria chariclea grandis*)185

 Pine Devil (*Citheronia sepulcralis*)186

Dry Woodland and Barrens (<60% canopy cover) (**UB**).....187

 Edwards' Hairstreak (*Satyrium edwardsii*)188

 Sleepy Duskywing (*Erynnis brizo*)189

 Twilight Moth (*Lycia rachelae*)189

 A Moth (*Cucullia speyeri*).....190

 A Moth (*Nepytia pellucidaria*).....190

 A Noctuid Moth (*Chaetagnathaea cerata*).....191

 Barrens Itame (*Itame sp. 1*)191

 Graceful Clearwing (*Hemaris gracilis*)192

 Pine Barrens Zale (*Zale sp. 1 nr. Lunifera*).....192

 Pine Barrens Zanclognatha (*Zanclognatha martha*).....193

 Pine Pinion (*Lithophane l. lepida*)194

 Pink Sallow (*Psectraglaea carnosae*)194

 The Buckmoth (*Hemileuca m. maia*).....195

Alpine (summits & tablelands above treeline) (**UA**)196

 Katahdin Arctic (*Oeneis polixenes katahdin*)196

Shrub / Early Successional (incl. regen. forest) (**US**)197

Grasslands / Agricultural / Old Field (shrubs <50%) (**UG**).....197

 Cobweb Skipper (*Hesperia metea*).....198

 Coral Hairstreak (*Satyrium titus*).....198

 Greenish Blue (*Plebejus saepiolus amica*)198

 Juniper Hairstreak (*Callophrys gryneus*).....199

 Leonard's Skipper (*Hesperia leonardus*)199

Cliff Face and Rocky Outcrop (incl. talus) (**UR**).....200

Unknown (**U?**).....201

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.
COASTAL

Associated species:

SPECIES	PRIORITY	SPECIES	PRIORITY	SPECIES	PRIORITY
Moths		Damselflies & Dragonflies		Damselflies & Dragonflies (cont.)	
Spartina Borer Moth <i>Spartiniphaga inops</i>	3	Big Bluet <i>Enallagma durum</i>	2	Rambur's Forktail <i>Ischnura ramburii</i>	2
		Citrine Forktail <i>Ischnura hastata</i>	2	Needhams Skimmer <i>Libellula needhami</i>	3

Coastal Species Threats:

- Habitat loss or degradation from development
- Watershed conversion to impervious surfaces (i.e. pavement, roofs)
- Impacts to hydrology (e.g. impoundment, draining, ditching)
- Impacts to benthic substrate (e.g. dredging, sedimentation, disturbance)
- Oil spills/contaminants
- Water pollution
- Aerial pesticide spraying
- Invasive aquatic plants (e.g. phragmites, purple loosestrife, Eurasian milfoil)
- Aquatic vegetation control and/or removal
- Intensive forestry operations in riparian zones

Goal: Identify, protect and enhance populations of priority species in coastal habitats.

Coastal Species Objectives:

1. Identify and protect high priority habitats.

Strategy	Task
Identify high-value coastal habitats	<ul style="list-style-type: none"> • Continue statewide surveys to identify coastal habitats hosting rare invertebrates. • Combine field survey and research to identify specific characteristics of coastal habitats important to priority invertebrates. • Using guidance from the Natural Heritage Program (NatureServe), refine element occurrence documentation and map representation (i.e. using taxa-specific polygons versus generic buffers)

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

Strategy	Task
	for priority invertebrates.
Protect high-value coastal habitats	<ul style="list-style-type: none"> • Develop regulatory habitat protection provisions for projects subject to review under the Maine Endangered Species Act (MESA) and other regulations protecting Maine’s wildlife (e.g. Natural Resources Protection Act, Site Location Law). • Develop nonregulatory habitat management guidelines for priority habitats (e.g. <i>Spartina</i> saltmarsh communities) and/or species for distribution to landowners, towns, landtrusts, and others. • Cooperate with The Nature Conservancy, local landtrusts, municipalities and other partners to conserve coastal habitats for priority invertebrates using fee acquisition, purchase of development rights, and improved comprehensive planning. • Implement existing and new public outreach efforts to gain support for priority invertebrates and their habitats.
Restore high-value coastal habitats	<ul style="list-style-type: none"> • Identify threats to saltmarsh and/or coastal pond habitats offering potential habitat to priority invertebrates and consider restorative measures to improve habitat integrity.

2. Monitor and enhance populations of high priority species.

Strategy	Task
Monitor priority species to determine population size, status and trends.	<ul style="list-style-type: none"> • Establish baseline locations for monitoring select rare invertebrate populations using taxa-appropriate survey methods. • Resurvey historical occurrences to reconfirm rare invertebrate presence and status. • Coordinate specific population monitoring objectives and methods with regional partners (e.g. USFWS, NE state/provincial wildlife agencies, North American Butterfly Association (NABA), Dragonfly Society of the Americas (DSA), NatureServe).
Enhance populations of priority species	<ul style="list-style-type: none"> • Consider site-specific intensive population management and recovery measures for rare invertebrate species threatened by imminent extirpation.

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

Estuarine Emergent Saltmarsh (CS)

Associated Species:

SPECIES	PRIORITY	SPECIES	PRIORITY	SPECIES	PRIORITY
Moths		Damselflies & Dragonflies		Damselflies & Dragonflies (cont.)	
Spartina Borer Moth <i>Spartiniphaga inops</i>	3	Big Bluet <i>Enallagma durum</i>	2	Rambur's Forktail <i>Ischnura ramburii</i>	2
		Citrine Forktail <i>Ischnura hastata</i>	2	Needhams Skimmer <i>Libellula needhami</i>	3

Species Specific Objectives:

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
Damselflies & Dragonflies				
Big Bluet <i>Enallagma durum</i>	See Lakes and Ponds			
Citrine Forktail <i>Ischnura hastata</i>	<ul style="list-style-type: none"> In ME, only 3 modern records (southern) Population size and trends unknown Proposed State Special Concern 	<ul style="list-style-type: none"> Loss or degradation of wetlands, riparian zones, or adjacent uplands to development Impacts to hydrology (e.g. ditching, draining, drawdown, impoundment) Impacts to benthic substrate (e.g. dredging, sedimentation, loss of fine sediments) Water pollution Oil spills/contaminants Aerial pesticide 	<ul style="list-style-type: none"> Develop habitat management guidelines for distribution to towns, landtrusts, landowners, land managers, and other cooperators. Consider listing under MESA if further populations not identified in the near future. Cooperate with The Nature Conservancy, local landtrusts, municipalities, watershed organizations, and other partners to conserve habitat at known occurrences. Increase public awareness of threats and concerns using posters, fact sheets, press 	<ul style="list-style-type: none"> Assess population size, viability, and habitat extent at known occurrence(s). Coordinate research objectives with state and regional partners (DSA, NE states/provinces, NatureServe). Continue surveys for new and historic occurrences, and determine distribution and status in ME. Publish a statewide atlas and conservation assessment of Maine's entire Odonate fauna.

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
		spraying <ul style="list-style-type: none"> • Invasive exotic plants (e.g. phragmites, purple loosestrife) • Aquatic vegetation control and/or removal • Intensive forestry operations in riparian zones 	releases, and public talks.	
Rambur's Forktail <i>Ischnura ramburii</i>	See Lakes and Ponds			

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

FRESHWATER

Associated species:

SPECIES	PRIORITY	SPECIES	PRIORITY	SPECIES	PRIORITY
Snails		Freshwater Mussels		Caddisflies	
A Spire Snail <i>Amnicola decisus</i>	1	Tidewater Mucket <i>Leptodea ochracea</i>	1	A Caddisfly <i>Hydroptila tomah</i>	2
Bigmouth Pondsnail <i>Stagnicola mighelsi</i>	2	Yellow Lampmussel <i>Lampsilis cariosa</i>	1	A Caddisfly <i>Ochrotrichia denningi</i>	3
Deep-Throat Vertigo <i>Vertigo nylanderi</i>	2	Brook Floater <i>Alasmidonta varicosa</i>	2	A Caddisfly <i>Oxyethira rossi</i>	3
Great Lakes Physa <i>Physella magnalacustris</i>	2	Creeper <i>Strophitus undulatus</i>	3	Mayflies	
Mystery Vertigo <i>Vertigo paradoxa</i>	2	Triangle Floater <i>Alasmidonta undulata</i>	3	Roaring Brook Mayfly <i>Epeorus frisoni</i>	1
Pleistocene Catinella <i>Catinella exile</i>	2	Stoneflies		Tomah Mayfly <i>Siphonisca aerodromia</i>	1
Six-whorl Vertigo <i>Vertigo morsei</i>	2	A Stonefly <i>Neoperla mainensis</i>	2	A Mayfly <i>Baetisca rubescens</i>	2
A Snail <i>Euconulus alderi</i>	3	A Stonefly <i>Allocapnia illinoensis</i>	3	A Mayfly <i>Nixe horrida</i>	2
A Snail <i>Vertigo sp. nov.</i>	3	A Stonefly <i>Alloperla ideii</i>	3	A Mayfly <i>Nixe rusticalis</i>	2
Delicate Vertigo <i>Vertigo bollesiana</i>	3	A Stonefly <i>Alloperla voinae</i>	3	A Mayfly <i>Plauditus veteris</i>	2
Eastern Flat-whorl <i>Planogyra asteriscus</i>	3	A Stonefly <i>Ostocerca prolongata</i>	3	A Mayfly <i>Procloeon mendax</i>	2
New England Silt Snail <i>Floridobia winkleyi</i>	3	Gaspé Sallfly <i>Utaperla gaspesiana</i>	3	A Mayfly <i>Procloeon ozburni</i>	2
Obese Pondsnail <i>Stagnicola oronoensis</i>	3	Spiny Salmonfly <i>Pteronarcys comstocki</i>	3	A Mayfly <i>Procloeon simplex</i>	2
Olive Vertigo <i>Vertigo perryi</i>	3			A Mayfly <i>Siphonurus demaryi</i>	2

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

FRESHWATER (continued)

SPECIES	PRIORITY	SPECIES	PRIORITY	SPECIES	PRIORITY
Mayflies (cont.)		Butterflies (cont.)		Damselflies & Dragonflies	
A Mayfly <i>Siphonurus securifer</i>	2	Frigga Fritillary <i>Boloria frigga</i>	2	Rapids Clubtail <i>Gomphus quadricolor</i>	1
A Mayfly <i>Ameletus browni</i>	3	Appalachian Brown <i>Satyrodes appalachia</i>	3	Ringed Boghaunter <i>Williamsonia lintneri</i>	1
A Mayfly <i>Ameletus tertius</i>	3	Bog Elfin <i>Callophrys lanoraieensis</i>	3	Spatterdock Darner <i>Rhionaeschna mutata</i>	1
A Mayfly <i>Baetisca berneri</i>	3	Bog Fritillary <i>Boloria eunomia dawsoni</i>	3	Arrow Clubtail <i>Stylurus spiniceps</i>	2
A Mayfly <i>Baetisca carolina</i>	3	Delaware Skipper <i>Anatrytone logan</i>	3	Arrowhead Spiketail <i>Cordulegaster obliqua</i>	2
A Mayfly <i>Centroptillum semirufum</i>	3	Little Glassywing <i>Pompeius verna</i>	3	Big Bluet <i>Enallagma durum</i>	2
A Mayfly <i>Cloeon dipterum</i>	3	Satyr Comma <i>Polygonia satyrus</i>	3	Boreal Snaketail <i>Ophiogomphus colubrinus</i>	2
A Mayfly <i>Metretopus borealis</i>	3	Moths		Canada Whiteface <i>Leucorrhinia patricia</i>	2
A Mayfly <i>Procloeon intermediale</i>	3	Graceful Clearwing <i>Hemaris gracilis</i>	2	Citrine Forktail <i>Ischnura hastata</i>	2
A Mayfly <i>Rhithrogena brunneotincta</i>	3	Precious Underwing <i>Catocala p. pretiosa</i>	2	Cobra Clubtail <i>Gomphus vastus</i>	2
A Mayfly <i>Rhithrogena uhari</i>	3	A Moth <i>Syngrapha altera</i>	3	Dusky Dancer <i>Argia translata</i>	2
A Mayfly <i>Siphonurus barbaroides</i>	3	A Noctuid Moth <i>Apamea mixta</i>	3	Pygmy Snaketail <i>Ophiogomphus howei</i>	2
Butterflies		A Noctuid Moth <i>Chortodes defecta</i>	3	Quebec Emerald <i>Somatochlora brevicincta</i>	2
Clayton's Copper <i>Lycaena dorcas claytoni</i>	1	Broad Sallow <i>Xylotype capax</i>	3	Rambur's Forktail <i>Ischnura ramburii</i>	2
Hessel's Hairstreak <i>Callophrys hesseli</i>	1	Culvers Root Borer <i>Papaipema sciata</i>	3	Scarlet Bluet <i>Enallagma pictum</i>	2
Crowberry Blue <i>Plebejus idas empetri</i>	2	Thaxter's Pinion <i>Lithophane thaxteri</i>	3	Sedge Darner <i>Aeshna juncea</i>	2

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

SPECIES	PRIORITY	SPECIES	PRIORITY	SPECIES	PRIORITY
Damselflies & Dragonflies (cont.)		Damselflies & Dragonflies (cont.)		Damselflies & Dragonflies (cont.)	
Southern Pygmy Clubtail <i>Lanthus vernalis</i>	2	Carolina Saddlebags <i>Tramea carolina</i>	3	Needhams Skimmer <i>Libellula needhami</i>	3
Swamp Darner <i>Epiaeschna heros</i>	2	Comet Darner <i>Anax longipes</i>	3	New England Bluet <i>Enallagma laterale</i>	3
Tule Bluet <i>Enallagma carunculatum</i>	2	Common Sanddragon <i>Progomphus obscurus</i>	3	Spine-crowned Clubtail <i>Gomphus abbreviatus</i>	3
Black Saddlebags <i>Tramea lacerata</i>	3	Ebony Boghaunter <i>Williamsonia fletcheri</i>	3	Variegated Meadowhawk <i>Sympetrum corruptum</i>	3
Broadtailed Shadowdragon <i>Neurocordulia michaeli</i>	3	Extra-striped Snaketail <i>Ophiogomphus anomalus</i>	3	Beetles	
Brook Snaketail <i>Ophiogomphus aspersus</i>	3	Little Bluet <i>Enallagma minusculum</i>	3	White Mountain Tiger Beetle <i>Cicindela ancocisconensis</i>	3

Freshwater Species Threats:

- Habitat loss or degradation from development
- Watershed conversion to impervious surfaces (i.e. pavement, roofs)
- Impacts to hydrology (e.g. impoundment, draining, ditching)
- Impacts to benthic substrate (e.g. scouring, sedimentation, loss of fine sediments)
- Oil spills/contaminants
- Water pollution
- Aerial pesticide spraying
- Introduction of exotic species (e.g. zebra mussel, insects for biocontrol)
- Invasive aquatic plants (e.g. phragmites, purple loosestrife, Eurasian milfoil)
- Aquatic vegetation control and/or removal
- Overcollection/illegal collection
- Global warming
- Impacts to native fish community (e.g. introduction of exotic species, artificial stocking, barriers to fish passage)
- Natural community succession
- Commercial resource extraction (e.g. peat mining, sunken log salvage, sand and gravel mining)
- Roadkill
- Motorboat wave-wash
- Inadequate MDEP regulatory protection for habitat type (e.g. headwater streams, forested wetlands, pocket swamps)
- Intensive forestry operations in riparian zones, forested wetlands, and/or adjacent uplands (e.g. where host plant present)

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

Goal: Identify, protect and enhance populations of priority species in freshwater habitats.

Freshwater Species Objectives:

1. *Identify and protect high priority habitats.*

Strategy	Task
Identify high-value freshwater habitats	<ul style="list-style-type: none"> • Continue statewide surveys to identify freshwater habitats hosting rare invertebrates. • Combine field survey and research to identify specific characteristics of freshwater habitats important to priority invertebrates. • Using guidance from the Natural Heritage Program (NatureServe), refine element occurrence documentation and map representation (i.e. using taxa-specific polygons versus generic buffers) for priority invertebrates.
Protect high-value freshwater habitats	<ul style="list-style-type: none"> • Develop regulatory habitat protection provisions for projects subject to review under the Maine Endangered Species Act (MESA) and other regulations protecting Maine’s wildlife (e.g. Natural Resources Protection Act, Site Location Law). • Develop nonregulatory habitat management guidelines for priority habitats (e.g. vernal pools, rare peatlands) and/or species for distribution to landowners, towns, landtrusts, and others. • Cooperate with The Nature Conservancy, local landtrusts, municipalities and other partners to conserve freshwater habitats for priority invertebrates using fee acquisition, purchase of development rights, and improved comprehensive planning. • Implement existing and new public outreach efforts to gain support for priority invertebrates and their habitats.
Restore high-value freshwater habitats	<ul style="list-style-type: none"> • Identify threats to freshwater wetland, river, stream, lake and /or pond habitats offering potential habitat to priority invertebrates and consider restorative measures to improve habitat integrity.

2. *Monitor and enhance populations of high priority species.*

Strategy	Task
Monitor priority species to determine population size, status and trends.	<ul style="list-style-type: none"> • Establish baseline locations for monitoring select rare invertebrate populations using taxa-appropriate survey methods. • Resurvey historical occurrences to reconfirm rare invertebrate presence and status. • Coordinate specific population monitoring objectives and methods with regional partners (e.g. USFWS, NE state/provincial wildlife agencies, North American Butterfly Association (NABA), Dragonfly Society of the Americas (DSA), NatureServe).
Enhance populations of priority species	<ul style="list-style-type: none"> • Consider site-specific intensive population management and recovery measures for rare

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

Strategy	Task
	invertebrate species threatened by imminent extirpation.

Lakes and Ponds (WL)

Associated Species:

SPECIES	PRIORITY	SPECIES	PRIORITY	SPECIES	PRIORITY
Snails		Mayflies		Damselflies & Dragonflies (cont.)	
A Spire Snail <i>Amnicola decisus</i>	1	A Mayfly <i>Siphonurus demaryi</i>	2	Scarlet Bluet <i>Enallagma pictum</i>	2
Bigmouth Pondsnailed <i>Stagnicola mighelsi</i>	2	A Mayfly <i>Siphonurus securifer</i>	2	Tule Bluet <i>Enallagma carunculatum</i>	2
Great Lakes Physa <i>Physella magnalacustris</i>	2	A Mayfly <i>Cloeon dipterum</i>	3	Black Saddlebags <i>Tramea lacerata</i>	3
Obese Pondsnailed <i>Stagnicola oronoensis</i>	3	A Mayfly <i>Siphonurus barbaroides</i>	3	Carolina Saddlebags <i>Tramea carolina</i>	3
Freshwater Mussels		Damselflies & Dragonflies		Comet Darner <i>Anax longipes</i>	3
Tidewater Mucket <i>Leptodea ochracea</i>	1	Spatterdock Darner <i>Rhionaeschna mutata</i>	1	Common Sanddragon <i>Progomphus obscurus</i>	3
Yellow Lampmussel <i>Lampsilis cariosa</i>	1	Big Bluet <i>Enallagma durum</i>	2	Little Bluet <i>Enallagma minusculum</i>	3
Creeper <i>Strophitus undulatus</i>	3	Citrine Forktail <i>Ischnura hastata</i>	2	Needhams Skimmer <i>Libellula needhami</i>	3
Triangle Floater <i>Alasmidonta undulata</i>	3	Dusky Dancer <i>Argia translata</i>	2	New England Bluet <i>Enallagma laterale</i>	3
		Rambur's Forktail <i>Ischnura ramburii</i>	2	Variegated Meadowhawk <i>Sympetrum corruptum</i>	3

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

Species Specific Objectives:

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
Snails				
A Spire Snail <i>Amnicola decusus</i>	See Rivers and Streams			
Bigmouth Pondsnaill <i>Stagnicola mighelsi</i>	<ul style="list-style-type: none"> • Reported only from ME • ME occurrence data unknown • Population size, distribution, and status unknown • NatureServe G1G3 	<ul style="list-style-type: none"> • Loss or degradation of wetlands, riparian zones, or adjacent uplands to development • Impacts to hydrology (e.g. ditching, draining, impoundment, drawdown) • Impacts to benthic substrate (e.g. sedimentation, disturbance) • Invasive exotic plants (e.g. milfoil) • Aquatic vegetation control and/or removal • Water pollution • Peat mining • Intensive forestry operations in riparian zones 	<ul style="list-style-type: none"> • Develop Habitat and Outreach Actions once status and conservation needs are determined. 	<ul style="list-style-type: none"> • Initiate surveys for new and historic occurrences, and determine distribution and status in ME. • Initiate a statewide atlas and conservation assessment of Maine's entire snail fauna.
Great Lakes Physa <i>Physella magnalacustris</i>	<ul style="list-style-type: none"> • In U.S., reported only from ME, MI, WI; in Canada, from ON • ME occurrence data 	<ul style="list-style-type: none"> • Excessive shoreline and/or watershed development • Impacts to hydrology (e.g. drawdown) 	<ul style="list-style-type: none"> • Develop Habitat and Outreach Actions once status and conservation needs are determined. 	<ul style="list-style-type: none"> • Initiate surveys for new and historic occurrences, and determine distribution and status in ME. • Initiate a statewide atlas and

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
	<ul style="list-style-type: none"> • unknown • Population size, distribution, and status unknown • NatureServe G2Q 	<ul style="list-style-type: none"> • Impacts to benthic substrate (e.g. sedimentation, disturbance) • Water pollution • Invasive exotic plants (e.g. milfoil) • Aquatic vegetation control and/or removal • Intensive forestry operations in riparian zones 		<ul style="list-style-type: none"> • conservation assessment of Maine's entire snail fauna.
Freshwater Mussels				
Tidewater Mucket <i>Leptodea ochracea</i>	<ul style="list-style-type: none"> • Documented declines throughout range • In ME, documented at ~45 of 1600+ survey sites statewide (11-13 metapopulations) • Restricted to Penobscot, St George, and lower Kennebec River watersheds • Often found in low numbers and densities • Population size and trends unknown • State Threatened • Northeast Regional Concern 	<ul style="list-style-type: none"> • Loss or degradation of riparian zones to development • Watershed conversion ($\geq 6-10\%$) to impervious surfaces) • Impacts to hydrology (e.g. impoundment, dam removal, drawdown, channelization) • Impacts to benthic substrate (e.g. sedimentation, scouring, loss of fine sediments, crushing) • Water pollution • Invasive exotic plants (e.g. milfoil) 	<ul style="list-style-type: none"> • Develop consistent regulatory habitat protection standards for projects subject to review under the Maine Endangered Species Act (MESA). • Distribute existing habitat management guidelines to towns, landtrusts, landowners, land managers, hydropower companies, and other cooperators. • Cooperate with The Nature Conservancy, local landtrusts, municipalities, watershed organizations, and other partners to conserve habitat at known occurrences. • Develop cooperative management agreements with dam owners and hydro companies to ensure 	<ul style="list-style-type: none"> • Coordinate research objectives with state and regional partners (USFWS, UMO, PRRP, NE states/provinces, MDEP, NatureServe). • Continue fish host investigations. • Investigate life history, habitat requirements, limiting factors, and conservation needs • Develop and implement a systematic protocol for monitoring population size, demographics, and trends. • Conduct surveys to identify priority river segment populations. • Investigate significance of impoundments and dam removals to short and long-

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
	<ul style="list-style-type: none"> • AFS Special Concern • IUCN Lesser Risk 	<ul style="list-style-type: none"> • Loss of access to fish host(s) • Introduction of exotic species (e.g. fish host competitors, zebra mussel) • Illegal collection? • Intensive forestry operations in riparian zones 	<ul style="list-style-type: none"> • compatible water level and impoundment management. • Support proposals to improve fish passage over dams currently having limited or no access. • Increase public awareness of threats and concerns using posters, fact sheets, press releases, and public talks. 	<ul style="list-style-type: none"> • term conservation. • Develop effective mitigation and relocation protocols for projects impacting rare mussel populations. • Conduct long-term post-monitoring of impacted mussel populations to determine efficacy of mitigation and relocation techniques.
Yellow Lampmussel <i>Lampsilis cariosa</i>	See Rivers and Streams			
Mayflies				
A Mayfly <i>Siphonurus demaryi</i>	<ul style="list-style-type: none"> • Reported only from ME and Maritime Canada (NB, NS) • In ME, documented at 2+ sites (west central) • Population size, distribution, and status unknown • NatureServe G2 	<ul style="list-style-type: none"> • Excessive shoreline and/or watershed development • Impacts to hydrology (e.g. drawdown) • Impacts to benthic substrate (e.g. sedimentation, disturbance) • Water pollution • Aerial pesticide spraying • Invasive exotic plants (e.g. milfoil) • Intensive forestry operations in riparian zones 	<ul style="list-style-type: none"> • Develop Habitat and Outreach Actions once status and conservation needs are determined. 	<ul style="list-style-type: none"> • Initiate surveys for new and historic occurrences, and determine distribution and status in ME. • Initiate a statewide atlas and conservation assessment of Maine's entire mayfly fauna.
A Mayfly <i>Siphonurus securifer</i>	<ul style="list-style-type: none"> • In U.S., reported from ME, CT; in Canada, from ON, QC 	<ul style="list-style-type: none"> • Excessive shoreline and/or watershed development • Impacts to hydrology 	<ul style="list-style-type: none"> • Develop Habitat and Outreach Actions once status and conservation needs are determined. 	<ul style="list-style-type: none"> • Initiate surveys for new and historic occurrences, and determine distribution and status in ME.

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
	<ul style="list-style-type: none"> • In ME, documented at 1+ site (western) • Population size, distribution, and status unknown • NatureServe G2 	<ul style="list-style-type: none"> (e.g. drawdown) • Impacts to benthic substrate (e.g. sedimentation, disturbance) • Water pollution • Aerial pesticide spraying • Invasive exotic plants (e.g. milfoil) • Intensive forestry operations in riparian zones 		<ul style="list-style-type: none"> • Initiate a statewide atlas and conservation assessment of Maine's entire mayfly fauna.
Damselflies & Dragonflies				
Spatterdock Darner <i>Rhionaeschna mutata</i>	<ul style="list-style-type: none"> • Widespread in eastern NA, but uncommon and local • In ME, documented at only 1 site (southern) • Population size, exact distribution, and trends unknown • Proposed State Special Concern • NatureServe G3G4 	<ul style="list-style-type: none"> • Loss or degradation of wetlands, riparian zones, or adjacent uplands to development • Impacts to hydrology (e.g. drawdown, ditching, draining, impoundment) • Impacts to benthic substrate (e.g. sedimentation, disturbance) • Water pollution • Aerial pesticide spraying • Invasive exotic plants (e.g. milfoil) • Fish stocking 	<ul style="list-style-type: none"> • Develop habitat management guidelines for distribution to towns, landtrusts, landowners, land managers, and other cooperators. • Consider listing under MESA if further populations not identified in the near future. • Cooperate with The Nature Conservancy, local landtrusts, municipalities, watershed organizations, and other partners to conserve habitat at known occurrences. • Consider habitat acquisition by/for MDIFW of the Clays Pond watershed which abuts existing Brownfield Bog WMA. • Increase public awareness of threats and concerns using 	<ul style="list-style-type: none"> • Assess population size, viability, and habitat extent at known occurrence(s). • Coordinate research objectives with state and regional partners (DSA, NE states/provinces, NatureServe). • Continue surveys for new occurrences, and determine distribution and status in ME. • Publish a statewide atlas and conservation assessment of Maine's entire Odonate fauna.

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
		<ul style="list-style-type: none"> • Aquatic vegetation control and/or removal • Intensive forestry operations in riparian zones 	<p>posters, fact sheets, press releases, and public talks.</p>	
<p>Big Bluet <i>Enallagma durum</i></p>	<ul style="list-style-type: none"> • In ME, only 2 modern records (both MDI) • Population size and trends unknown • Proposed State Threatened 	<ul style="list-style-type: none"> • Loss or degradation of wetlands, riparian zones, or adjacent uplands to development • Watershed conversion ($\geq 6-10\%$ to impervious surfaces) • Impacts to hydrology (e.g. impoundment, drawdown, ditching, draining, channelization) • Impacts to benthic substrate (e.g. sedimentation, loss of fine sediments, disturbance, dredging) • Water pollution • Oil spills/contaminants • Aerial pesticide spraying • Invasive exotic plants (e.g. phragmites, milfoil) • Aquatic vegetation 	<ul style="list-style-type: none"> • Develop habitat management guidelines for distribution to towns, landtrusts, landowners, land managers, and other cooperators. • Cooperate with The Nature Conservancy, local landtrusts, municipalities, watershed organizations, and other partners to conserve habitat at known occurrences. • Increase public awareness of threats and concerns using posters, fact sheets, press releases, and public talks. 	<ul style="list-style-type: none"> • Assess population size, viability, and habitat extent at known occurrence(s). • Coordinate research objectives with state and regional partners (DSA, NE states/provinces, MDEP, NatureServe). • Continue surveys for new and historic occurrences, and determine distribution and status in ME. • Publish a statewide atlas and conservation assessment of Maine's entire Odonate fauna.

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
		control and/or removal • Intensive forestry operations in riparian zones		
Citrine Forktail <i>Ischnura hastata</i>	See Estuarine Emergent Saltmarsh			
Dusky Dancer <i>Argia translata</i>	<ul style="list-style-type: none"> • In ME, documented at 4 sites (central) • Population size and trends unknown • Proposed State Special Concern 	<ul style="list-style-type: none"> • Loss or degradation of wetlands, riparian zones, or adjacent uplands to development • Watershed conversion ($\geq 6-10\%$) to impervious surfaces) • Impacts to hydrology (e.g. impoundment, drawdown, channelization) • Impacts to benthic substrate (e.g. sedimentation, loss of fine sediments, disturbance) • Water pollution • Aerial pesticide spraying • Invasive exotic plants (e.g. milfoil) • Aquatic vegetation control and/or removal • Intensive forestry operations in riparian 	<ul style="list-style-type: none"> • Develop habitat management guidelines for distribution to towns, landtrusts, landowners, land managers, and other cooperators. • Cooperate with The Nature Conservancy, local landtrusts, municipalities, watershed organizations, and other partners to conserve habitat at known occurrences. • Increase public awareness of threats and concerns using posters, fact sheets, press releases, and public talks. 	<ul style="list-style-type: none"> • Coordinate research objectives with state and regional partners (DSA, NE states/provinces, MDEP, NatureServe). • Continue surveys for new occurrences, and determine distribution and status in ME. • Publish a statewide atlas and conservation assessment of Maine's entire Odonate fauna.

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
		zones		
Rambur's Forktail <i>Ischnura ramburii</i>	<ul style="list-style-type: none"> • In ME, documented at 2 sites (east-coastal) • Population size and trends unknown • Proposed State Special Concern 	<ul style="list-style-type: none"> • Loss or degradation of wetlands, riparian zones, or adjacent uplands to development • Impacts to hydrology (e.g. drawdown, ditching, draining, impoundment) • Impacts to benthic substrate (e.g. sedimentation, disturbance, dredging) • Water pollution • Oil spills/contaminants • Aerial pesticide spraying • Invasive exotic plants (e.g. phragmites, purple loosestrife, milfoil) • Aquatic vegetation control and/or removal • Intensive forestry operations in riparian zones 	<ul style="list-style-type: none"> • Develop habitat management guidelines for distribution to towns, landtrusts, landowners, land managers, and other cooperators. • Consider listing under MESA if further populations not identified in the near future. • Cooperate with The Nature Conservancy, local landtrusts, municipalities, watershed organizations, and other partners to conserve habitat at known occurrences. • Increase public awareness of threats and concerns using posters, fact sheets, press releases, and public talks. 	<ul style="list-style-type: none"> • Assess population size, viability, and habitat extent at known occurrence(s). • Coordinate research objectives with state and regional partners (DSA, NE states/provinces, NatureServe). • Continue surveys for new occurrences, and determine distribution and status in ME. • Publish a statewide atlas and conservation assessment of Maine's entire Odonate fauna.
Scarlet Bluet <i>Enallagma pictum</i>	<ul style="list-style-type: none"> • Northeast endemic; reported from ME, MA, NH, NJ, CT, 	<ul style="list-style-type: none"> • Excessive shoreline and/or watershed development 	<ul style="list-style-type: none"> • Develop habitat management guidelines for distribution to towns, landtrusts, landowners, 	<ul style="list-style-type: none"> • Coordinate research objectives with state and regional partners (DSA, NE

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
	<ul style="list-style-type: none"> • NY, RI • Not as abundant as other bluets • In ME, documented at 12 sites (southern) • Population size, exact distribution, and trends unknown • Proposed State Special Concern • NatureServe G3 	<ul style="list-style-type: none"> • Impacts to hydrology (e.g. drawdown) • Impacts to benthic substrate (e.g. sedimentation, disturbance) • Water pollution • Aerial pesticide spraying • Invasive exotic plants (e.g. milfoil) • Aquatic vegetation control and/or removal • Intensive forestry operations in riparian zones 	<ul style="list-style-type: none"> • land managers, and other cooperators. • Cooperate with The Nature Conservancy, local landtrusts, municipalities, watershed organizations, and other partners to conserve habitat at known occurrences. • Increase public awareness of threats and concerns using posters, fact sheets, press releases, and public talks. 	<ul style="list-style-type: none"> • states/provinces, NatureServe). • Continue surveys for new occurrences, and determine distribution and status in ME. • Publish a statewide atlas and conservation assessment of Maine's entire Odonate fauna.
<p>Tule Bluet <i>Enallagma carunculatum</i></p>	<ul style="list-style-type: none"> • In ME, 3 modern records (northern, eastern) • Population size and trends unknown • Proposed State Special Concern 	<ul style="list-style-type: none"> • Loss or degradation of wetlands, riparian zones, or adjacent uplands to development • Watershed conversion (≥6-10% to impervious surfaces) • Impacts to hydrology (e.g. drawdown, impoundment) • Impacts to benthic substrate (e.g. sedimentation, loss of fine sediments, disturbance) • Water pollution 	<ul style="list-style-type: none"> • Develop habitat management guidelines for distribution to towns, landtrusts, landowners, land managers, and other cooperators. • Cooperate with The Nature Conservancy, local landtrusts, municipalities, watershed organizations, and other partners to conserve habitat at known occurrences. • Increase public awareness of threats and concerns using posters, fact sheets, press releases, and public talks. 	<ul style="list-style-type: none"> • Assess population size, viability, and habitat extent at known occurrence(s). • Coordinate research objectives with state and regional partners (DSA, NE states/provinces, MDEP, NatureServe). • Continue surveys for new and historic occurrences, and determine distribution and status in ME. • Publish a statewide atlas and conservation assessment of Maine's entire Odonate fauna.

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
		<ul style="list-style-type: none"> • Aerial pesticide spraying • Invasive exotic plants (e.g. milfoil) • Aquatic vegetation control and/or removal • Intensive forestry operations in riparian zones 		

Emergent Marsh and Wet Meadows (WM)

Associated Species:

SPECIES	PRIORITY	SPECIES	PRIORITY	SPECIES	PRIORITY
Snails		Caddisflies		Moths	
Bigmouth Pondsnaail <i>Stagnicola mighelsi</i>	2	A Caddisfly <i>Hydroptila tomah</i>	2	Culvers Root Borer <i>Papaipema sciata</i>	3
A Snail <i>Euconulus alderi</i>	3	A Caddisfly <i>Oxyethira rossi</i>	3	Damselflies & Dragonflies	
Eastern Flat-whorl <i>Planogyra asteriscus</i>	3	Mayflies		Spatterdock Darner <i>Rhionaeschna mutata</i>	1
New England Silt Snail <i>Floridobia winkleyi</i>	3	Tomah Mayfly <i>Siphonisca aerodromia</i>	1	Citrine Forktail <i>Ischnura hastata</i>	2
Obese Pondsnaail <i>Stagnicola oronoensis</i>	3	Butterflies		Rambur's Forktail <i>Ischnura ramburii</i>	2
Olive Vertigo <i>Vertigo perryi</i>	3	Delaware Skipper <i>Anatrytone logan</i>	3	Sedge Darner <i>Aeshna juncea</i>	2
		Little Glassywing <i>Pompeius verna</i>	3	Black Saddlebags <i>Tramea lacerata</i>	3

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

Species Specific Objectives:

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
Snails				
Bigmouth Pondsnail <i>Stagnicola mighelsi</i>	See Lakes and Ponds			
Caddisflies				
A Caddisfly <i>Hydroptila tomah</i>	See Rivers and Streams			
Mayflies				
Tomah Mayfly <i>Siphonisca aerodromia</i>	See Rivers and Streams			
Damselflies & Dragonflies				
Spatterdock Darner <i>Rhionaeschna mutata</i>	See Lakes and Ponds			
Citrine Forktail <i>Ischnura hastata</i>	See Estuarine Emergent Saltmarsh			
Rambur's Forktail <i>Ischnura ramburii</i>	See Lakes and Ponds			
Sedge Darner <i>Aeshna juncea</i>	<ul style="list-style-type: none"> • In ME, documented at only 1 site (northern) • Population size and trends unknown • Proposed State Special Concern 	<ul style="list-style-type: none"> • Loss or degradation of wetlands, riparian zones, or adjacent uplands to development • Impacts to hydrology (e.g. ditching, draining, impoundment) • Impacts to benthic substrate (e.g. sedimentation, disturbance) • Water pollution • Aerial pesticide 	<ul style="list-style-type: none"> • Develop habitat management guidelines for distribution to towns, landtrusts, landowners, land managers, and other cooperators. • Consider listing under MESA if further populations not identified in the near future. • Cooperate with The Nature Conservancy, local landtrusts, municipalities, watershed organizations, and other partners to conserve habitat at known 	<ul style="list-style-type: none"> • Assess population size, viability, and habitat extent at known occurrence(s). • Coordinate research objectives with state and regional partners (DSA, NE states/provinces, NatureServe). • Continue surveys for new occurrences, and determine distribution and status in ME. • Publish a statewide atlas and conservation assessment of Maine's entire Odonate fauna.

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
		spraying • Invasive exotic plants (e.g. purple loosestrife) • Peat mining • Aquatic vegetation control and/or removal • Intensive forestry operations in riparian zones	occurrences. • Increase public awareness of threats and concerns using posters, fact sheets, press releases, and public talks.	

Forested Wetland (WF)

Associated Species:

SPECIES	PRIORITY	SPECIES	PRIORITY	SPECIES	PRIORITY
Snails		Butterflies		Damselflies & Dragonflies	
Deep-Throat Vertigo <i>Vertigo nylanderi</i>	2	Hessel's Hairstreak <i>Callophrys hesseli</i>	1	Ringed Boghaunter <i>Williamsonia lintneri</i>	1
Mystery Vertigo <i>Vertigo paradoxa</i>	2	Appalachian Brown <i>Satyroides appalachia</i>	3	Swamp Darner <i>Epiaschna heros</i>	2
Pleistocene Catinella <i>Catinella exile</i>	2	Satyr Comma <i>Polygonia satyrus</i>	3	Black Saddlebags <i>Tramea lacerata</i>	3
A Snail <i>Euconulus alderi</i>	3	Moths		Carolina Saddlebags <i>Tramea carolina</i>	3
Delicate Vertigo <i>Vertigo bollesiana</i>	3	Precious Underwing <i>Catocala p. pretiosa</i>	2	Ebony Boghaunter <i>Williamsonia fletcheri</i>	3
Eastern Flat-whorl <i>Planogyra asteriscus</i>	3			Variegated Meadowhawk <i>Sympetrum corruptum</i>	3
Olive Vertigo <i>Vertigo perryi</i>	3				

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

Species Specific Objectives:

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
Snails				
Deep-Throat Vertigo <i>Vertigo nylanderi</i>	See Peatlands			
Mystery Vertigo <i>Vertigo paradoxa</i>	See Deciduous and Mixed Forest			
Pleistocene Catinella <i>Catinella exile</i>	See Peatlands			
Butterflies				
Hessel’s Hairstreak <i>Callophrys hesseli</i>	<ul style="list-style-type: none"> • Rare in most of range • In ME, documented at 4 sites (southern) • Host plant rare and at northern edge of range in southern ME • Population size and trends unknown • State Endangered • NatureServe G3G4 	<ul style="list-style-type: none"> • Loss or degradation of wetlands, riparian zones, or adjacent uplands to development • Impacts to hydrology (e.g. ditching, draining) • Occupies forested wetlands not adequately protected by existing MDEP regulations • Aerial pesticide spraying • Forest succession and/or lack of adequate host plant regeneration • Illegal collection? • Intensive forestry operations in 	<ul style="list-style-type: none"> • Develop consistent regulatory habitat protection standards for projects subject to review under the Maine Endangered Species Act (MESA). • Consider implementing Essential Habitat (MESA) provisions for known occurrences (host plant habitat is discrete and limiting). • Coordinate ¼ mile no-spray zones with Bureau of Pesticide Control around all occurrences. • Distribute existing habitat management guidelines to towns, landtrusts, landowners, landmanagers, and other cooperators. • Develop cooperative habitat management agreements with landowners to facilitate host plant regeneration and riparian zone protection. • Cooperate with The Nature 	<ul style="list-style-type: none"> • Coordinate research objectives with state and regional partners (NABA, NE states/provinces, NatureServe). • Continue surveys of suitable habitats for new occurrences. • Develop and implement a systematic protocol for monitoring population size and trends. • Investigate life history, habitat requirements, limiting factors, and conservation needs. • Publish a statewide atlas and conservation assessment of Maine’s entire butterfly fauna.

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
		forested wetlands or riparian zones	Conservancy, local landtrusts, municipalities, and other partners to conserve habitat at known occurrences. <ul style="list-style-type: none"> Increase public awareness of threats and concerns using posters, fact sheets, press releases, and public talks. 	
Moths				
Precious Underwing <i>Catocala p. pretiosa</i>	<ul style="list-style-type: none"> Gone from entire historic range; possibly recolonizing north from NJ Recent records from MA, NJ In ME, no 20th/21st century records State Special Concern (proposed Extirpated) NatureServe G4T2T3 	<ul style="list-style-type: none"> Loss or degradation of wetlands, riparian zones, or adjacent uplands to development Impacts to hydrology (e.g. draining, impoundment) Aerial pesticide spraying Prescribed burning or wildfire at any season Intensive forestry operations in forested wetlands or riparian zones 	<ul style="list-style-type: none"> Develop Habitat and Outreach Actions if reconfirmed extant. 	<ul style="list-style-type: none"> Initiate surveys for new and historic occurrences, and determine distribution and status in ME. Initiate a statewide atlas and conservation assessment of Maine’s entire moth fauna.
Damselflies & Dragonflies				
Ringed Boghaunter <i>Williamsonia lintneri</i>	See Shrub-scrub Wetland			
Swamp Darner <i>Epiaeschna heros</i>	<ul style="list-style-type: none"> In ME, only 1 modern (unvouchered) record (coastal) 	<ul style="list-style-type: none"> Loss or degradation of wetlands, riparian 	<ul style="list-style-type: none"> Develop habitat management guidelines for distribution to towns, landtrusts, landowners, 	<ul style="list-style-type: none"> Coordinate research objectives with state and regional partners (DSA, NE

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
	<ul style="list-style-type: none"> Population size and trends unknown State Special Concern 	<ul style="list-style-type: none"> zones, or adjacent uplands to development Impacts to hydrology (e.g. draining, impoundment) Impacts to benthic substrate (e.g. sedimentation, disturbance) Frequents pocket swamps and vernal pools not adequately protected by existing MDEP regulations. Aerial pesticide spraying Water pollution Intensive forestry operations in forested wetlands or riparian zones 	<ul style="list-style-type: none"> land managers, and other cooperators. Consider listing under MESA if further populations not identified in the near future. Cooperate with The Nature Conservancy, local landtrusts, municipalities, and other partners to conserve habitat at known occurrences. Increase public awareness of threats and concerns using posters, fact sheets, press releases, and public talks. 	<ul style="list-style-type: none"> states/provinces, NatureServe). Initiate surveys for new and historic occurrences, and determine distribution and status in ME. Publish a statewide atlas and conservation assessment of Maine's entire Odonate fauna.

Shrub-scrub Wetland (WS)

Associated Species:

SPECIES	PRIORITY	SPECIES	PRIORITY	SPECIES	PRIORITY
Snails				Butterflies	
Deep-Throat Vertigo <i>Vertigo nylanderi</i>	2	A Snail <i>Vertigo sp. nov.</i>	3	Clayton's Copper <i>Lycaena dorcas claytoni</i>	1

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

SPECIES	PRIORITY	SPECIES	PRIORITY	SPECIES	PRIORITY
Moths		Damselflies & Dragonflies (cont.)		Damselflies & Dragonflies (cont.)	
Culvers Root Borer <i>Papaipema sciata</i>	3	Swamp Darner <i>Epiaeschna heros</i>	2	Ebony Boghaunter <i>Williamsonia fletcheri</i>	3
Damselflies & Dragonflies		Black Saddlebags <i>Tramea lacerata</i>	3	Variegated Meadowhawk <i>Sympetrum corruptum</i>	3
Ringed Boghaunter <i>Williamsonia lintneri</i>	1	Carolina Saddlebags <i>Tramea carolina</i>	3		

Species Specific Objectives:

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
Snails				
Deep-Throat Vertigo <i>Vertigo nylanderi</i>	See Peatlands			
Butterflies				
Clayton's Copper <i>Lycaena dorcas claytoni</i>	See Peatlands			
Damselflies & Dragonflies				
Ringed Boghaunter <i>Williamsonia lintneri</i>	<ul style="list-style-type: none"> Reported from ME, MA, NH, NJ, CT, NY, RI, MI, VT, WI ~60 occurrences rangewide Adult populations typically very small (<50) In ME, documented at 13 sites (southern) Population size and trends unknown State Endangered Federal Special 	<ul style="list-style-type: none"> Loss or degradation of wetlands, riparian zones, or adjacent uplands to development Impacts to hydrology (e.g. draining, impoundment) Frequents pocket swamps and vernal pools not adequately 	<ul style="list-style-type: none"> Develop consistent regulatory habitat protection standards for projects subject to review under the Maine Endangered Species Act (MESA). Consider implementing Essential Habitat (MESA) provisions for high value occurrences. Cooperate with MDEP to enact Significant Wildlife Habitat provisions (Natural Resource Protection Act) for high value vernal pools. 	<ul style="list-style-type: none"> Coordinate research objectives with state and regional partners (DSA, NE states/provinces, USFWS, NatureServe). Develop and implement a systematic protocol for monitoring population size and trends. Investigate life history, habitat requirements, limiting factors, and conservation needs. Continue surveys of suitable habitats for new occurrences.

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
	Concern <ul style="list-style-type: none"> NatureServe G3 IUCN Vulnerable 	protected by existing MDEP regulations. <ul style="list-style-type: none"> Impacts to benthic substrate (e.g. sedimentation, disturbance) Aerial pesticide spraying Water pollution Roadkill (often basks on road shoulders) Intensive forestry operations in forested wetlands or riparian zones 	<ul style="list-style-type: none"> Consider implementation of no-spray zones around all occurrences. Distribute existing habitat management guidelines to towns, landtrusts, landowners, landmanagers, and other cooperators. Cooperate with The Nature Conservancy, local landtrusts, municipalities, and other partners to conserve habitat at known occurrences. Increase public awareness of threats and concerns using posters, fact sheets, press releases, and public talks. 	<ul style="list-style-type: none"> Publish a statewide atlas and conservation assessment of Maine's entire Odonate fauna.
Swamp Darner <i>Epiaeschna heros</i>	See Forested Wetlands			

Peatlands (WP)

Associated Species:

SPECIES	PRIORITY	SPECIES	PRIORITY	SPECIES	PRIORITY
Snails		Snails (cont.)		Butterflies	
Bigmouth Pondsnaail <i>Stagnicola mighelsi</i>	2	A Snail <i>Vertigo sp. nov.</i>	3	Clayton's Copper <i>Lycaena dorcas claytoni</i>	1
Deep-Throat Vertigo <i>Vertigo nylanderi</i>	2	Delicate Vertigo <i>Vertigo bollesiana</i>	3	Hessel's Hairstreak <i>Callophrys hesseli</i>	1
Pleistocene Catinella <i>Catinella exile</i>	2	Obese Pondsnaail <i>Stagnicola oronoensis</i>	3	Crowberry Blue <i>Plebejus idas empetri</i>	2
Six-whorl Vertigo <i>Vertigo morsei</i>	2			Frigga Fritillary <i>Boloria frigga</i>	2

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

SPECIES	PRIORITY	SPECIES	PRIORITY	SPECIES	PRIORITY
Butterflies (cont.)		Moths		Moths (cont.)	
Bog Elfin <i>Callophrys lanoraieensis</i>	3	Graceful Clearwing <i>Hemaris gracilis</i>	2	Thaxter's Pinion <i>Lithophane thaxteri</i>	3
Bog Fritillary <i>Boloria eunomia dawsoni</i>	3	A Moth <i>Syngrapha altera</i>	3	Damselflies & Dragonflies	
Delaware Skipper <i>Anatrytone logan</i>	3	A Noctuid Moth <i>Apamea mixta</i>	3	Canada Whiteface <i>Leucorrhinia patricia</i>	2
		Broad Sallow <i>Xylotype capax</i>	3	Quebec Emerald <i>Somatochlora brevicincta</i>	2

Species Specific Objectives:

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
Snails				
Bigmouth Pondsnaail <i>Stagnicola mighelsi</i>	See Lakes and Ponds			
Deep-Throat Vertigo <i>Vertigo nylanderi</i>	<ul style="list-style-type: none"> In U.S., known from ME, MI, WI; in Canada, historically from ON In ME, documented at 3-4 sites (northern, central) Population size, distribution, and status unknown NatureServe G2 	<ul style="list-style-type: none"> Loss or degradation of wetlands, riparian zones, or adjacent uplands to development Impacts to hydrology (e.g. draining, impoundment) Peat mining Intensive forestry operations in forested wetlands or riparian zones 	<ul style="list-style-type: none"> Develop Habitat and Outreach Actions once status and conservation needs are determined. 	<ul style="list-style-type: none"> Initiate surveys for new and historic occurrences, and determine distribution and status in ME. Initiate a statewide atlas and conservation assessment of Maine's entire snail fauna.
Pleistocene Catinella <i>Catinella exile</i>	<ul style="list-style-type: none"> In U.S., reported from ME, IL, IN, MI, MN, WI; and in Canada, from ON In ME, ID unconfirmed and 	<ul style="list-style-type: none"> Loss or degradation of wetlands, riparian zones, or adjacent uplands to development Impacts to hydrology (e.g. draining, 	<ul style="list-style-type: none"> Develop Habitat and Outreach Actions once status and conservation needs are determined. 	<ul style="list-style-type: none"> Initiate surveys for new occurrences, and determine distribution and status in ME. Initiate a statewide atlas and conservation assessment of Maine's entire snail fauna.

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
	taxonomy needs work; B. Coles recommends tracking as <i>Catinella sp. cf exile</i> <ul style="list-style-type: none"> • Population size, distribution, and status unknown • NatureServe G2 	impoundment) <ul style="list-style-type: none"> • Peat mining • Intensive forestry operations in forested wetlands or riparian zones 		
Six-whorl Vertigo <i>Vertigo morsei</i>	<ul style="list-style-type: none"> • In U.S., known from ME, MI, WI, MN, IL, IN, NJ, NY, OH; in Canada, from ON • In ME, documented at only 1 site (northern) • Population size, distribution, and status unknown • NatureServe G2G3 	<ul style="list-style-type: none"> • Loss or degradation of wetlands, riparian zones, or adjacent uplands to development • Impacts to hydrology (e.g. draining, ditching) • Peat mining • Intensive forestry operations in riparian zones 	<ul style="list-style-type: none"> • Develop Habitat and Outreach Actions once status and conservation needs are determined. 	<ul style="list-style-type: none"> • Initiate surveys for new occurrences, and determine distribution and status in ME. • Initiate a statewide atlas and conservation assessment of Maine's entire snail fauna.
Butterflies				
Clayton's Copper <i>Lycaena dorcus claytoni</i>	<ul style="list-style-type: none"> • Endemic to ME and New Brunswick • In ME, extant at 10-11 sites (most occurrences concentrated in 10 mi² area of eastern Penobscot Co.) • Restricted to uncommon calcareous habitats w/ sufficient host 	<ul style="list-style-type: none"> • Loss or degradation of wetlands, riparian zones, or adjacent uplands to development • Impacts to hydrology (e.g. draining, impoundment, drawdown) • Aerial pesticide spraying • Forest and wetland succession 	<ul style="list-style-type: none"> • Develop consistent regulatory habitat protection standards for projects subject to review under the Maine Endangered Species Act (MESA). • Coordinate ¼ mile no-spray zones with Bureau of Pesticide Control around all occurrences. • Distribute existing habitat management guidelines to towns, landtrusts, landowners, landmanagers, and other 	<ul style="list-style-type: none"> • See specific goals and objectives defined in "Clayton's Copper Management System (MDIFW 2002), including: • Continue surveys of suitable habitats for new occurrences. • Determine amount and quality of potential habitat. • Develop and implement a systematic protocol for monitoring population size

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
	plant <ul style="list-style-type: none"> • Abundant at only a few sites • Population size and trends unknown • State Endangered • Federal Special Concern • NatureServe G5T1 	<ul style="list-style-type: none"> • Intensive forestry operations in riparian zones or adjacent uplands (where host plant present) 	cooperators. <ul style="list-style-type: none"> • Develop cooperative habitat management agreements with landowners to facilitate host plant maintenance and riparian zone protection. • Cooperate with The Nature Conservancy, local landtrusts, municipalities, and other partners to conserve habitat at known occurrences. • Increase public awareness of threats and concerns using posters, fact sheets, press releases, and public talks. 	monitoring population size and trends. <ul style="list-style-type: none"> • Determine a tentative minimum viable population and establish population objectives. • Investigate life history, habitat requirements, limiting factors, population dynamics, and conservation needs. • Confirm subspecies status through DNA and morphological comparisons with nominate species. • Also, • Coordinate research objectives with state and regional partners (NABA, USFWS, UMO, New Brunswick, NatureServe). • Publish a statewide atlas and conservation assessment of Maine's entire butterfly fauna.
Hessel's Hairstreak <i>Callophrys hesseli</i>	See Forested Wetlands			
Crowberry Blue <i>Plebejus idas empetri</i>	<ul style="list-style-type: none"> • Endemic to ME and New Brunswick • In ME, documented at 12+ sites (Washington Co.) • Population size and trends unknown • State Special 	<ul style="list-style-type: none"> • Loss or degradation of wetlands, riparian zones, or adjacent uplands to development • Impacts to hydrology (e.g. draining, ditching) • Aerial pesticide spraying • Peat mining 	<ul style="list-style-type: none"> • Incorporate habitat management recommendations into project reviews. • Develop habitat management guidelines for distribution to towns, landtrusts, landowners, land managers, and other 	<ul style="list-style-type: none"> • Coordinate research objectives with state and regional partners (NABA, New Brunswick, NatureServe). • Continue surveys for new occurrences. • Develop and implement a systematic protocol for

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
	<ul style="list-style-type: none"> • Concern • NatureServe G5T3T4 	<ul style="list-style-type: none"> • Intensive forestry operations in riparian zones 	<ul style="list-style-type: none"> • cooperators. • Cooperate with The Nature Conservancy, local landtrusts, municipalities, and other partners to conserve habitat at known occurrences. • Increase public awareness of threats and concerns using posters, fact sheets, press releases, and public talks. 	<ul style="list-style-type: none"> • monitoring population size and trends. • Publish a statewide atlas and conservation assessment of Maine’s entire butterfly fauna.
<p>Frigga Fritillary <i>Boloria frigga</i></p>	<ul style="list-style-type: none"> • In ME, documented at 1 site (northern) • New state record is significant northeastern range extension • Population size, distribution, and status unknown • Proposed State Special Concern 	<ul style="list-style-type: none"> • Loss or degradation of wetlands, riparian zones, or adjacent uplands to development • Impacts to hydrology (e.g. draining, ditching) • Aerial pesticide spraying • Peat mining • Intensive forestry operations in riparian zones 	<ul style="list-style-type: none"> • Develop habitat management guidelines for distribution to towns, landtrusts, landowners, land managers, and other cooperators. • Consider listing under MESA if further populations not identified in the near future. • Cooperate with The Nature Conservancy, local landtrusts, municipalities, and other partners to conserve habitat at known occurrences. • Increase public awareness of threats and concerns using posters, fact sheets, press releases, and public talks. 	<ul style="list-style-type: none"> • Assess population size, viability, and habitat extent at known occurrence(s). • Coordinate research objectives with state and regional partners (NABA, NE states/provinces, USFWS, NatureServe). • Continue surveys for new occurrences, and determine distribution and status in ME. • Publish a statewide atlas and conservation assessment of Maine’s entire butterfly fauna.
<p>Moths</p>				
<p>Graceful Clearwing <i>Hemaris gracilis</i></p>	<p>See Dry Woodlands and Barrens</p>			
<p>Damselflies & Dragonflies</p>				

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
<p>Canada Whiteface <i>Leucorrhinia patricia</i></p>	<ul style="list-style-type: none"> • In U.S., known only from ME and AK (national records in 2003); known across Canada • In ME, documented at only 1 site (northwestern) • Population size and trends unknown • Proposed State Special Concern 	<ul style="list-style-type: none"> • Loss or degradation of wetlands, riparian zones, or adjacent uplands to development • Impacts to hydrology (e.g. draining, ditching) • Water pollution • Aerial pesticide spraying • Peat mining • Intensive forestry operations in riparian zones 	<ul style="list-style-type: none"> • Develop habitat management guidelines for distribution to towns, landtrusts, landowners, land managers, and other cooperators. • Consider listing under MESA if further populations not identified in the near future. • Cooperate with The Nature Conservancy, local landtrusts, municipalities, and other partners to conserve habitat at known occurrences. • Increase public awareness of threats and concerns using posters, fact sheets, press releases, and public talks. 	<ul style="list-style-type: none"> • Assess population size, viability, and habitat extent at known occurrence(s). • Coordinate research objectives with state and regional partners (DSA, NE states/provinces, NatureServe). • Continue surveys for new occurrences, and determine distribution and status in ME • Publish a statewide atlas and conservation assessment of Maine's entire Odonate fauna.
<p>Quebec Emerald <i>Somatochlora brevicincta</i></p>	<ul style="list-style-type: none"> • In U.S., known only from ME; in Canada, known from NB, BC, NS, NF, QC • In ME, documented at 6 sites (northern) • Population size and trends unknown • Proposed State Special Concern • NatureServe G3 • IUCN Vulnerable 	<ul style="list-style-type: none"> • Loss or degradation of wetlands, riparian zones, or adjacent uplands to development • Impacts to hydrology (e.g. draining, ditching) • Water pollution • Aerial pesticide spraying • Peat mining • Intensive forestry operations in riparian zones 	<ul style="list-style-type: none"> • Develop habitat management guidelines for distribution to towns, landtrusts, landowners, land managers, and other cooperators. • Cooperate with The Nature Conservancy, local landtrusts, municipalities, and other partners to conserve habitat at known occurrences. • Increase public awareness of threats and concerns using posters, fact sheets, press releases, and public talks. 	<ul style="list-style-type: none"> • Coordinate research objectives with state and regional partners (DSA, NE states/provinces, NatureServe). • Continue surveys for new occurrences, and determine distribution and status in ME. • Publish a statewide atlas and conservation assessment of Maine's entire Odonate fauna.
<p>Sedge Darner <i>Aeshna juncea</i></p>	<p>See Emergent Marsh and Wet Meadows</p>			

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat. Rivers and Streams (WR)

Associated Species:

SPECIES	PRIORITY	SPECIES	PRIORITY	SPECIES	PRIORITY
Snails		Stoneflies (cont.)		Mayflies (cont.)	
A Spire Snail <i>Amnicola decisus</i>	1	Spiny Salmonfly <i>Pteronarcys comstocki</i>	3	A Mayfly <i>Ameletus tertius</i>	3
New England Silt Snail <i>Floridobia winkleyi</i>	3	Caddisflies		A Mayfly <i>Baetisca berneri</i>	3
Freshwater Mussels		A Caddisfly <i>Hydroptila tomah</i>	2	A Mayfly <i>Baetisca carolina</i>	3
Tidewater Mucket <i>Leptodea ochracea</i>	1	A Caddisfly <i>Oxyethira rossi</i>	3	A Mayfly <i>Centroptillum semirufum</i>	3
Yellow Lampmussel <i>Lampsilis cariosa</i>	1	Mayflies		A Mayfly <i>Cloeon dipterum</i>	3
Brook Floater <i>Alasmidonta varicosa</i>	2	Roaring Brook Mayfly <i>Epeorus frisoni</i>	1	A Mayfly <i>Metretopus borealis</i>	3
Creeper <i>Strophitus undulatus</i>	3	Tomah Mayfly <i>Siphonisca aerodromia</i>	1	A Mayfly <i>Procloeon intermediale</i>	3
Triangle Floater <i>Alasmidonta undulata</i>	3	A Mayfly <i>Baetisca rubescens</i>	2	A Mayfly <i>Rhithrogena brunneotincta</i>	3
Stoneflies		A Mayfly <i>Nixe horrida</i>	2	A Mayfly <i>Rhithrogena uhari</i>	3
A Stonefly <i>Neoperla mainensis</i>	2	A Mayfly <i>Nixe rusticalis</i>	2	Damselflies & Dragonflies	
A Stonefly <i>Allocapnia illinoensis</i>	3	A Mayfly <i>Plauditus veteris</i>	2	Rapids Clubtail <i>Gomphus quadricolor</i>	1
A Stonefly <i>Alloperla ideii</i>	3	A Mayfly <i>Procloeon mendax</i>	2	Arrow Clubtail <i>Stylurus spiniceps</i>	2
A Stonefly <i>Alloperla voinae</i>	3	A Mayfly <i>Procloeon ozburni</i>	2	Arrowhead Spiketail <i>Cordulegaster obliqua</i>	2
A Stonefly <i>Ostocerca prolongata</i>	3	A Mayfly <i>Procloeon simplex</i>	2	Big Bluet <i>Enallagma durum</i>	2
Gaspe Sallfly <i>Utaperla gaspesiana</i>	3	A Mayfly <i>Ameletus browni</i>	3	Boreal Snaketail <i>Ophiogomphus colubrinus</i>	2

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

Rivers and Streams (WR) - continued

SPECIES	PRIORITY	SPECIES	PRIORITY	SPECIES	PRIORITY
Damselflies & Dragonflies (cont.)					
Cobra Clubtail <i>Gomphus vastus</i>	2	Tule Bluet <i>Enallagma carunculatum</i>	2	Extra-striped Snaketail <i>Ophiogomphus anomalus</i>	3
Dusky Dancer <i>Argia translata</i>	2	Broadtailed Shadowdragon <i>Neurocordulia michaeli</i>	3	Spine-crowned Clubtail <i>Gomphus abbreviatus</i>	3
Pygmy Snaketail <i>Ophiogomphus howei</i>	2	Brook Snaketail <i>Ophiogomphus aspersus</i>	3	Beetles	
Southern Pygmy Clubtail <i>Lanthus vernalis</i>	2	Common Sanddragon <i>Progomphus obscurus</i>	3	White Mountain Tiger Beetle <i>Cicindela ancocisconensis</i>	3

Species Specific Objectives:

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
SNAILS				
A Spire Snail <i>Amnicola decisus</i>	<ul style="list-style-type: none"> Known only from ME and PA ME occurrence data unknown Population size, distribution, and status unknown NatureServe G1 	<ul style="list-style-type: none"> Loss or degradation of riparian zones to development Watershed conversion ($\geq 6-10\%$) to impervious surfaces) Impacts to hydrology (e.g. impoundment, drawdown, channelization) Impacts to benthic substrate (e.g. sedimentation, loss of fine particles, disturbance) Water pollution Invasive exotic plants 	<ul style="list-style-type: none"> Develop Habitat and Outreach Actions once status and conservation needs are determined. 	<ul style="list-style-type: none"> Initiate surveys for new and historic occurrences, and determine distribution and status in ME. Initiate a statewide atlas and conservation assessment of Maine's entire snail fauna.

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
		(e.g. milfoil) • Intensive forestry operations in riparian zones		
Freshwater Mussels				
Tidewater Mucket <i>Leptodea ochracea</i>	See Lakes and Ponds			
Yellow Lampmussel <i>Lampsilis cariosa</i>	<ul style="list-style-type: none"> • Documented declines throughout range • In ME, found at ~65 of 1600+ survey sites statewide (10-12 metapopulations) • Restricted to Penobscot, St George, and lower Kennebec River watersheds • Often found in low numbers and densities • Population size and trends unknown • State Threatened • Federal Special Concern • NatureServe G3G4 • Northeast Regional Concern • AFS Threatened • IUCN Endangered 	<ul style="list-style-type: none"> • Loss or degradation of riparian zones to development • Watershed conversion (≥6-10%) to impervious surfaces) • Impacts to hydrology (e.g. impoundment, dam removal, drawdown, channelization) • Impacts to benthic substrate (e.g. sedimentation, loss of fine particles, disturbance, crushing) • Water pollution • Loss of access to fish host(s) • Introduction of exotic species (e.g. fish host competitors, zebra mussel) • Invasive exotic plants (e.g. milfoil) • Illegal collection? 	<ul style="list-style-type: none"> • Develop consistent regulatory habitat protection standards for projects subject to review under the Maine Endangered Species Act (MESA). • Distribute existing habitat management guidelines to towns, landtrusts, landowners, landmanagers, hydropower companies, and other cooperators. • Cooperate with The Nature Conservancy, local landtrusts, municipalities, watershed organizations, and other partners to conserve habitat at known occurrences. • Develop cooperative management agreements with dam owners and hydro companies to ensure compatible water level and impoundment management. • Support proposals to improve fish passage over dams currently having limited or no access. • Increase public awareness of 	<ul style="list-style-type: none"> • Coordinate research objectives with state and regional partners (UMO, NE states/provinces, USFWS, MDEP, PRRP, NatureServe). • Conduct surveys to identify priority river segment populations. • Develop and implement a systematic protocol for monitoring population size, demographics, and trends. • Continue fish host investigations. • Investigate life history, habitat requirements, limiting factors, and conservation needs. • Investigate significance of impoundments and dam removals to short and long-term conservation. • Develop effective mitigation and relocation protocols for projects impacting rare mussel populations. • Conduct long-term post-monitoring of impacted mussel populations to

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
Brook Floater <i>Alasmidonta varicosa</i>	<ul style="list-style-type: none"> Documented declines throughout range In ME, documented at ~85 (38+ rivers) of 1600+ survey sites statewide (Downeast, central, midcoast) Absent from northern and western ME; only 1 occurrence in southern ME (probable historic declines) Typically found in very low numbers and densities Population size, status, and trends unknown State Special Concern Federal Special Concern NatureServe G3 Northeast Regional Concern AFS Threatened 	<ul style="list-style-type: none"> Intensive forestry operations in riparian zones Loss or degradation of riparian zones to development Watershed conversion (≥6-10%) to impervious surfaces) Impacts to hydrology (e.g. impoundment, drawdown, channelization) Impacts to benthic substrate (e.g. sedimentation, loss of fine particles, disturbance, crushing) Water pollution Loss of access to fish host(s) Introduction of exotic species (e.g. fish host competitors, zebra mussel) Intensive forestry operations in riparian zones 	<ul style="list-style-type: none"> threats and concerns using posters, fact sheets, press releases, and public talks. Incorporate habitat management recommendations into project reviews. Develop habitat management guidelines for distribution to towns, landtrusts, landowners, land managers, hydropower companies, and other cooperators. Consider listing under MESA if population declines documented. Cooperate with The Nature Conservancy, local landtrusts, municipalities, watershed organizations, and other partners to conserve habitat at known occurrences. Support proposals to improve fish passage over dams currently having limited or no access. Increase public awareness of threats and concerns using posters, fact sheets, press releases, and public talks. 	<ul style="list-style-type: none"> determine efficacy of mitigation and relocation techniques. Coordinate research objectives with state and regional partners (UMO, NE states/provinces, USFWS, PRRP, MDEP, NatureServe). Conduct surveys to identify priority river segment populations. Develop and implement a systematic protocol for monitoring population size, demographics, and trends. Investigate life history, habitat requirements, limiting factors, and conservation needs. Develop effective mitigation and relocation protocols for projects impacting rare mussel populations. Conduct long-term post-monitoring of impacted mussel populations to determine efficacy of mitigation and relocation techniques.
Stoneflies				
A Stonefly <i>Neoperla mainensis</i>	<ul style="list-style-type: none"> In U.S., reported only from ME, OH, and IL (extirpated); in 	<ul style="list-style-type: none"> Loss or degradation of riparian zones to development 	<ul style="list-style-type: none"> Develop Habitat and Outreach Actions once status and conservation needs are 	<ul style="list-style-type: none"> Initiate surveys for new occurrences, and determine distribution and status in ME.

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
	<ul style="list-style-type: none"> • Canada, from ON • ME is type locality (1944) • Population size, distribution, and status unknown • NatureServe G2G3 	<ul style="list-style-type: none"> • Watershed conversion ($\geq 6-10\%$) to impervious surfaces) • Impacts to hydrology (e.g. impoundment, drawdown, channelization) • Impacts to benthic substrate (e.g. sedimentation, disturbance) • Water pollution • Aerial pesticide spraying • Intensive forestry operations in riparian zones 	<p>determined.</p>	<ul style="list-style-type: none"> • Initiate a statewide atlas and conservation assessment of Maine's entire stonefly fauna.
Caddisflies				
<p>A Caddisfly <i>Hydroptila tomah</i></p>	<ul style="list-style-type: none"> • New species known only from type locality in Tomah Stream (Washington Co.) • Population size, distribution, and status unknown • NatureServe G1G3 	<ul style="list-style-type: none"> • Loss or degradation of wetlands, flood plains, or riparian zones to development • Watershed conversion ($\geq 6-10\%$) to impervious surfaces) • Impacts to hydrology (e.g. impoundment, drawdown) • Impacts to benthic substrate (e.g. sedimentation, disturbance) 	<ul style="list-style-type: none"> • Develop Habitat and Outreach Actions once status and conservation needs are determined. 	<ul style="list-style-type: none"> • Initiate surveys for new occurrences, and determine distribution and status in ME. • Initiate a statewide atlas and conservation assessment of Maine's entire caddisfly fauna.

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
		<ul style="list-style-type: none"> • Water pollution • Aerial pesticide spraying • Invasive exotic plants (e.g. purple loosestrife) • Intensive forestry operations in riparian zones 		
Mayflies				
Roaring Brook Mayfly <i>Epeorus frisoni</i>	<ul style="list-style-type: none"> • Known only from ME and VT (1 site) • In ME, documented only from 2-3 streams on Mt. Katahdin • Population size, distribution, and status unknown • State Endangered • NatureServe G1 	<ul style="list-style-type: none"> • Global warming • Water quality degradation from airborne pollutants • Threats to undiscovered populations outside Baxter State Park could include: habitat degradation from pollution, intensive forestry practices and development in riparian zones; watershed conversion to impervious surfaces; impacts to hydrology and substrate; aerial pesticide spraying; and introduction of fish to fishless streams (?) 	<ul style="list-style-type: none"> • Cooperate with Baxter State Park (BSP) to conserve all occurrences. • Increase public awareness of threats and concerns using posters, fact sheets, press releases, and public talks. • Expand Habitat and Outreach Actions if populations discovered outside Baxter State Park. 	<ul style="list-style-type: none"> • Assess population size, viability, and habitat extent at known occurrence(s). • Coordinate research objectives with state and regional partners (BSP, VT, MDEP, NatureServe). • Continue surveys of suitable habitats for new occurrences. • Develop and implement a systematic protocol for monitoring population size and trends. • Investigate life history, habitat requirements, limiting factors, global distribution, and conservation needs. • Initiate a statewide atlas and conservation assessment of Maine's entire mayfly fauna. •

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
<p>Tomah Mayfly <i>Siphonisca aerodromia</i></p>	<ul style="list-style-type: none"> • Extant populations known only from ME and NY (1-2 sites) • In ME, documented at 14-16 sites • Occurrences widely scattered across northern 2/3 of state; absent from southern and midcoast regions • Found in abundance at only a few sites • Population size and trends unknown • State Threatened • Federal Special Concern • NatureServe G2 	<ul style="list-style-type: none"> • Loss or degradation of wetlands, flood plains, or riparian zones to development • Watershed conversion ($\geq 6-10\%$ to impervious surfaces) • Impacts to hydrology (e.g. impoundment, drawdown) • Impacts to benthic substrate (e.g. sedimentation, disturbance) • Water pollution • Aerial pesticide spraying • Introduction of non-native fish predators • Invasive aquatic plants (e.g. purple loosestrife) • Intensive forestry operations in riparian zones 	<ul style="list-style-type: none"> • Develop consistent regulatory habitat protection standards for projects subject to review under the Maine Endangered Species Act (MESA). • Consider implementation of no-spray zones around all occurrences. • Distribute existing habitat management guidelines to towns, landtrusts, landowners, landmanagers, hydropower companies, and other cooperators. • Cooperate with The Nature Conservancy, local landtrusts, municipalities, watershed organizations, and other partners to conserve habitat at known occurrences. • Increase public awareness of threats and concerns using posters, fact sheets, press releases, and public talks. 	<ul style="list-style-type: none"> • See specific goals and objectives defined in "Tomah Mayfly Management System (MDIFW 2004), including: • Continue surveys of suitable habitats for new occurrences. • Develop and implement a systematic protocol for monitoring population size and trends. • Determine the amount and quality of suitable habitat at priority sites. • Investigate life history, habitat requirements, limiting factors, population dynamics, global distribution, and conservation needs. • Also, • Coordinate research objectives with state and regional partners (UMO, USFWS, MDEP, NY, NatureServe). • Initiate a statewide atlas and conservation assessment of Maine's entire mayfly fauna.
<p>A Mayfly <i>Baetisca rubescens</i></p>	<ul style="list-style-type: none"> • In U.S., known from ME, NH, VA, VT; in Canada, from LB, QC • In ME, documented from 3+ rivers (northwestern) • Population size, 	<ul style="list-style-type: none"> • Loss or degradation of riparian zones to development • Watershed conversion ($\geq 6-10\%$ to impervious surfaces) 	<ul style="list-style-type: none"> • Develop Habitat and Outreach Actions once status and conservation needs are determined. 	<ul style="list-style-type: none"> • Initiate surveys for new and historic occurrences, and determine distribution and status in ME. • Initiate a statewide atlas and conservation assessment of Maine's entire mayfly fauna.

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
	distribution, and status unknown <ul style="list-style-type: none"> • NatureServe G2 	<ul style="list-style-type: none"> • Impacts to hydrology (e.g. impoundment, drawdown, channelization) • Impacts to benthic substrate (e.g. sedimentation, disturbance) • Water pollution • Aerial pesticide spraying • Intensive forestry operations in riparian zones 		
A Mayfly <i>Nixe horrida</i>	<ul style="list-style-type: none"> • In U.S., known only from ME; in Canada, only from ON • In ME, documented from 2+ rivers (northern, eastern) • Population size, distribution, and status unknown • NatureServe G2 	<ul style="list-style-type: none"> • Loss or degradation of riparian zones to development • Watershed conversion ($\geq 6-10\%$) to impervious surfaces) • Impacts to hydrology (e.g. impoundment, drawdown, channelization) • Impacts to benthic substrate (e.g. sedimentation, disturbance) • Water pollution • Aerial pesticide spraying • Intensive forestry operations in riparian zones 	<ul style="list-style-type: none"> • Develop Habitat and Outreach Actions once status and conservation needs are determined. 	<ul style="list-style-type: none"> • Initiate surveys for new and historic occurrences, and determine distribution and status in ME. • Initiate a statewide atlas and conservation assessment of Maine's entire mayfly fauna.

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
<p>A Mayfly <i>Nixe rusticalis</i></p>	<ul style="list-style-type: none"> • In U.S., known from ME, IA, NY, OH; in Canada, from QC, SK • In ME, documented at only 1 site on Mt. Katahdin (state record in 2003) • Population size, distribution, and status unknown • NatureServe G2 	<ul style="list-style-type: none"> • Loss or degradation of riparian zones to development • Watershed conversion ($\geq 6-10\%$) to impervious surfaces) • Impacts to hydrology (e.g. impoundment, drawdown, channelization) • Impacts to benthic substrate (e.g. sedimentation, disturbance) • Water pollution • Aerial pesticide spraying • Intensive forestry operations in riparian zones 	<ul style="list-style-type: none"> • Develop Habitat and Outreach Actions once status and conservation needs are determined. 	<ul style="list-style-type: none"> • Initiate surveys for new occurrences, and determine distribution and status in ME. • Initiate a statewide atlas and conservation assessment of Maine's entire mayfly fauna.
<p>A Mayfly <i>Plauditus veteris</i></p>	<ul style="list-style-type: none"> • Known from ME, IL, OH, TN • In ME, documented only from 1+ river (western) • Population size, distribution, and status unknown • NatureServe G2 	<ul style="list-style-type: none"> • Loss or degradation of riparian zones to development • Watershed conversion ($\geq 6-10\%$) to impervious surfaces) • Impacts to hydrology (e.g. impoundment, drawdown, channelization) • Impacts to benthic substrate (e.g. sedimentation, 	<ul style="list-style-type: none"> • Develop Habitat and Outreach Actions once status and conservation needs are determined. 	<ul style="list-style-type: none"> • Initiate surveys for new and historic occurrences, and determine distribution and status in ME. • Initiate a statewide atlas and conservation assessment of Maine's entire mayfly fauna.

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
		disturbance) • Water pollution • Aerial pesticide spraying • Intensive forestry operations in riparian zones		
A Mayfly <i>Procloeon mendax</i>	<ul style="list-style-type: none"> • In U.S., known from ME, IL, NY, MI; in Canada, from ON • In ME, documented from only 1+ river (central coast) • Population size, distribution, and status unknown • NatureServe G2 	<ul style="list-style-type: none"> • Loss or degradation of riparian zones to development • Watershed conversion ($\geq 6-10\%$) to impervious surfaces) • Impacts to hydrology (e.g. impoundment, drawdown, channelization) • Impacts to substrate (e.g. sedimentation, loss of fine sediments, disturbance) • Water pollution • Aerial pesticide spraying • Intensive forestry operations in riparian zones 	<ul style="list-style-type: none"> • Develop Habitat and Outreach Actions once status and conservation needs are determined. 	<ul style="list-style-type: none"> • Initiate surveys for new occurrences, and determine distribution and status in ME. • Initiate a statewide atlas and conservation assessment of Maine's entire mayfly fauna.
A Mayfly <i>Procloeon ozburni</i>	<ul style="list-style-type: none"> • In U.S., known from ME, NY; in Canada, from ON, QC • In ME, documented from 2+ rivers (north 	<ul style="list-style-type: none"> • Loss or degradation of riparian zones to development • Watershed conversion ($\geq 6-10\%$) 	<ul style="list-style-type: none"> • Develop Habitat and Outreach Actions once status and conservation needs are determined. 	<ul style="list-style-type: none"> • Initiate surveys for new occurrences, and determine distribution and status in ME. • Initiate a statewide atlas and conservation assessment of

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
	central, eastern) <ul style="list-style-type: none"> • Population size, distribution, and status unknown • NatureServe G2 	to impervious surfaces) <ul style="list-style-type: none"> • Impacts to hydrology (e.g. impoundment, drawdown, channelization) • Impacts to benthic substrate (e.g. sedimentation, disturbance) • Water pollution • Aerial pesticide spraying • Intensive forestry operations in riparian zones 		Maine's entire mayfly fauna.
A Mayfly <i>Proclleon simplex</i>	<ul style="list-style-type: none"> • In U.S., known from ME, IL, IN, MI; in Canada, from ON, QC • In ME, documented from 4+ rivers (eastern, central, coastal) • Population size, distribution, and status unknown • NatureServe G2 	<ul style="list-style-type: none"> • Loss or degradation of riparian zones to development • Watershed conversion ($\geq 6-10\%$) to impervious surfaces) • Impacts to hydrology (e.g. impoundment, drawdown, channelization) • Impacts to benthic substrate (e.g. sedimentation, disturbance) • Water pollution • Aerial pesticide spraying • Intensive forestry 	<ul style="list-style-type: none"> • Develop Habitat and Outreach Actions once status and conservation needs are determined. 	<ul style="list-style-type: none"> • Initiate surveys for new and historic occurrences, and determine distribution and status in ME. • Initiate a statewide atlas and conservation assessment of Maine's entire mayfly fauna.

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
		operations in riparian zones		
Damselflies & Dragonflies				
Rapids Clubtail <i>Gomphus quadricolor</i>	<ul style="list-style-type: none"> • In ME, documented at only 1 site (southern) • Population size, exact distribution, and trends unknown • Proposed State Threatened • NatureServe G3G4 	<ul style="list-style-type: none"> • Loss or degradation of riparian zones to development • Watershed conversion ($\geq 6-10\%$) to impervious surfaces) • Impacts to hydrology (e.g. impoundment, drawdown, channelization) • Impacts to benthic substrate (e.g. sedimentation, loss of fine sediments, disturbance) • Water pollution • Aerial pesticide spraying • Motorboat wave-wash during larval emergence • Intensive forestry operations in riparian zones 	<ul style="list-style-type: none"> • Develop habitat management guidelines for distribution to towns, landtrusts, landowners, land managers, hydropower companies, and other cooperators. • Cooperate with The Nature Conservancy, local landtrusts, municipalities, watershed organizations, and other partners to conserve habitat at known occurrences. • Increase public awareness of threats and concerns using posters, fact sheets, press releases, and public talks. 	<ul style="list-style-type: none"> • Assess population size, viability, and habitat extent at known occurrence(s). • Coordinate research objectives with state and regional partners (DSA, MDEP, NE states/provinces, NatureServe). • Continue surveys for new occurrences, and determine distribution and status in ME. • Develop and implement a systematic protocol for monitoring population size and trends. • Publish a statewide atlas and conservation assessment of Maine's entire Odonate fauna.
Arrow Clubtail <i>Stylurus spiniceps</i>	<ul style="list-style-type: none"> • In ME, documented only from Sandy and Little Androscoggin Rivers (central) • Population size, exact distribution, and 	<ul style="list-style-type: none"> • Loss or degradation of riparian zones to development • Watershed conversion ($\geq 6-10\%$) to impervious 	<ul style="list-style-type: none"> • Develop habitat management guidelines for distribution to towns, landtrusts, landowners, land managers, hydropower companies, and other cooperators. 	<ul style="list-style-type: none"> • Assess population size, viability, and habitat extent at known occurrence(s). • Coordinate research objectives with state and regional partners (DSA,

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
	<ul style="list-style-type: none"> • trends unknown • Proposed State Threatened 	<ul style="list-style-type: none"> to impervious surfaces) • Impacts to hydrology (e.g. impoundment, drawdown, channelization) • Impacts to benthic substrate (e.g. sedimentation, loss of fine sediments, disturbance) • Motorboat wave-wash during larval emergence • Water pollution • Aerial pesticide spraying • Intensive forestry operations in riparian zones 	<ul style="list-style-type: none"> • Cooperate with The Nature Conservancy, local landtrusts, municipalities, watershed organizations, and other partners to conserve habitat at known occurrences. • Increase public awareness of threats and concerns using posters, fact sheets, press releases, and public talks. 	<ul style="list-style-type: none"> MDEP, NE states/provinces, NatureServe). • Continue surveys for new occurrences, and determine distribution and status in ME. • Develop and implement a systematic protocol for monitoring population size and trends. • Publish a statewide atlas and conservation assessment of Maine's entire Odonate fauna.
<p>Arrowhead Spiketail <i>Cordulegaster obliqua</i></p>	<ul style="list-style-type: none"> • In ME, only 2 modern records (central) • Population size, exact distribution, and trends unknown • Proposed State Special Concern 	<ul style="list-style-type: none"> • Loss or degradation of riparian zones to development • Watershed conversion (≥6-10%) to impervious surfaces) • Impacts to hydrology (e.g. impoundment, drawdown, channelization) • Occupies headwater stream habitats not adequately protected by existing MDEP 	<ul style="list-style-type: none"> • Develop habitat management guidelines for distribution to towns, landtrusts, landowners, land managers, hydropower companies, and other cooperators. • Consider listing under MESA if further populations not identified in the near future. • Cooperate with The Nature Conservancy, local landtrusts, municipalities, watershed organizations, and other partners to conserve habitat at known occurrences. 	<ul style="list-style-type: none"> • Assess population size, viability, and habitat extent at known occurrence(s). • Coordinate research objectives with state and regional partners (DSA, MDEP, NE states/provinces, NatureServe). • Continue surveys for new and historic occurrences, and determine distribution and status in ME. • Publish a statewide atlas and conservation assessment of Maine's entire Odonate fauna.

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
		regulations <ul style="list-style-type: none"> • Impacts to benthic substrate (e.g. sedimentation, loss of fine sediments, disturbance) • Water pollution • Aerial pesticide spraying • Intensive forestry operations in riparian zones 	<ul style="list-style-type: none"> • Increase public awareness of threats and concerns using posters, fact sheets, press releases, and public talks. 	
Big Bluet <i>Enallagma durum</i>	See Lakes and Ponds			
Boreal Snaketail <i>Ophiogomphus colubrinus</i>	<ul style="list-style-type: none"> • In ME, modern records from 2 rivers (southern) • Population size, exact distribution, and trends unknown • Proposed State Special Concern 	<ul style="list-style-type: none"> • Loss or degradation of riparian zones to development • Watershed conversion ($\geq 6-10\%$) to impervious surfaces) • Impacts to hydrology (e.g. impoundment, drawdown, channelization) • Impacts to benthic substrate (e.g. sedimentation, loss of fine sediments, disturbance) • Motorboat wave-wash during larval emergence • Water pollution • Aerial pesticide 	<ul style="list-style-type: none"> • Develop habitat management guidelines for distribution to towns, landtrusts, landowners, land managers, hydropower companies, and other cooperators. • Cooperate with The Nature Conservancy, local landtrusts, municipalities, watershed organizations, and other partners to conserve habitat at known occurrences. • Increase public awareness of threats and concerns using posters, fact sheets, press releases, and public talks. • Consider listing under MESA if further populations not identified in the near future. 	<ul style="list-style-type: none"> • Assess population size, viability, and habitat extent at known occurrence(s). • Coordinate research objectives with state and regional partners (DSA, MDEP, NE states/provinces, NatureServe). • Continue surveys for new and historic occurrences, and determine distribution and status in ME. • Publish a statewide atlas and conservation assessment of Maine's entire Odonate fauna.

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
		spraying <ul style="list-style-type: none"> Intensive forestry operations in riparian zones 		
Cobra Clubtail <i>Gomphus vastus</i>	<ul style="list-style-type: none"> In ME, documented only from Saco and Penobscot Rivers (southern, central) Population size, exact distribution, and trends unknown Proposed State Threatened 	<ul style="list-style-type: none"> Loss or degradation of riparian zones to development Watershed conversion ($\geq 6-10\%$) to impervious surfaces) Impacts to hydrology (e.g. impoundment, drawdown, channelization) Motorboat wave-wash during larval emergence Impacts to benthic substrate (e.g. sedimentation, loss of fine sediments, disturbance) Water pollution Aerial pesticide spraying Intensive forestry operations in riparian zones 	<ul style="list-style-type: none"> Develop habitat management guidelines for distribution to towns, landtrusts, landowners, land managers, hydropower companies, and other cooperators. Cooperate with The Nature Conservancy, local landtrusts, municipalities, watershed organizations, and other partners to conserve habitat at known occurrences. Increase public awareness of threats and concerns using posters, fact sheets, press releases, and public talks. 	<ul style="list-style-type: none"> Assess population size, viability, and habitat extent at known occurrence(s). Coordinate research objectives with state and regional partners (DSA, MDEP, NE states/provinces, NatureServe). Continue surveys for new occurrences, and determine distribution and status in ME. Develop and implement a systematic protocol for monitoring population size and trends. Publish a statewide atlas and conservation assessment of Maine's entire Odonate fauna.
Dusky Dancer <i>Argia translata</i>	See Lakes and Ponds			
Pygmy Snaketail <i>Ophiogomphus howei</i>	<ul style="list-style-type: none"> Rare throughout a moderately large range 	<ul style="list-style-type: none"> Loss or degradation of riparian zones to development 	<ul style="list-style-type: none"> Develop consistent regulatory habitat protection standards for projects subject to review under the Maine Endangered 	<ul style="list-style-type: none"> Coordinate research objectives with state and regional partners (DSA, USFWS, MDEP, NE

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
	<ul style="list-style-type: none"> • In ME, documented from 8 rivers (statewide) • Population size and trends unknown • State Threatened (Proposed State Special Concern) • Federal Special Concern • NatureServe G3 • IUCN Vulnerable 	<ul style="list-style-type: none"> • Watershed conversion ($\geq 6-10\%$) to impervious surfaces) • Impacts to hydrology (e.g. impoundment, drawdown, channelization) • Impacts to benthic substrate (e.g. sedimentation, loss of fine sediments, disturbance) • Motorboat wave-wash during larval emergence • Water pollution • Aerial pesticide spraying • Intensive forestry operations in riparian zones 	<p>Species Act (MESA).</p> <ul style="list-style-type: none"> • Consider implementation of no-spray zones around all occurrences. • Distribute existing habitat management guidelines to towns, landtrusts, landowners, landmanagers, hydropower companies, and other cooperators. • Cooperate with The Nature Conservancy, local landtrusts, municipalities, watershed organizations, and other partners to conserve habitat at known occurrences. • Increase public awareness of threats and concerns using posters, fact sheets, press releases, and public talks. 	<p>states/provinces, NatureServe).</p> <ul style="list-style-type: none"> • Continue surveys for new occurrences. • Conduct surveys to identify priority river segment populations. • Develop and implement a systematic protocol for monitoring population size and trends. • Investigate life history, habitat requirements, limiting factors, and conservation needs. • Publish a statewide atlas and conservation assessment of Maine's entire Odonate fauna.
<p>Southern Pygmy Clubtail <i>Lanthus vernalis</i></p>	<ul style="list-style-type: none"> • In ME, documented from 7 rivers (statewide) • Population size and trends unknown • Proposed State Special Concern 	<ul style="list-style-type: none"> • Loss or degradation of riparian zones to development • Watershed conversion ($\geq 6-10\%$) to impervious surfaces) • Impacts to hydrology (e.g. impoundment, drawdown, channelization) • Occupies headwater stream habitats not 	<ul style="list-style-type: none"> • Develop habitat management guidelines for distribution to towns, landtrusts, landowners, land managers, hydropower companies, and other cooperators. • Cooperate with The Nature Conservancy, local landtrusts, municipalities, watershed organizations, and other partners to conserve habitat at known occurrences. • Increase public awareness of 	<ul style="list-style-type: none"> • Coordinate research objectives with state and regional partners (DSA, MDEP, NE states/provinces, NatureServe). • Continue surveys for new occurrences, and determine distribution and status in ME. • Publish a statewide atlas and conservation assessment of Maine's entire Odonate fauna.

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
		adequately protected by existing MDEP regulations <ul style="list-style-type: none"> • Impacts to benthic substrate (e.g. sedimentation, loss of fine sediments, disturbance) • Water pollution • Aerial pesticide spraying • Intensive forestry operations in riparian zones 	threats and concerns using posters, fact sheets, press releases, and public talks.	
Tule Bluet <i>Enallagma carunculatum</i>	See Lakes and Ponds			

Unknown Wetland Habitat (W?)

Associated Species:

SPECIES	PRIORITY
Caddisflies	
A Caddisfly <i>Hydroptila tomah</i>	2
A Caddisfly <i>Ochrotrichia denningi</i>	3
A Caddisfly <i>Oxyethira rossi</i>	3
Moths	
A Noctuid Moth <i>Chortodes defecta</i>	3

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
Caddisflies				
A Caddisfly <i>Hydroptila tomah</i>	See Rivers and Streams			

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.
UPLAND

Associated Species:

SPECIES	PRIORITY	SPECIES	PRIORITY	SPECIES	PRIORITY
Snails		Butterflies (cont.)		Moths	
Pleistocene Catinella <i>Catinella exile</i>	2	Purple Lesser Fritillary <i>Coloria chariclea grandis</i>	2	Twilight Moth <i>Lycia rachelae</i>	1
Lamellate Supercoil <i>Paravitrea lamellidens</i>	2	Sleepy Duskywing <i>Erynnis brizo</i>	2	A Moth <i>Cucullia speyeri</i>	2
Mystery Vertigo <i>Vertigo paradoxa</i>	2	Spicebush Swallowtail <i>Papilio troilus</i>	2	A Moth <i>Nepytia pellucidaria</i>	2
Delicate Vertigo <i>Vertigo bollesiana</i>	3	Bog Elfin <i>Callophrys lanoraieensis</i>	3	A Noctuid Moth <i>Chaetagnaea cerata</i>	2
Eastern Flat-whorl <i>Planogyra asteriscus</i>	3	Delaware Skipper <i>Anatrytone logan</i>	3	Barrens Itame <i>Itame sp. 1</i>	2
Butterflies		Frosted Elfin <i>Callophrys irus</i>	3	Graceful Clearwing <i>Hemaris gracilis</i>	2
Clayton's Copper <i>Lycaena dorcas claytoni</i>	1	Karner Blue <i>Plebejus melissa samuelis</i>	3	Pine Barrens Zale <i>Zale sp. 1 nr. lunifera</i>	2
Katahdin Arctic <i>Oeneis polixenes katahdin</i>	1	Little Glassywing <i>Pompeius verna</i>	3	Pine Barrens Zanclognatha <i>Zanclognatha martha</i>	2
Cobweb Skipper <i>Hesperia metea</i>	2	Persius Duskywing <i>Erynnis p. persius</i>	3	Pine Devil <i>Citheronia sepulcralis</i>	2
Coral Hairstreak <i>Satyrium titus</i>	2	Regal Fritillary <i>Speyeria idalia</i>	3	Pine Pinion <i>Lithophane l. lepida</i>	2
Early Hairstreak <i>Eroria laeta</i>	2	Satyr Comma <i>Polygonia satyrus</i>	3	Pink Sallow <i>Psectraglaea carnosus</i>	2
Edwards' Hairstreak <i>Satyrium edwardsii</i>	2	Tawny Crescent <i>Physiodes batesii</i>	3	The Buckmoth <i>Hemileuca m. maia</i>	2
Greenish Blue <i>Plebejus saepiolus amica</i>	2	Western Pine Elfin <i>Callophrys eryphon</i>	3	A Moth <i>Lepipolys perscripta</i>	3
Juniper Hairstreak <i>Callophrys gryneus</i>	2	Western Tailed Blue <i>Cupido amyntula maritima</i>	3	A Moth <i>Syngrapha altera</i>	3
Leonard's Skipper <i>Hesperia leonardus</i>	2			A Moth <i>Syngrapha cryptica</i>	3

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.
UPLANDS – (continued)

SPECIES	PRIORITY	SPECIES	PRIORITY	SPECIES	PRIORITY
Moths (cont.)		Moths (cont.)		Moths (cont.)	
A Moth <i>Syngrapha selecta</i>	3	Broad Sallow <i>Xylotype capax</i>	3	Similar Underwing <i>Catocala similis</i>	3
A Notodontid Moth <i>Furcula modesta</i>	3	Chestnut Clearwing <i>Synanthedon castaneae</i>	3	Southern Pine Sphinx <i>Lapara coniferarum</i>	3
A Seed Borer <i>Rhodoecia aurantiago</i>	3	Culvers Root Borer <i>Papaipema sciata</i>	3	Thaxter's Pinion <i>Lithophane thaxteri</i>	3
Acadian Swordgrass Moth <i>Xylena thoracica</i>	3	Huckleberry Sphinx <i>Paonias astylus</i>	3	Trembling Sallow <i>Chaetagnaea tremula</i>	3
Annointed Sallow Moth <i>Pyreffera ceromatica</i>	3	Oblique Zale <i>Zale obliqua</i>	3	Beetles	
Barrens Metarranthis Moth <i>Metarranthis apicaria</i>	3	Red-winged Sallow <i>Xystocephalus rufago</i>	3	American Burying Beetle <i>Nicrophorus americanus</i>	2

Upland Species Threats:

- Habitat loss or degradation from development
- Natural community succession
- Incompatible fire management (e.g. fire suppression, seasonality of burns, wildfire)
- Aerial pesticide spraying
- Overcollection/illegal collection
- Commercial resource extraction (e.g. peat mining, sand and gravel mining)
- Global warming
- Severe winter conditions
- Competition from vertebrate scavengers
- Introduction of exotic species (e.g. insects for biocontrol)
- Impacts to hydrology (e.g. impoundment, draining, ditching)
- Intensive agricultural practices
- Trampling of alpine vegetation by hikers
- Bug zappers
- Intensive forestry operations (e.g. effecting host plant, duff layer, or community structure)

Goal: Identify, protect and enhance populations of priority species in upland habitats.

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

Upland Species Objectives:

1. Identify and protect high priority habitats.

Strategy	Task
Identify high-value upland habitats	<ul style="list-style-type: none"> • Continue statewide surveys to identify upland habitats hosting rare invertebrates. • Combine field survey and research to identify specific characteristics of upland habitats important to priority invertebrates. • Using guidance from the Natural Heritage Program (NatureServe), refine element occurrence documentation and map representation (i.e. using taxa-specific polygons versus generic buffers) for priority invertebrates.
Protect high-value upland habitats	<ul style="list-style-type: none"> • Develop regulatory habitat protection provisions for projects subject to review under the Maine Endangered Species Act (MESA) and other regulations protecting Maine’s wildlife (e.g. Natural Resources Protection Act, Site Location Law). • Develop nonregulatory habitat management guidelines for priority habitats (e.g. pitch pine - scrub oak woodlands) and/or species for distribution to landowners, towns, landtrusts, and others. • Cooperate with The Nature Conservancy, local landtrusts, municipalities and other partners to conserve upland habitats for priority invertebrates using fee acquisition, purchase of development rights, and improved comprehensive planning. • Implement existing and new public outreach efforts to gain support for priority invertebrates and their habitats.
Restore high-value upland habitats	<ul style="list-style-type: none"> • Identify threats to upland habitats offering potential habitat to priority invertebrates and consider restorative measures to improve habitat integrity.

2. Monitor and enhance populations of high priority species.

Strategy	Task
Monitor priority species to determine population size, status and trends.	<ul style="list-style-type: none"> • Establish baseline locations for monitoring select rare invertebrate populations using taxa-appropriate survey methods. • Resurvey historical occurrences to reconfirm rare invertebrate presence and status. • Coordinate specific population monitoring objectives and methods with regional partners (e.g. USFWS, NE state/provincial wildlife agencies, North American Butterfly Association (NABA), Dragonfly Society of the Americas (DSA), NatureServe).
Enhance populations of priority species	<ul style="list-style-type: none"> • Consider site-specific intensive population management and recovery measures for rare invertebrate species threatened by imminent extirpation.

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

Deciduous and Mixed Forests (UD)

Associated Species:

SPECIES	PRIORITY	SPECIES	PRIORITY	SPECIES	PRIORITY
Snails		Butterflies (cont.)		Moths (cont.)	
Lamellate Supercoil <i>Paravitrea lamellidens</i>	2	Satyr Comma <i>Polygonia satyrus</i>	3	Culvers Root Borer <i>Papaipema sciata</i>	3
Mystery Vertigo <i>Vertigo paradoxa</i>	2	Western Pine Elf <i>Callophrys eryphon</i>	3	Beetles	
Delicate Vertigo <i>Vertigo bollesiana</i>	3	Moths		American Burying Beetle <i>Nicrophorus americanus</i>	2
Eastern Flat-whorl <i>Planogyra asteriscus</i>	3	A Notodontid Moth <i>Furcula modesta</i>	3		
Butterflies		A Seed Borer <i>Rhodoecia aurantiago</i>	3		
Early Hairstreak <i>Erora laeta</i>	2	Anointed Sallow Moth <i>Pyreffera ceromatica</i>	3		
Spicebush Swallowtail <i>Papilio troilus</i>	2	Chestnut Clearwing <i>Synanthedon castaneae</i>	3		

Species Specific Objectives:

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
Snails				
Lamellate Supercoil <i>Paravitrea lamellidens</i>	<ul style="list-style-type: none"> Known from ME, NC, TN Population size, distribution, and status unknown NatureServe G2 	<ul style="list-style-type: none"> Loss or degradation of habitat to development Intensive forestry operations 	<ul style="list-style-type: none"> Develop Habitat and Outreach Actions once status and conservation needs are determined. 	<ul style="list-style-type: none"> Initiate surveys for new and historic occurrences, and determine distribution and status in ME. Initiate a statewide atlas and conservation assessment of Maine's entire snail fauna.
Mystery Vertigo <i>Vertigo paradoxa</i>	<ul style="list-style-type: none"> In U.S., known from ME, MI, MN, WI, SD, WY; in Canada, 	<ul style="list-style-type: none"> Loss or degradation of wetlands, riparian zones, or adjacent 	<ul style="list-style-type: none"> Develop Habitat and Outreach Actions once status and conservation needs are 	<ul style="list-style-type: none"> Initiate surveys for new and historic occurrences, and determine distribution and

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
	<p>known from NF, QC, AB, ON</p> <ul style="list-style-type: none"> • Considered rare in U.S. • In ME, 2 modern records from Caribou and Crystal Bog (northern/northeastern) • Population size, distribution, and status unknown • State Special Concern • NatureServe G3Q 	<p>uplands to development</p> <ul style="list-style-type: none"> • Impacts to hydrology (e.g. draining, impoundment) • Impacts to benthic substrate (e.g. sedimentation, disturbance) • Water pollution • Intensive forestry operations in forested wetlands or riparian zones 	<p>determined.</p>	<p>status in ME.</p> <ul style="list-style-type: none"> • Initiate a statewide atlas and conservation assessment of Maine's entire snail fauna.
Butterflies				
<p>Early Hairstreak <i>Erora laeta</i></p>	<ul style="list-style-type: none"> • In ME, no modern records • Population size, distribution, and status unknown • Proposed State Special Concern • NatureServe G3G4 	<ul style="list-style-type: none"> • Loss or degradation of habitat to development • Aerial pesticide spraying • Intensive forestry operations (habitat is mature, mast-producing beech stands) 	<ul style="list-style-type: none"> • Develop Habitat and Outreach Actions if reconfirmed extant. 	<ul style="list-style-type: none"> • Initiate surveys for new and historic occurrences, and determine distribution and status in ME. • Publish a statewide atlas and conservation assessment of Maine's entire butterfly fauna.
<p>Spicebush Swallowtail <i>Papilio troilus</i></p>	<ul style="list-style-type: none"> • In ME, historic records only (southern; possible strays) • ME is northern edge of range • Host plants rare and restricted to York Co. and vicinity 	<ul style="list-style-type: none"> • Loss or degradation of habitat to development • Aerial pesticide spraying • Intensive forestry operations 	<ul style="list-style-type: none"> • Develop Habitat and Outreach Actions if reconfirmed extant. 	<ul style="list-style-type: none"> • Initiate surveys for new and historic occurrences, and determine distribution and status in ME. • Publish a statewide atlas and conservation assessment of Maine's entire butterfly fauna.

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
	<ul style="list-style-type: none"> • Population size and status unknown • State Special Concern 			
Beetles				
American Burying Beetle <i>Nicrophorus americanus</i>	<ul style="list-style-type: none"> • In ME, no modern records; believed extirpated • Historical distribution southwestern and central • Potentially suitable habitat still available • Federal Endangered • NatureServe G2G3 • IUCN Critically Endangered 	<ul style="list-style-type: none"> • Loss or degradation of habitat to development • Intensive agricultural practices • Aerial pesticide spraying • Bug zappers • Inadequate prey base from competition with overabundant vertebrate scavengers (e.g. raccoons, skunks, foxes) • Intensive forestry operations 	<ul style="list-style-type: none"> • Develop Habitat and Outreach Actions if reconfirmed extant. 	<ul style="list-style-type: none"> • Initiate surveys for new and historic occurrences, and determine distribution and status in ME.

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

Coniferous Forest (UC)

Associated Species:

SPECIES	PRIORITY	SPECIES	PRIORITY
Butterflies		Moths	
Purple Lesser Fritillary <i>Boloria chariclea grandis</i>	2	A Moth <i>Nepytia pellucidaria</i>	2
Bog Elfin <i>Callophrys lanoraieensis</i>	3	Pine Devil <i>Citheronia sepulcralis</i>	2
Satyr Comma <i>Polygonia satyrus</i>	3	Pine Pinion <i>Lithophane l. lepida</i>	2
Western Pine Elfin <i>Callophrys eryphon</i>	3	A Moth <i>Syngrapha cryptica</i>	3
		Southern Pine Sphinx <i>Lapara coniferarum</i>	3

Species Specific Objectives:

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
Butterflies				
Purple Lesser Fritillary <i>Boloria chariclea grandis</i>	<ul style="list-style-type: none"> In U.S., known only from ME, MN; in Canada, from AB, NB, ON, QC, SK In ME, documented at only 2 sites (northern) Boreal habitat-type rare (extreme southern edge of range) Population size and status unknown Proposed State 	<ul style="list-style-type: none"> Loss or degradation of habitat to development Aerial pesticide spraying Intensive forestry operations 	<ul style="list-style-type: none"> Develop habitat management guidelines for distribution to towns, landtrusts, landowners, land managers, and other cooperators. Consider listing under MESA if further populations not identified in the near future. Cooperate with The Nature Conservancy, local landtrusts, municipalities, and other partners to conserve habitat at known occurrences. Increase public awareness of 	<ul style="list-style-type: none"> Assess population size, viability, and habitat extent at known occurrence(s). Coordinate research objectives with state and regional partners (NABA, NE states/provinces, NatureServe). Continue surveys for new occurrences, and determine distribution and status in ME. Publish a statewide atlas and conservation assessment of Maine's entire butterfly fauna.

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
	Special Concern		threats and concerns using posters, fact sheets, press releases, and public talks.	
Moths				
A Moth <i>Nepytia pellucidaria</i>	See Dry Woodlands and Barrens			
Pine Devil <i>Citheronia sepulcralis</i>	<ul style="list-style-type: none"> • In ME, no modern records • Victim of parasitoid <i>Compsilura</i> (Diptera: Tachinidae) introductions in Northeast • Population size, distribution, and status unknown • State Special Concern 	<ul style="list-style-type: none"> • Loss or degradation of habitat to development • Aerial pesticide spraying • Bug zappers • Introduction of exotic fly species for gypsy moth control • Fire suppression • Sand and gravel mining • Intensive forestry operations 	<ul style="list-style-type: none"> • Develop Habitat and Outreach Actions if reconfirmed extant. 	<ul style="list-style-type: none"> • Initiate surveys for new and historic occurrences, and determine distribution and status in ME. • Initiate a statewide atlas and conservation assessment of Maine's entire moth fauna.
Pine Pinion <i>Lithophane l. lepida</i>	See Dry Woodlands and Barrens			

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

Dry Woodland and Barrens (<60% canopy cover) (UB)

Associated Species:

SPECIES	PRIORITY	SPECIES	PRIORITY	SPECIES	PRIORITY
Butterflies		Moths (cont.)		Moths (cont.)	
Cobweb Skipper <i>Hesperia metea</i>	2	A Moth <i>Nepytia pellucidaria</i>	2	A Moth <i>Syngrapha altera</i>	3
Edwards' Hairstreak <i>Satyrrium edwardsii</i>	2	A Noctuid Moth <i>Chaetagnaea cerata</i>	2	A Seed Borer <i>Rhodoecia aurantiago</i>	3
Leonard's Skipper <i>Hesperia leonardus</i>	2	Barrens Itame <i>Itame sp. 1</i>	2	Acadian Swordgrass Moth <i>Xylena thoracica</i>	3
Sleepy Duskywing <i>Erynnis brizo</i>	2	Graceful Clearwing <i>Hemaris gracilis</i>	2	Broad Sallow <i>Xylotype capax</i>	3
Delaware Skipper <i>Anatrytone logan</i>	3	Pine Barrens Zale <i>Zale sp. 1 nr. lunifera</i>	2	Huckleberry Sphinx <i>Paonias astylus</i>	3
Frosted Elfin <i>Callophrys irus</i>	3	Pine Barrens Zanclognatha <i>Zanclognatha martha</i>	2	Oblique Zale <i>Zale obliqua</i>	3
Karner Blue <i>Plebejus melissa samuelis</i>	3	Pine Devil <i>Citheronia sepulcralis</i>	2	Red-winged Sallow <i>Xystocheilus rufago</i>	3
Persius Duskywing <i>Erynnis p. persius</i>	3	Pine Pinion <i>Lithophane l. lepida</i>	2	Similar Underwing <i>Catocala similis</i>	3
Moths		Pink Sallow <i>Psectraglaea carnosia</i>	2	Southern Pine Sphinx <i>Lapara coniferarum</i>	3
Twilight Moth <i>Lycia rachelae</i>	1	The Buckmoth <i>Hemileuca m. maia</i>	2	Thaxter's Pinion <i>Lithophane thaxteri</i>	3
A Moth <i>Cucullia speyeri</i>	2	A Moth <i>Lepipolys perscripta</i>	3	Trembling Sallow <i>Chaetagnaea tremula</i>	3

Species Specific Objectives:

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
Butterflies				
Cobweb Skipper <i>Hesperia metea</i>	See Grasslands / Agricultural / Old Fields			

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
Edwards’ Hairstreak <i>Satyrium edwardsii</i>	<ul style="list-style-type: none"> • In ME, 5 modern records (southwestern) • ME is northern edge of range • Habitat rare and restricted primarily to York and southern Oxford Cos. • Population size and trends unknown • State Endangered 	<ul style="list-style-type: none"> • Loss or degradation of habitat to development • Forest succession • Fire suppression • Aerial pesticide spraying • Sand and gravel mining • Severe winter conditions • Intensive forestry operations 	<ul style="list-style-type: none"> • Develop consistent regulatory habitat protection standards for projects subject to review under the Maine Endangered Species Act (MESA). • Coordinate ¼ mile no-spray zones with Bureau of Pesticide Control around all occurrences. • Distribute existing habitat management guidelines to towns, landtrusts, landowners, landmanagers, and other cooperators. • Develop cooperative habitat management agreements with landowners to facilitate host plant maintenance. • Cooperate with The Nature Conservancy, local landtrusts, municipalities, and other partners to conserve habitat at known occurrences. • Increase public awareness of threats and concerns using posters, fact sheets, press releases, and public talks. 	<ul style="list-style-type: none"> • Coordinate research objectives with state and regional partners (NABA, NE states/provinces, NatureServe). • Develop and implement a systematic protocol for monitoring population size and trends. • Continue surveys for new and historic occurrences. • Investigate life history, habitat requirements, limiting factors, and conservation needs. • Publish a statewide atlas and conservation assessment of Maine’s entire butterfly fauna.
Leonard’s Skipper <i>Hesperia leonardus</i>	See Grasslands / Agricultural / Old Fields			

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
<p>Sleepy Duskywing <i>Erynnis brizo</i></p>	<ul style="list-style-type: none"> In ME, 5 modern locales (southwestern) ME is northern edge of range Habitat rare and restricted primarily to York and southern Oxford Co's. Population size and trends unknown Proposed State Special Concern 	<ul style="list-style-type: none"> Loss or degradation of habitat to development Forest succession Fire suppression Aerial pesticide spraying Sand and gravel mining Severe winter conditions Intensive forestry operations 	<ul style="list-style-type: none"> Coordinate ¼ mile no-spray zones with Bureau of Pesticide Control around all occurrences. Develop habitat management guidelines for distribution to towns, landtrusts, landowners, land managers, and other cooperators. Cooperate with The Nature Conservancy, local landtrusts, municipalities, and other partners to conserve habitat at known occurrences. Increase public awareness of threats and concerns using posters, fact sheets, press releases, and public talks. 	<ul style="list-style-type: none"> Assess population size, viability, and habitat extent at known occurrence(s). Coordinate research objectives with state and regional partners (NABA, NE states/provinces, NatureServe). Continue surveys for new and historic occurrences, and determine distribution and status in ME. Publish a statewide atlas and conservation assessment of Maine's entire butterfly fauna.
MOTHS				
<p>Twilight Moth <i>Lycia rachelae</i></p>	<ul style="list-style-type: none"> In U.S., known from ME, MA, NH, PA; in Canada, from QC In ME, documented at 3 sites (southwestern) ME is northeastern edge of range Habitat rare and restricted primarily to York and southern Oxford Cos. Population size and trends unknown State Threatened 	<ul style="list-style-type: none"> Loss or degradation of habitat to development Fire suppression Aerial pesticide spraying Bug zappers Sand and gravel mining Intensive forestry operations 	<ul style="list-style-type: none"> Develop consistent regulatory habitat protection standards for projects subject to review under the Maine Endangered Species Act (MESA). Coordinate ¼ mile no-spray zones with Bureau of Pesticide Control around all occurrences. Distribute existing habitat management guidelines to towns, landtrusts, landowners, landmanagers, and other cooperators. Cooperate with The Nature Conservancy, local landtrusts, municipalities, and other partners to conserve habitat at known 	<ul style="list-style-type: none"> Assess population size, viability, and habitat extent at known occurrence(s). Coordinate research objectives with state and regional partners (NE states/provinces, NatureServe). Develop and implement a systematic protocol for monitoring population size and trends. Continue surveys for new occurrences. Investigate life history, habitat requirements, limiting factors, and conservation needs.

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
			occurrences. • Increase public awareness of threats and concerns using posters, fact sheets, press releases, and public talks.	• Initiate a statewide atlas and conservation assessment of Maine's entire moth fauna.
A Moth <i>Cucullia speyeri</i>	• In ME, no modern records (moderate chance of rediscovery) • Habitat rare and restricted primarily to York and southern Oxford Cos. • Population size and status unknown	• Loss or degradation of habitat to development • Aerial pesticide spraying • Bug zappers • Sand and gravel mining • Forest succession • Incompatible fire management • Intensive forestry operations	• Develop Habitat and Outreach Actions if reconfirmed extant.	• Initiate surveys for new and historic occurrences, and determine distribution and status in ME. • Initiate a statewide atlas and conservation assessment of Maine's entire moth fauna.
A Moth <i>Nepytia pellucidaria</i>	• In U.S., known from ME, NH, NY; in Canada, from ON, QC • Extirpated from much of region; ME is only known extant occurrence • In ME, 1 modern record (Oxford Co.); first U.S. record since 1940s • Possible victim of parasitoid <i>Compsilura</i> (Diptera: Tachinidae) introductions in	• Loss or degradation of habitat to development • Aerial pesticide spraying • Bug zappers • Introduction of exotic fly species for gypsy moth control • Sand and gravel mining • Intensive forestry operations	• Develop habitat management guidelines for distribution to towns, landtrusts, landowners, land managers, and other cooperators. • Consider listing under MESA if further populations not identified in the near future. • Cooperate with The Nature Conservancy, local landtrusts, municipalities, and other partners to conserve habitat at known occurrences. • Increase public awareness of threats and concerns using posters, fact sheets, press releases, and public talks.	• Assess population size, viability, and habitat extent at known occurrence(s). • Coordinate research objectives with state and regional partners (NE states/provinces, NatureServe). • Continue surveys for new and historic occurrences, and determine distribution and status in ME. • Initiate a statewide atlas and conservation assessment of Maine's entire moth fauna.

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
	<p>Northeast</p> <ul style="list-style-type: none"> • Population size, distribution, and status unknown • Proposed State Special Concern • NatureServe GU 			
<p>A Noctuid Moth <i>Chaetagnaea cerata</i></p>	<ul style="list-style-type: none"> • Rare and very local throughout much of range • Evidence of historic decline • In ME, no modern records but likely to still occur • Habitat rare and restricted primarily to York and southern Oxford Cos. • Population size and status unknown • State Special Concern • NatureServe G3G4 	<ul style="list-style-type: none"> • Loss or degradation of habitat to development • Aerial pesticide spraying • Bug zappers • Sand and gravel mining • Forest succession • Incompatible fire management (e.g. wildfire, seasonality of burns) • Intensive forestry operations 	<ul style="list-style-type: none"> • Develop Habitat and Outreach Actions if reconfirmed extant. 	<ul style="list-style-type: none"> • Initiate surveys for new and historic occurrences, and determine distribution and status in ME. • Initiate a statewide atlas and conservation assessment of Maine's entire moth fauna.
<p>Barrens Itame <i>Itame sp. 1</i></p>	<ul style="list-style-type: none"> • Very limited range outside NJ • In ME, documented at 2 sites (southwestern) • Habitat rare and restricted primarily to York and southern Oxford 	<ul style="list-style-type: none"> • Loss or degradation of habitat to development • Aerial pesticide spraying • Bug zappers • Forest succession • Incompatible fire management (e.g. 	<ul style="list-style-type: none"> • Incorporate habitat management recommendations into project reviews. • Develop habitat management guidelines for distribution to towns, landtrusts, landowners, land managers, and other cooperators. • Cooperate with The Nature 	<ul style="list-style-type: none"> • Assess population size, viability, and habitat extent at known occurrence(s). • Coordinate research objectives with state and regional partners (NE states/provinces, NatureServe). • Continue surveys of suitable

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
	Cos. <ul style="list-style-type: none"> • Population size and status unknown • State Special Concern • NatureServe G3 	<ul style="list-style-type: none"> • fire suppression, wildfires in small habitats) • Sand and gravel mining • Intensive forestry operations 	Conservancy, local landtrusts, municipalities, and other partners to conserve habitat at known occurrences. <ul style="list-style-type: none"> • Increase public awareness of threats and concerns using posters, fact sheets, press releases, and public talks. 	habitat for new occurrences, and determine distribution and status in ME. <ul style="list-style-type: none"> • Develop and implement a systematic protocol for monitoring population size and trends. • Initiate a statewide atlas and conservation assessment of Maine’s entire moth fauna.
Graceful Clearwing <i>Hemaris gracilis</i>	<ul style="list-style-type: none"> • Rare throughout most of range and possibly declining • Habitat loss severe throughout much of range • In ME, no modern records but high probability of occurrence • Population size, distribution, and status unknown • NatureServe G3G4 	<ul style="list-style-type: none"> • Loss or degradation of habitat to development • Impacts to hydrology (e.g. ditching, draining) • Aerial pesticide spraying • Introduction of exotic fly species for gypsy moth control • Peat mining • Sand and gravel mining • Intensive forestry operations in riparian zones, dry woodlands, or barrens 	<ul style="list-style-type: none"> • Develop Habitat and Outreach Actions if reconfirmed extant. 	<ul style="list-style-type: none"> • Initiate surveys for new and historic occurrences, and determine distribution and status in ME. • Initiate a statewide atlas and conservation assessment of Maine’s entire moth fauna.
Pine Barrens Zale <i>Zale sp. 1 nr. lunifera</i>	<ul style="list-style-type: none"> • Limited range and low number of occurrences • In ME, documented at 2 sites 	<ul style="list-style-type: none"> • Loss or degradation of habitat to development • Aerial pesticide spraying 	<ul style="list-style-type: none"> • Incorporate habitat management recommendations into project reviews. • Develop habitat management guidelines for distribution to 	<ul style="list-style-type: none"> • Assess population size, viability, and habitat extent at known occurrence(s). • Coordinate research objectives with state and

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
	<ul style="list-style-type: none"> • (southwestern) • Habitat rare and restricted primarily to York and southern Oxford Cos. • Population size and status unknown • State Special Concern • NatureServe G3Q 	<ul style="list-style-type: none"> • Bug zappers • Sand and gravel mining • Forest succession • Fire suppression • Intensive forestry operations 	<ul style="list-style-type: none"> towns, landtrusts, landowners, land managers, and other cooperators. • Cooperate with The Nature Conservancy, local landtrusts, municipalities, and other partners to conserve habitat at known occurrences. • Increase public awareness of threats and concerns using posters, fact sheets, press releases, and public talks. 	<ul style="list-style-type: none"> regional partners (NE states/provinces, NatureServe). • Continue surveys of suitable habitat for new occurrences, and determine distribution and status in ME. • Develop and implement a systematic protocol for monitoring population size and trends. • Initiate a statewide atlas and conservation assessment of Maine's entire moth fauna.
<p>Pine Barrens Zanclognatha <i>Zanclognatha martha</i></p>	<ul style="list-style-type: none"> • Very local outside of NJ • In ME, documented at 3 sites (southwestern) • Habitat rare and restricted primarily to York and southern Oxford Cos. • Population size and trends unknown • State Threatened 	<ul style="list-style-type: none"> • Loss or degradation of habitat to development • Aerial pesticide spraying • Bug zappers • Sand and gravel mining • Fire suppression • Intensive forestry operations 	<ul style="list-style-type: none"> • Develop consistent regulatory habitat protection standards for projects subject to review under the Maine Endangered Species Act (MESA). • Coordinate ¼ mile no-spray zones with Bureau of Pesticide Control around all occurrences. • Distribute existing habitat management guidelines to towns, landtrusts, landowners, landmanagers, and other cooperators. • Cooperate with The Nature Conservancy, local landtrusts, municipalities, and other partners to conserve habitat at known occurrences. • Increase public awareness of threats and concerns using posters, fact sheets, press 	<ul style="list-style-type: none"> • Assess population size, viability, and habitat extent at known occurrence(s). • Coordinate research objectives with state and regional partners (NE states/provinces, NatureServe). • Continue surveys of suitable habitat for new occurrences. • Develop and implement a systematic protocol for monitoring population size and trends. • Investigate life history, habitat requirements, limiting factors, and conservation needs. • Initiate a statewide atlas and conservation assessment of Maine's entire moth fauna.

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
Pine Devil <i>Citheronia sepulcralis</i>	See Coniferous Forest		releases, and public talks.	
Pine Pinion <i>Lithophane l. lepida</i>	<ul style="list-style-type: none"> • In U.S., known from ME, NH, NY; in Canada, from QC • Documented U.S. declines and extirpations • In ME, only 1 modern record (Penobscot Co.) • State Special Concern • NatureServe G4T3T4 	<ul style="list-style-type: none"> • Loss or degradation of habitat to development • Aerial pesticide spraying • Bug zappers • Sand and gravel mining • Incompatible fire management • Intensive forestry operations 	<ul style="list-style-type: none"> • Incorporate habitat management recommendations into project reviews. • Develop habitat management guidelines for distribution to towns, landtrusts, landowners, land managers, and other cooperators. • Cooperate with The Nature Conservancy, local landtrusts, municipalities, and other partners to conserve habitat at known occurrences. • Increase public awareness of threats and concerns using posters, fact sheets, press releases, and public talks. 	<ul style="list-style-type: none"> • Assess population size, viability, and habitat extent at known occurrence(s). • Coordinate research objectives with state and regional partners (NE states/provinces, NatureServe). • Continue surveys for new and historic occurrences, and determine distribution and status in ME. • Develop and implement a systematic protocol for monitoring population size and trends. • Initiate a statewide atlas and conservation assessment of Maine's entire moth fauna.
Pink Sallow <i>Psectraglaea carnosa</i>	<ul style="list-style-type: none"> • Historic to rare in much of range • Evidence of declines in Northeast • Recent records for ME • Habitat rare and restricted primarily to York and southern Oxford Cos. • Population size, 	<ul style="list-style-type: none"> • Loss or degradation of habitat to development • Forest succession • Incompatible fire management (e.g. longterm fire suppression, high fire frequencies, seasonality of burns) • Aerial pesticide 	<ul style="list-style-type: none"> • Develop habitat management guidelines for distribution to towns, landtrusts, landowners, land managers, and other cooperators. • Cooperate with The Nature Conservancy, local landtrusts, municipalities, and other partners to conserve habitat at known occurrences. • Increase public awareness of threats and concerns using 	<ul style="list-style-type: none"> • Coordinate research objectives with state and regional partners (NE states/provinces, NatureServe). • Continue surveys for new and historic occurrences, and determine distribution and status in ME. • Initiate a statewide atlas and conservation assessment of Maine's entire moth fauna.

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
	<ul style="list-style-type: none"> • distribution, and status unknown • Proposed State Special Concern • NatureServe G3 	<ul style="list-style-type: none"> • spraying • Bug zappers • Sand and gravel mining • Intensive forestry operations 	<ul style="list-style-type: none"> • posters, fact sheets, press releases, and public talks. 	
<p>The Buckmoth <i>Hemileuca m. maia</i></p>	<ul style="list-style-type: none"> • Widespread but rare and declining north of PA • In ME, documented at 2 sites (southwestern) • Habitat rare and restricted primarily to York and southern Oxford Cos. • Population size and status unknown • State Special Concern 	<ul style="list-style-type: none"> • Loss or degradation of habitat to development • Aerial pesticide spraying • Introduction of exotic fly species for gypsy moth control • Sand and gravel mining • Intensive forestry operations 	<ul style="list-style-type: none"> • Incorporate habitat management recommendations into project reviews. • Develop habitat management guidelines for distribution to towns, landtrusts, landowners, land managers, and other cooperators. • Cooperate with The Nature Conservancy, local landtrusts, municipalities, and other partners to conserve habitat at known occurrences. • Increase public awareness of threats and concerns using posters, fact sheets, press releases, and public talks. 	<ul style="list-style-type: none"> • Assess population size, viability, and habitat extent at known occurrence(s). • Coordinate research objectives with state and regional partners (NE states/provinces, NatureServe). • Continue surveys for new and historic occurrences, and determine distribution and status in ME. • Develop and implement a systematic protocol for monitoring population size and trends. • Initiate a statewide atlas and conservation assessment of Maine's entire moth fauna.

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

Alpine (summits & tablelands above treeline) (UA)

Associated Species:

SPECIES	PRIORITY
Butterflies	
Katahdin Arctic <i>Oeneis polixenes katahdin</i>	1

Species Specific Objectives:

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
Butterflies				
Katahdin Arctic <i>Oeneis polixenes katahdin</i>	<ul style="list-style-type: none"> • Endemic to tablelands of Mt. Katahdin only • Population size and trends unknown • State Endangered • NatureServe G5T1 	<ul style="list-style-type: none"> • Trampling of vegetation by off-trail hikers • Illegal collection • Global warming 	<ul style="list-style-type: none"> • Cooperate with Baxter State Park (BSP) to conserve and manage known habitat. • Increase public awareness of threats and concerns using posters, fact sheets, press releases, and public talks. 	<ul style="list-style-type: none"> • Assess population size, viability, and habitat extent at known occurrence(s). • Coordinate research objectives with partners (BSP). • Develop and implement a systematic protocol for monitoring population size and trends. • Investigate life history, habitat requirements, limiting factors, and conservation needs. • Publish a statewide atlas and conservation assessment of Maine's entire butterfly fauna.

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

Shrub / Early Successional (incl. regen. forest) (US)

Associated Species:

SPECIES	PRIORITY	SPECIES	PRIORITY
Butterflies		Moths	
Clayton's Copper <i>Lycaena dorcas claytoni</i>	1	Huckleberry Sphinx <i>Paonias astylus</i>	3
Juniper Hairstreak <i>Callophrys gryneus</i>	2		

Species Specific Objectives:

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
Butterflies				
Clayton's Copper <i>Lycaena dorcas claytoni</i>	See Peatlands			
Juniper Hairstreak <i>Callophrys gryneus</i>	See Grasslands / Agricultural / Old Fields			

Grasslands / Agricultural / Old Field (shrubs <50%) (UG)

Associated Species:

SPECIES	PRIORITY	SPECIES	PRIORITY	SPECIES	PRIORITY
Butterflies		Butterflies (cont.)		Moths	
Cobweb Skipper <i>Hesperia metea</i>	2	Delaware Skipper <i>Anatrytone logan</i>	3	Culvers Root Borer <i>Papaipema sciata</i>	3
Coral Hairstreak <i>Satyrrium titus</i>	2	Little Glassywing <i>Pompeius verna</i>	3	Beetles	
Greenish Blue <i>Plebejus saepiolus amica</i>	2	Regal Fritillary <i>Speyeria idalia</i>	3	American Burying Beetle <i>Nicrophorus americanus</i>	2
Juniper Hairstreak <i>Callophrys gryneus</i>	2	Tawny Crescent <i>Physiodes batesii</i>	3		
Leonard's Skipper <i>Hesperia leonardus</i>	2	Western Tailed Blue <i>Cupido amyntula maritima</i>	3		

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

Species Specific Objectives:

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
Butterflies				
Cobweb Skipper <i>Hesperia metea</i>	<ul style="list-style-type: none"> • In ME, no modern records • Historically known from 3 locales (southwestern) • Population size, distribution and status unknown • Proposed State Special Concern 	<ul style="list-style-type: none"> • Loss or degradation of habitat to development • Habitat succession • Aerial pesticide spraying • Intensive agricultural practices • Sand and gravel mining • Intensive forestry operations 	<ul style="list-style-type: none"> • Develop Habitat and Outreach Actions if reconfirmed extant. 	<ul style="list-style-type: none"> • Initiate surveys for new and historic occurrences, and determine distribution and status in ME. • Publish a statewide atlas and conservation assessment of Maine’s entire butterfly fauna.
Coral Hairstreak <i>Satyrium titus</i>	<ul style="list-style-type: none"> • In ME, only 2 modern occurrences (southern) • Population size, distribution and status unknown • Proposed State Special Concern 	<ul style="list-style-type: none"> • Loss or degradation of habitat to development • Habitat succession • Aerial pesticide spraying • Intensive agricultural practices 	<ul style="list-style-type: none"> • Develop habitat management guidelines for distribution to towns, landtrusts, landowners, land managers, and other cooperators. • Consider listing under MESA if further populations not identified in the near future. • Cooperate with The Nature Conservancy, local landtrusts, municipalities, and other partners to conserve habitat at known occurrences. • Increase public awareness of threats and concerns using posters, fact sheets, press releases, and public talks. 	<ul style="list-style-type: none"> • Assess population size, viability, and habitat extent at known occurrence(s). • Coordinate research objectives with state and regional partners (NABA, NE states/provinces, NatureServe). • Continue surveys for new and historic occurrences, and determine distribution and status in ME. • Publish a statewide atlas and conservation assessment of Maine’s entire butterfly fauna.
Greenish Blue <i>Plebejus saepiolus</i>	<ul style="list-style-type: none"> • In ME, no modern records 	<ul style="list-style-type: none"> • Loss or degradation of habitat to 	<ul style="list-style-type: none"> • Develop Habitat and Outreach Actions if reconfirmed extant. 	<ul style="list-style-type: none"> • Initiate surveys for new and historic occurrences, and

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
<i>amica</i>	<ul style="list-style-type: none"> Historically known from 12 locales (central) Population size, distribution and status unknown Proposed State Special Concern 	<ul style="list-style-type: none"> development Habitat succession Aerial pesticide spraying Intensive agricultural practices 		<ul style="list-style-type: none"> determine distribution and status in ME. Publish a statewide atlas and conservation assessment of Maine’s entire butterfly fauna.
Juniper Hairstreak <i>Callophrys gryneus</i>	<ul style="list-style-type: none"> In ME, only 2 modern records (southern) Habitat and host plant rare in ME Population size and exact distribution unknown State Special Concern Proposed State Endangered 	<ul style="list-style-type: none"> Loss or degradation of habitat to development Habitat succession Aerial pesticide spraying Intensive agricultural practices Fire suppression 	<ul style="list-style-type: none"> Incorporate habitat management recommendations into project reviews. Develop habitat management guidelines for distribution to towns, landtrusts, landowners, land managers, and other cooperators. Develop cooperative habitat management agreements with landowners/right-of-ways to facilitate host plant maintenance. Cooperate with The Nature Conservancy, local landtrusts, municipalities, and other partners to conserve habitat at known occurrences. Increase public awareness of threats and concerns using posters, fact sheets, press releases, and public talks. 	<ul style="list-style-type: none"> Assess population size, viability, and habitat extent at known occurrence(s). Coordinate research objectives with state and regional partners (NABA, NE states/provinces, NatureServe). Continue surveys for new and historic occurrences, and determine distribution and status in ME. Develop and implement a systematic protocol for monitoring population size and trends. Publish a statewide atlas and conservation assessment of Maine’s entire butterfly fauna.
Leonard’s Skipper <i>Hesperia leonardus</i>	<ul style="list-style-type: none"> In ME, only 1 modern locale Historically known from 14 locales (southwestern) 	<ul style="list-style-type: none"> Loss or degradation of habitat to development Habitat succession Aerial pesticide 	<ul style="list-style-type: none"> Develop habitat management guidelines for distribution to towns, landtrusts, landowners, land managers, and other cooperators. 	<ul style="list-style-type: none"> Assess population size, viability, and habitat extent at known occurrence(s). Coordinate research objectives with state and regional

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
	<ul style="list-style-type: none"> Population size, distribution and status unknown Proposed State Special Concern 	<ul style="list-style-type: none"> spraying Intensive agricultural practices Sand and gravel mining Intensive forestry operations 	<ul style="list-style-type: none"> Consider listing under MESA if further populations not identified in the near future. Cooperate with The Nature Conservancy, local landtrusts, municipalities, and other partners to conserve habitat at known occurrences. Increase public awareness of threats and concerns using posters, fact sheets, press releases, and public talks. 	<ul style="list-style-type: none"> partners (NABA, NE states/provinces, NatureServe). Continue surveys for new and historic occurrences, and determine distribution and status in ME. Publish a statewide atlas and conservation assessment of Maine's entire butterfly fauna.
Beetles				
American Burying Beetle <i>Nicrophorus americanus</i>	See Deciduous and Mixed Forests			

Cliff Face and Rocky Outcrop (incl. talus) (UR)

Associated Species:

SPECIES	PRIORITY
Butterflies	
Juniper Hairstreak <i>Callophrys gryneus</i>	2

Species Specific Objectives:

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
Butterflies				
Juniper Hairstreak <i>Callophrys gryneus</i>	See Grasslands / Agricultural / Old Field			

Table 32. Goals, Objectives, Threats, and Strategies for Priority Invertebrates by Habitat.

Unknown Upland Habitat (U?)

Associated Species:

SPECIES	PRIORITY
Snails	
Pleistocene Catinella <i>Catinella exile</i>	2
Moths	
A Moth <i>Syngrapha selecta</i>	3
Barrens Metarranthis Moth <i>Metarranthis apicaria</i>	3

Species Specific Objectives:

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
Snails				
Pleistocene Catinella <i>Catinella exile</i>	See Peatlands			

Table 33. Goals, Objectives, Threats, and Strategies for Priority Inland Fish in Maine

Featured Species

Swamp Darter	203
Lake Whitefish	203
Redfin Pickerel.....	205
Arctic Charr.....	206
American Eel	207
Lake Trout (Togue).....	208
Landlocked Salmon	210
Brook Trout.....	213
Round Whitefish	214
Longnose Sucker.....	216
Rainbow Smelt.....	216
Burbot	218

Table 33. Goals, Objectives, Threats, and Strategies for Priority Inland Fish in Maine

SPECIES	PRIORITY
Swamp Darter	1

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
Swamp Darter	<ul style="list-style-type: none"> Known to occur in 8 sites from three coastal watersheds (Lower Kennebunk, York, and Great Works Rivers) Current status unknown in one historical site in Ogunquit River State Threatened 	<ul style="list-style-type: none"> Habitat loss or degradation Water level fluctuations/ loss of littoral habitat – especially at spawning time (whenever that may be) Competition from non-native species/habitat displacement Predation by anything that eats little fishes 	<ul style="list-style-type: none"> Little is known regarding habitat requirements of darters 	<ul style="list-style-type: none"> Continued survey efforts of southern Maine likely darter habitats An understanding of seasonal habitat requirements for all size/age classes A greater understanding of spawning ecology A greater understanding of their trophic ecology

SPECIES	PRIORITY
Lake Whitefish	1

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
Lake Whitefish	<ul style="list-style-type: none"> Lake whitefish populations are found in freshwater lakes and ponds. The greatest number of lake whitefish is found in deep oligotrophic lakes; however, a few populations are found in 	<ul style="list-style-type: none"> Introduction of competing and/or prey fish species (i.e. rainbow smelt) Exploitation of principal fisheries 	<ul style="list-style-type: none"> Continue to monitor lake whitefish habitat suitability in existing lake whitefish waters. Cooperate with regulatory agencies and landowners in land and water use planning and enforcement to prevent habitat 	<ul style="list-style-type: none"> Research regional files to identify and evaluate the status of lake whitefish populations in Maine lakes. Intensive clerk sport fishery surveys should be conducted during the ice fishing and open

Table 33. Goals, Objectives, Threats, and Strategies for Priority Inland Fish in Maine

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
	<p>mesotrophic and eutrophic waters.</p> <ul style="list-style-type: none"> • Of those lakes providing a principal fishery for lake whitefish, 16 of 18 populations occur in oligotrophic waters and 1 each is found in a mesotrophic and eutrophic lake. • Maine lake whitefish populations are concentrated in headwater lakes of the Allagash and Penobscot River drainages in the north-central part of the state. • Lakes in the St. Croix drainage in Washington County are also noted for lake whitefish populations. • Distribution of lake whitefish in southern and western Maine is limited to only four lakes. • There are no known strictly riverine populations of lake whitefish, however, it is noted that lake populations may enter into streams on a short-term basis for spawning and/or feeding purposes. • MDIFW Fishery management regions B and D (Figure 16) have no waters containing lake whitefish populations. • The 1981 statewide lake whitefish assessment identified 	<p>by recreational anglers.</p> <ul style="list-style-type: none"> • Habitat degradation by human development (i.e. forest mgt. through extensive cutting and road building in the drainage; seasonal/permanent home development on lake shore) • Inappropriate water level management on lakes controlled by a dam. 	<p>degradation.</p> <ul style="list-style-type: none"> • Maintain public awareness on the threat of illegally introduced fish species to native Maine fish species. • Maintain public awareness on the threat of illegally dumping baitfish into Maine waters. • Peer review proposals to introduce new fish species in Maine lakes by MDIFW biologists 	<p>water seasons on principal fishery waters statewide to determine angler use, catch and harvest of lake whitefish.</p> <ul style="list-style-type: none"> • Determine population abundance, habitat use, size and age structure and interaction with other fish species in representative waters. • Promulgate and evaluate fishing regulations that control angler harvest and sustain wild fisheries. • Identify factors that have contributed to declining populations of lake whitefish. • Develop and implement rehabilitation programs for sport fisheries that have declined.

Table 33. Goals, Objectives, Threats, and Strategies for Priority Inland Fish in Maine

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
	<p>principal fisheries in 21 lakes totaling 121, 085 acres.</p> <ul style="list-style-type: none"> The 2001 assessment has identified 18 lakes totaling 80,903 acres as supporting principal lake whitefish fisheries. This represents a 15% reduction in the number of waters and a 33% reduction in the acreage of lakes supporting principal fisheries for lake whitefish over the last 20 years. The species may continue to decline should the possible loss of an additional 17% of the number and 18% of the acreage not be reversed over the next 5 years. Lake whitefish were the only coldwater species in decline during the 2001 comprehensive management plan update. 			

SPECIES	PRIORITY
Redfin Pickerel	1

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
Redfin Pickerel	<ul style="list-style-type: none"> Known to occur in 2 locations within the same watershed of the lower Kennebec River 1 unconfirmed report from the Scarborough 	<ul style="list-style-type: none"> Competition from chain pickerel Competition from non-indigenous species/ habitat displacement 	<ul style="list-style-type: none"> One known Redfin site (West Bath) has recently been severely degraded by the property owner for agricultural purposes (MDEP violation and cited as such)/ effects on the population are 	<ul style="list-style-type: none"> Continued survey efforts of southern Maine small coastal streams An understanding of seasonal habitat requirements for all size/age classes

Table 33. Goals, Objectives, Threats, and Strategies for Priority Inland Fish in Maine

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
	<ul style="list-style-type: none"> River watershed Considered extirpated from the Pemaquid River watershed 	<ul style="list-style-type: none"> Habitat loss/degradation Dams and fish passage concerns (this species may need the ability to access a variety of habitats on a seasonal basis) Changes in flow regime that may destabilize the system Predation by anything that eats little fishes 	currently unknown.	<ul style="list-style-type: none"> A greater understanding of spawning ecology A greater understanding of their trophic ecology

SPECIES	PRIORITY
Arctic Charr	1

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
Arctic Charr	<ul style="list-style-type: none"> Small number of populations, very limited distribution (12 waters statewide) Subspecies status: only populations in US; other populations of subspecies exist in nearby Canada provinces of Quebec and New Brunswick Extremely narrow habitat 	<ul style="list-style-type: none"> Habitat degradation: introduction of nonnative fishes or other organisms The existing, and relatively recent, presence of introduced predator, competitor or species that may potentially hybridize with charr at Big Reed Pond 	<ul style="list-style-type: none"> Reassess habitat quality and quantity to determine future population viability Monitor the fish assemblage of each lake, in particular the existence of invasive species Identify key aquatic habitats such as spawning sites and coordinate protection with federal, state, or NGOs and willing private landowners Identify key terrestrial habitats 	<ul style="list-style-type: none"> Assess population status at each location Investigate and describe all life history and life cycle requirements of each population to provide for maximum protection of each population Assess the sport fishery utilization of charr including harvest rates and participating angler attitudes

Table 33. Goals, Objectives, Threats, and Strategies for Priority Inland Fish in Maine

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
	<p>requirements</p> <ul style="list-style-type: none"> • Populations limited to headwaters of three drainages • Population status is unknown at Big Reed Pond and Green Lake and assumed stable at other locations • All populations are genetically distinct, among which gene flow is restricted 	<p>(rainbow smelt) and Green Lake (lake trout).</p> <ul style="list-style-type: none"> • Dewatering of historic spawning site at Floods Pond • Harvest in sport fishery • Avian and mammalian predation 	<p>connected or adjacent to aquatic habitats that are essential to maintaining viability of populations</p> <ul style="list-style-type: none"> • Work collaboratively with NGOs and institutions on projects designed to better understand charr life history and to provide pertinent information on management and maximum protection • Coordinate protection of populations and their habitats through legislation or rule-making processes 	<ul style="list-style-type: none"> • Investigate the dynamics of evolutionary divergence of charr populations in cooperation with the University of Maine • Investigative potential new populations of naturally occurring charr • Assess influence rainbow smelt may have on charr populations

SPECIES	PRIORITY
American Eel	1

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
American Eel	<ul style="list-style-type: none"> • American eel presence is documented in 419 Maine watersheds (HUC 12) with a total area of 14,077.6 sq. miles (36,460.8 sq KM) • Eel presence is confirmed in 510 lakes, 534 stream sites, and presence is highly suspected, although unconfirmed in 293 	<ul style="list-style-type: none"> • Commercial fishing of all inland life stages – all harvest occurs prior to sexual maturity • Dams and fish passage concerns for both upstream and downstream migratory stages • Habitat loss or degradation • Long life cycle, slow 	<ul style="list-style-type: none"> • Little is understood regarding the essential habitat requirements of American eel • Public perception is very poor regarding this ecologically important species • Although stock declines are highly probable, there is little empirical evidence to support this • Downstream passage difficulties at some hydro facilities warrants 	<ul style="list-style-type: none"> • Current stock status for resident eels needs to be assessed • Trends in elver recruitment needs to be investigated • Success during downstream passage needs to be improved • Sources of mortality for inland stages (yellow and silver) need to be identified and estimated • An understanding of the causes and effects of high

Table 33. Goals, Objectives, Threats, and Strategies for Priority Inland Fish in Maine

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
	lakes. <ul style="list-style-type: none"> Eels are considered extirpated from six lakes (Prong Pond - Region E; Shattuck Lake – Region C; Silver Lake, Broken Bridge Pond, Coffee Pond, and Bryant Pond – Region A) Population declines 	growing, single spawning opportunity per life cycle makes this species prone to overharvest and potentially difficult to restore depleted stocks <ul style="list-style-type: none"> Poor understanding of marine processes that affect inland recruitment Disease and parasite concerns Predation by fish eating birds (all life stages) and larger fishes (mostly smaller sized or younger ages) 	public review and correction	parasite loads and increased mortality in some populations recently observed in Maine

SPECIES	PRIORITY
Lake Trout (Togue)	1

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
Lake Trout (Togue)	<ul style="list-style-type: none"> Originally found in about 100 lakes throughout Maine. Lake trout have been successfully raised in hatcheries, and consequently, the range has been expanded throughout the state. Lake trout presently occur 	<ul style="list-style-type: none"> The reduction of spawning habitat and/or destruction of eggs by excessive and untimely fall and winter lake drawdowns can seriously limit the success of natural reproduction. Lake trout habitat will be degraded or destroyed if 	<ul style="list-style-type: none"> Continue to seek and maintain water level drawdown agreements on waters with self-sustaining lake trout populations. Continue active involvement in the protection of aquatic habitat from degradation as a result of unwise land and water use practices through coordination with other state and federal 	<ul style="list-style-type: none"> Assess lake trout population status in all waters with naturally occurring populations. Continue to collect angler use, catch, and harvest of lake trout from both summer and winter fishing on Maine’s principal fisheries. Determine seasonal harvest levels that are biologically

Table 33. Goals, Objectives, Threats, and Strategies for Priority Inland Fish in Maine

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
	<p>in 137 lakes and ponds throughout the State of Maine, with a total acreage of 389,003 acres.</p> <ul style="list-style-type: none"> • There are a total of 111 waters (320,402 acres) with principal fisheries for lake trout. • Distributed throughout Maine but primarily found in Western and Northern sections of the state. • Typical habitat consists of large, deep, oligotrophic lakes with irregular bottom contours and rocky shorelines. • Most abundant in lakes with large volumes of deep water where temperatures remain at 60° F or less throughout the year, and where dissolved oxygen levels exceed 6 parts per million. • Maine lake trout waters average 2,839 acres in surface area, but there are 4 waters that are less than 100 acres in size that support populations of lake trout. • There are 20 waters totaling 26,509 acres with 	<p>lakeshore and water uses are not properly managed, and if existing environmental regulations are not enforced.</p> <ul style="list-style-type: none"> • Suckers, eels, bullheads, some aquatic insects, and crayfish will prey on lake trout eggs. • Introduction, either authorized or not, of competitors and/or predators on lake trout. • Stocking of hatchery reared lake trout in waters with wild populations, especially those having never been stocked. • Over exploitation by recreational anglers both summer and winter. 	<p>agencies.</p> <ul style="list-style-type: none"> • Continue to support enforcement of all rules and laws that are designed to protect aquatic habitat. • Continue to subject all proposals for new species introductions into Maine lakes to peer review by MDIFW biologists. • Continue efforts by the MDIFW to educate the public about the threat of illegal introductions to native Maine fish species. • Continue efforts at raising the awareness of anglers to the threat posed by the practice of illegally disposing unused baitfish into Maine waters. • Develop and maintain an information program to inform the public about lake trout management in Maine. • Report all work done on lake trout management and research at appropriate scientific meetings, in progress reports and scientific journals. 	<p>sound and socially acceptable.</p> <ul style="list-style-type: none"> • Determine appropriate regulations for each body of water given its productivity and the abundance of forage, growth and maturity of lake trout, and angler exploitation in relation to the ability of lake trout populations in those waters to sustain observed levels of harvest. • Study the interactions of lake trout and other coldwater sportfish species in lake trout waters, including their use and dependence upon the species available as prey. • Continue to be engaged and informed of lake trout research and management in other states and provinces through fishery literature, scientific meetings, and contacts with lake trout managers and researchers.

Table 33. Goals, Objectives, Threats, and Strategies for Priority Inland Fish in Maine

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
	<p>populations of lake trout that have never been stocked or influenced by lake trout stocked either upstream or downstream in the drainage, representing 6.8% of the total acreage of Maine waters with lake trout present.</p> <ul style="list-style-type: none"> • Considering only those waters with <u>principal fisheries</u> for lake trout, 15 waters have never been stocked or influenced by the stocking of lake trout either upstream or downstream in the drainage, representing a total of 21,584 acres. • These waters hold Maine's last pure wild populations of lake trout. 			

SPECIES	PRIORITY
Landlocked Salmon	2

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
Landlocked Salmon	<ul style="list-style-type: none"> • Present in 303 lakes (641,207 acres); 64 rivers or river reaches (635 miles) • Principal fisheries in 176 	<ul style="list-style-type: none"> • Displacement or reduced production from illegally-introduced invasive fish species • Cultural development of 	<ul style="list-style-type: none"> • Intensify public education efforts that stress the negative impacts of illegal fish introductions • Vigorously prosecute those apprehended making illegal fish 	<ul style="list-style-type: none"> • Monitor angler use and harvest on waters with heavy exploitation • Promulgate and evaluate regulations to control angler

Table 33. Goals, Objectives, Threats, and Strategies for Priority Inland Fish in Maine

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
	<p>lakes (484,791 acres); 44 rivers or river reaches (289 miles)</p> <ul style="list-style-type: none"> • Stocking supports principal fisheries in 127 lakes (72% of total) • Significant naturalized populations in 49 lakes (~112,000 acres) • Recent evaluations of two indigenous populations (West Grand Lake, Sebago Lake) showed they are genetically distinct from each other, and both are distinct from anadromous Atlantic salmon 	<p>lake shorelines, modification of spawning and nursery areas, and non-point sources of pollution in lake watersheds</p> <ul style="list-style-type: none"> • Burgeoning populations of competing coldwater species, especially lake trout, have reduced salmon production in certain lakes • Current fishing quality is threatened in some salmon fisheries because angler use and harvest rates remain at critical levels • High population densities have resulted in declining growth, size, and condition of salmon in some lakes, threatening to reduce their value as sport fisheries • Rainbow smelts, the principal forage fish for salmon, fluctuate dramatically in abundance on most salmon lakes • There is insufficient information for a number of salmon fisheries and types of fisheries 	<p>introductions and prominently advertise these prosecutions in the popular press</p> <ul style="list-style-type: none"> • Involve the public in enforcement efforts by encouraging the use of 1-800-ALERT-US • Coordinate and combine the educational and enforcement strategies with those to prevent the introduction of nuisance aquatic plants • Establish contingency plans that would permit a rapid response when exotic species that pose threats to salmon populations have been illegally introduced, and when the likelihood of successful chemical eradication is high • Continuously monitor habitat quality of salmon lakes • Seek adequate regulatory protection of critical salmon spawning and nursery habitat • Provide technical support to local, state and federal agencies responsible for managing and protecting lake and stream habitat quality • Enforce existing environmental laws and seek enactment of stronger measures where appropriate • Where feasible, maximize smelt 	<p>harvest</p> <ul style="list-style-type: none"> • Intensively monitor major salmon lakes to evaluate the need for changes in stocking regimes or fishing regulations • Utilize hydroacoustics techniques to provide annual estimates of smelt abundance on major salmon lakes • Expand ongoing evaluations of the role of competition and interrelationships with other coldwater species • Broaden the scope of angler surveys to obtain better coverage and reliable estimates of angler use, catch, harvest, fishing quality, and population structure for all seasons and habitat types • Expand river survey and monitoring efforts to identify and evaluate important riverine salmon resources • Determine the genetic diversity and the degree of differentiation from likely donor waters of several naturalized salmon populations • Identify and measure competing recreational uses of salmon waters • Survey angler preferences through ongoing public

Table 33. Goals, Objectives, Threats, and Strategies for Priority Inland Fish in Maine

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
		<ul style="list-style-type: none"> • There is limited knowledge of the abundance and distribution of salmon in rivers • An adequate assessment of the location, amount, and quality of salmon spawning and nursery areas is lacking • The genetic characteristics of several naturalized populations, their potential value as unique genotypes, and the degree to which they should receive special regulatory protection are unknown • Loss of public access to salmon waters threatens use-opportunities by anglers and other users • Angler preferences for various types of salmon fisheries are rapidly evolving and are not fully understood by resource managers • Increased use of salmon waters (particularly rivers) for recreational uses other than angling detracts from the aesthetic value of 	<p>production by improving access to traditional spawning habitat, and by restricting commercial and/or recreational harvest</p> <ul style="list-style-type: none"> • Recruit local anglers to monitor important smelt spawning tributaries • Seek public input to determine species management priorities that are socially acceptable when managing salmon with other cold water species • Expand network of anglers who maintain records of their fishing trips on lakes and rivers • Cooperate with state and federal agencies, the Legislature, and private groups to secure public access rights over private roads by purchase, easement, or gift • Continue to provide anglers with accurate information on probable consequences of fishing rules proposals • Develop information programs to inform the public about salmon management • Report management findings at appropriate scientific meetings, in progress reports, and in scientific journals 	<p>outreach programs</p>

Table 33. Goals, Objectives, Threats, and Strategies for Priority Inland Fish in Maine

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
		angling and may have other deleterious effects on angler use <ul style="list-style-type: none"> • Fishing regulation proposals are often made without or in spite of sound biological data and may result in regulations that place a salmon fishery at risk • Anglers and professional fishery workers in other states and provinces are inadequately informed about the progress and results of salmon management in Maine 		

SPECIES	PRIORITY
Brook Trout	2

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
Brook Trout	<ul style="list-style-type: none"> • Present statewide in 1,487 lakes (769,264 acres) • Provide principal fisheries in 1,135 lakes (403,396 acres) • Present in an estimated 22,248 miles of streams 	<ul style="list-style-type: none"> • Intraspecific competition resulting from illegal introductions of other fish species • Habitat degradation resulting from development/land use • Possible long-term threats include global warming and acid precipitation 	<ul style="list-style-type: none"> • Continue to educate public about the harm done by illegal introductions and prosecute violators • Chemically remove competing species when feasible. • Support land use laws and zoning initiatives designed to protect habitat 	<ul style="list-style-type: none"> • Maintain native populations by continuing policy of not stocking waters with viable native brook trout populations. • Continue to monitor status of lake populations to prevent overexploitation • Continue statewide stream surveys to document brook trout distribution and

Table 33. Goals, Objectives, Threats, and Strategies for Priority Inland Fish in Maine

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
				abundance • Conduct a genetic inventory of stream populations • Restore degraded stream habitat

SPECIES	PRIORITY
Round Whitefish	2

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
Round Whitefish	<ul style="list-style-type: none"> • Round whitefish are found in freshwater lakes and ponds. • Round whitefish prefer deep, oligotrophic lakes but are also found in mesotrophic lakes. • Riverine populations of round whitefish are known to exist in the St. John River and its tributary, the Fish River. • Round whitefish are primarily distributed in the Kennebec, Penobscot, and St. John River drainages of north-central and northern Maine. • Round whitefish exist in the headwaters of the St. Croix River drainage 	<ul style="list-style-type: none"> • Introduction of competing and/or prey fish species (i.e. muskellunge) • Habitat degradation by human development (i.e. forest mgt. through extensive cutting and road building in the drainage; seasonal/permanent home development on lake shore) • Inappropriate water level management on lakes controlled by a dam. 	<ul style="list-style-type: none"> • Continue to monitor round whitefish habitat suitability in existing lake whitefish waters. • Cooperate with regulatory agencies and landowners in land and water use planning and enforcement to prevent habitat degradation. • Maintain public awareness on the threat of illegally introduced fish species to native Maine fish species. • Maintain public awareness on the threat of illegally dumping baitfish into Maine waters. • Peer review proposals to introduce new fish species in Maine lakes by IF&W biologists 	<ul style="list-style-type: none"> • Research regional files to identify and evaluate the status of round whitefish populations in Maine lakes. • Intensive clerk sport fishery surveys should be conducted during the ice fishing and open water seasons on waters known to provide a sport fishery to determine angler use, catch and harvest of round whitefish. • In representative waters, determine population dynamics of round whitefish including, but not limited to: abundance, habitat use, size and age structure and interaction with other fish species in representative waters. • Promulgate and evaluate fishing regulations that control

Table 33. Goals, Objectives, Threats, and Strategies for Priority Inland Fish in Maine

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
	<p>in northern Hancock and Washington Counties.</p> <ul style="list-style-type: none"> • Round whitefish are not present in fishery management regions A & B (Figure 16). • Round whitefish are a minor contributor to sport fishing in the state of Maine. Even where abundant, these fish are seldom caught and are rarely pursued by anglers. • A sport fishery once existed for round whitefish in Glazier Lake but increased abundance of muskellunge in the drainage is believed to have reduced this fishery. • Spring fishing for round whitefish are known to occur in the upper Kennebec River and Fish River. • The status of round whitefish populations appears to be stable, <u>except in waters containing muskellunge.</u> 			<p>angler harvest and sustain wild round whitefish fisheries.</p>

Table 33. Goals, Objectives, Threats, and Strategies for Priority Inland Fish in Maine

SPECIES	PRIORITY
Longnose Sucker	2

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
Longnose Sucker	<ul style="list-style-type: none"> • Indigenous to Maine • Listed in lake inventory as occurring in 144 ponds and lakes • Stream species inventories indicate that longnose suckers have been found in 19 streams • Widespread throughout Maine, but greatest concentrations occur in Regions D, E, F & G (Figure 16) • May be commercially harvested with sucker permit 	<ul style="list-style-type: none"> • Loss of habitat through logging, farming and development activities • Illegal introductions of large predatory fish • Predatory birds and mammals exploiting spawning runs • Unregulated commercial fishery 	<ul style="list-style-type: none"> • Continue cooperative approach with federal, state and local government agencies, as well as NGO's during land use regulatory permitting processes to protect at risk habitats. • Continue to educate anglers about the dangers associated with the movement of fish • Educate public about the importance of maintaining a highly diverse assemblage of native species 	<ul style="list-style-type: none"> • Collect and analyze historical population information about the range and distribution of this species in Maine • Collect information about the specific habitat needs of this species • Direct research towards those populations at significant risk

SPECIES	PRIORITY
Rainbow Smelt	2

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
Rainbow Smelt	<ul style="list-style-type: none"> • Landlocked smelt populations are fairly well distributed around the State, but historically smelt were likely restricted to coastal 	<ul style="list-style-type: none"> • Illegal introductions of native and nonnative fish species are probably one of the 	<ul style="list-style-type: none"> • Continue to work with MDEP, other state/federal agencies, and NGO's to protect lake and stream habitats • Work with local clubs to 	<ul style="list-style-type: none"> • Overall, there is a lack of knowledge and control over the factors that effect smelt abundance • Continue to work towards successful smelt culture, which would

Table 33. Goals, Objectives, Threats, and Strategies for Priority Inland Fish in Maine

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
	<p>drainages (map in species plan).</p> <ul style="list-style-type: none"> • 614 lakes and ponds are known to currently or historically have supported smelts • 508 waters are currently known to support smelt, 71 of these support principal fisheries for the species • 10 smelt population have reportedly been extirpated via reclamation or other unknown reasons • 88 waters have unconfirmed reports of smelt • Smelt status is currently unknown on 7 waters • Anecdotal evidence suggests population abundance has declined, particularly in southern and central Maine where human populations are the highest • 134 coastal smelt streams documented by Flagg in 1971. No additional surveys conducted until 2004/2005. Jayne Winters (MDMR) received information on status of smelt populations in 45 coastal streams (Independent study Bio 494, University of Maine Augusta, 	<p>largest threats to smelt populations</p> <ul style="list-style-type: none"> • Potential of overharvest by commercial anglers • Potential of overharvest by recreational dipnetters • Lake and stream habitat degradation, spawning habitat may be quite vulnerable to development • Habitat degradation (improperly placed culverts, sedimentation due to erosion from increased development, and pollutants including acid rain) • Overfishing 	<p>improve spawning habitat where feasible</p> <ul style="list-style-type: none"> • Educate recreational dipnetters about egg and habitat disruption during the spawning runs • Educate wholesale/retail smelt dealers on collection, transport, and holding methods that reduce smelt mortalities • Work with commercial dealers to investigate the use of grder panels installed in commercial dropnets 	<p>likely ease commercial pressures on smelt populations</p> <ul style="list-style-type: none"> • Continue to work with hydroacoustics equipment to develop the best indices possible for measuring smelt abundance and to develop correlations on factors that might influence smelt abundance • Collect data on the commercial and recreational harvest of smelt in conjunction with population abundance information • Maintain species distribution information and conduct another smelt run survey to compare with historical data • Examine success/failures of smelt egg transfers • Assess and monitor recreational use of smelt through specific questions in the MDIFW's next angler questionnaire • Assess commercial use and economic value • Locate, delineate, and map spawning areas for all coastal streams • Assess threats to smelt populations (increased development, roads, acid rain)

Table 33. Goals, Objectives, Threats, and Strategies for Priority Inland Fish in Maine

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
	2005). <ul style="list-style-type: none"> • NMFS Species of Concern • Intensive creel surveys of the Kennebec winter smelt fishery were conducted by MDMR from 1974-1982; estimated catches varied from 20,000 – 96,000 pounds. Since that time, however, work has been limited to annual winter smelt camp counts in the Androscoggin, Eastern, Cathance, and Kennebec estuaries. • MDMR conducted tagging studies on the Kennebec and Penobscot Rivers throughout the 1970s and early 1980s to document migratory movements and abundance 			

SPECIES	PRIORITY
Burbot (Cusk)	2

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
Burbot (Cusk)	<ul style="list-style-type: none"> • Burbot populations are distributed in lakes and ponds throughout Maine. • In the 2001 assessment burbot had been found in 158 lakes 	<ul style="list-style-type: none"> • Potential exploitation of larger older burbot by recreational anglers in principal fisheries. 	<ul style="list-style-type: none"> • Maintain the present amount of suitable habitat (a well oxygenated hypolimnion) for Burbot. • Determine the effects, if any, of 	<ul style="list-style-type: none"> • Continue to study the population dynamics of the burbot to establish relative population levels needed to sustain fisheries, especially on

Table 33. Goals, Objectives, Threats, and Strategies for Priority Inland Fish in Maine

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
	<p>and ponds, with a combined area of 459,265 acres. This represented less than 8% of the 2,706 lakes and ponds, which had been inventoried, but 48% of their total area.</p> <ul style="list-style-type: none"> • Maine’s three northern Fishery Management Regions account for 78% of the total area of the State’s burbot lakes. • One-half of the lakes with populations are over 1,000 acres in area. • Burbot commonly occur in the headwaters of the larger river systems, especially the Kennebec, Penobscot, and St. John and are conspicuously absent from the smaller coastal drainages. • Burbot inhabit many of Maine’s larger rivers. No information is available on the distribution of the species in the State’s 31,800 miles of stream habitat. • Of all lakes containing burbot, 104 (258,978 acres) are managed principally for coldwater species, 44 (189,619 acres) are managed for both coldwater and warmwater species, a 9 (10,591 acres) are managed for warm water species and 1 (77 acres) is 	<ul style="list-style-type: none"> • Habitat degradation by human development. • Potential inappropriate water level management on lakes and ponds controlled by dams 	<p>winter draw downs spawning by in the various controlled lakes.</p> <ul style="list-style-type: none"> • Seek assistance from the Cooperative Fishery Unit and other non-Department to conduct life history studies on the burbot. • As needed, implement a public information program to promote burbot regulations. • Continue to support strict adherence to LURC, MDEP, and all other agencies’ laws designed to protect the environment. • Continue to survey Maine’s riverine habitat. 	<p>principal fishery waters.</p> <ul style="list-style-type: none"> • Request that all Regions report burbot catch statistics on all waters currently being surveyed for data on other coldwater species. • Conduct creel surveys designed to provide data on incidental daytime as well as nighttime burbot fisheries. • Develop burbot regulation options to address various fishery problems that may arise. • Select representative water in various Regions upon which population studies might be conducted as time and manpower permit.

Table 33. Goals, Objectives, Threats, and Strategies for Priority Inland Fish in Maine

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
	managed for baitfish. <ul style="list-style-type: none"> • Burbot lake habitat is not expected to change significantly. • More is known about the distribution and habitat of the burbot than about the abundance of the species. 			

Figure 16. Map of Maine's Fisheries and Wildlife Management Regions.

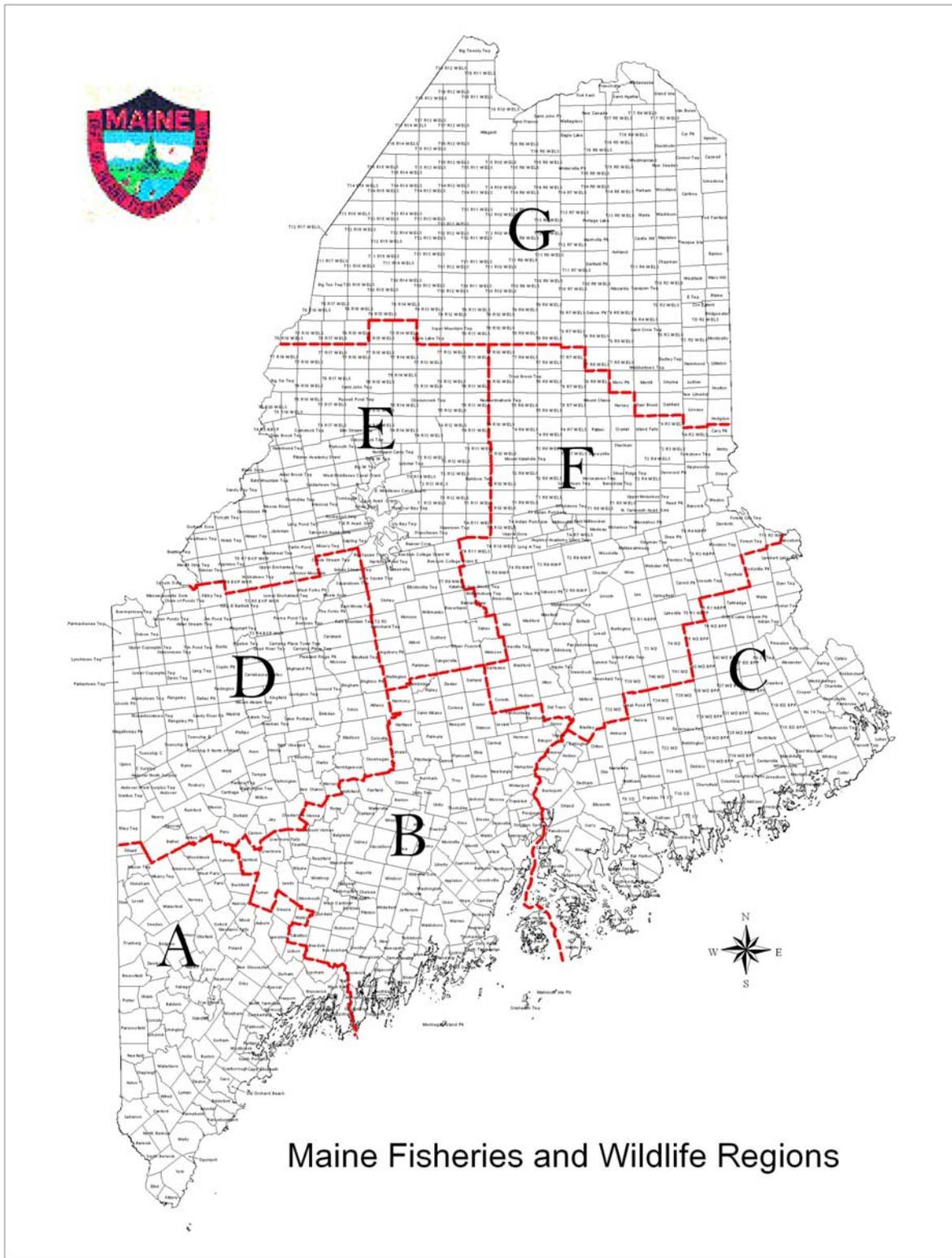


Table 34. Goals, Objectives, Threats, and Strategies for Priority Mammals by Habitat.

Featured Species

Canada Lynx.....	230
Eastern Small-footed Myotis.....	233
New England Cottontail	231
Northern Bog Lemming.....	229
Penobscot Meadow Vole.....	224
Wolf.....	231

Habitats

COASTAL	224
Rocky Coastline and Islands (CC)	224
Penobscot Meadow Vole	224
FRESHWATER	225
Lakes and Ponds (WL)	225
Emergent Marsh and Wet Meadows (WM)	225
Rivers and Streams (WR)	225
UPLAND	226
Deciduous and Mixed Forest (UD)	228
Coniferous Forest (UC)	228
Dry Woodland and Barrens (<60% canopy cover) (UB)	229
Mountaintop Forest (incl. Krummholz) (UM)	229
Northern Bog Lemming.....	229
Alpine (summits & tablelands above treeline) (UA)	230
Shrub / Early Successional (incl. regen. forest) (US)	230
Canada Lynx.....	230
New England Cottontail	231
Wolf.....	231

Table 34. Goals, Objectives, Threats, and Strategies for Priority Mammals by Habitat.

Habitats (continued)

Urban / Suburban (UU)	232
Cliff Face and Rocky Outcrop (incl. talus) (UR)	232
Eastern Small-footed Myotis	232
Caves and Mines (UCM)	233

Table 34. Goals, Objectives, Threats, and Strategies for Priority Mammals by Habitat.

COASTAL

Associated Species:

SPECIES	PRIORITY
Penobscot Meadow Vole	1

The Penobscot meadow vole occupies upland (US, UG) and wetland habitats on off shore islands. It is separated by water from meadow voles found on the mainland and is recognized as a separate subspecies. Because the threats to and objectives for this species do not involve threats to coastal habitats they will be discussed under species-specific threats and objectives.

Rocky Coastline and Islands (CC)

Species Specific Objectives:

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
Penobscot Meadow Vole	<ul style="list-style-type: none"> Recorded on 3 Islands in Penobscot Bay. DNA/ morphometric investigations by Lowry support subspecies status State special concern Federal special concern G1 	<ul style="list-style-type: none"> Limited distribution Possible habitat loss Genetic swamping by introduced <i>M. p. pennsylvanicus</i> from mainland 	<ul style="list-style-type: none"> If habitat needs/threats are identified address through easements, cooperative agreements or other means. Provide information on Penobscot meadow vole and risks posed by the introduction of mainland voles through agricultural products and nursery stock. 	<ul style="list-style-type: none"> Survey islands near North Haven, Islesboro, and Tumbledown Dick for presence and taxonomic status of meadow voles to determine range. Identify habitat used and determine if any threats exist

Table 34. Goals, Objectives, Threats, and Strategies for Priority Mammals by Habitat.

FRESHWATER

Associated Species:

SPECIES	PRIORITY
American Beaver	3

Beaver are included as a priority species because they are a keystone species whose activities have positive and negative impacts on the habitats of several other priority species rather than because of concerns for beavers or their habitat.

Freshwater Lakes and Ponds (WL)

Associated Species:

SPECIES	PRIORITY
American Beaver	3

Emergent Marsh and Wet Meadows (WM)

Associated Species:

SPECIES	PRIORITY
American Beaver	3

Rivers and Streams (WR)

Associated Species:

SPECIES	PRIORITY
American Beaver	3

Table 34. Goals, Objectives, Threats, and Strategies for Priority Mammals by Habitat.

UPLAND

Associated Species:

SPECIES	PRIORITY	SPECIES	PRIORITY	SPECIES	PRIORITY
New England Cottontail	1	Caribou	3	Northern Long-eared Myotis	3
Canada Lynx	2	Eastern Pipistrelle	3	Puma	3
Eastern Small-footed Myotis	2	Eastern Red Bat	3	Rock Vole	3
Northern Bog Lemming	2	Hoary Bat	3	Silver-haired Bat	3
Wolf	2	Little Brown Myotis	3	Southern Flying Squirrel	3
Big Brown Bat	3	Long-tailed Shrew	3		

Threats:

- Habitat loss/alteration/fragmentation from development or forest maturation
- Roadkill
- Excessive take due to “nuisance” or intolerance
- Predation
- Climatic extremes near edge of range
- Habitat fragmentation, changes in stand age and composition due to forestry operations
- Loss of roost/den trees
- Contaminants
- Human disturbance
- Habitat loss on migration and wintering areas (bats)

Goal: Identify, protect and enhance populations of priority species in upland habitats.

Upland Objectives:

1. *Identify and protect high priority habitats.*

Strategy	Task
Identify high-value upland habitats	<ul style="list-style-type: none"> • Continue surveys to identify habitats hosting rare mammals. • Combine field survey and research to identify specific characteristics of habitats important to priority mammals.

Table 34. Goals, Objectives, Threats, and Strategies for Priority Mammals by Habitat.

Strategy	Task
	<ul style="list-style-type: none"> • Using guidance from the Natural Heritage network refine element occurrence and mapping standards for depicting priority habitats for rare mammals. • Periodically resurvey historic sites to confirm status.
Protect/manage high-value upland	<ul style="list-style-type: none"> • Develop regulatory habitat protection provisions for projects subject to review under the Maine Endangered Species Act (MESA) and other regulations protecting Maine’s wildlife (e.g. Natural Resources Protection Act, Site Location Law). • Develop nonregulatory habitat management guidelines for priority habitats (e.g. roost trees, early successional habitats) and species for distribution to landowners, towns, landtrusts, and others. • Cooperate with NGOs, local landtrusts, municipalities, government agencies, private landowners and other partners to conserve/manage habitats for priority mammals using fee acquisition, cooperative agreements, purchase of development rights, tax incentives, cost sharing programs (WHIP, LIP) and improved comprehensive planning. • Implement environmental outreach efforts to gain support for priority mammals. • Create and restore habitat in focus areas through manipulation, augmentation, connecting smaller forest blocks to create large patches, etc • Assess the effects of various logging practices on occurrence of important habitat features and stand types. (roosts/den/maternity sites/mast producing stands.) • Develop specific habitat management guidelines for high priority species. • Leave suitable roost trees, especially near water.
Target large undeveloped blocks for protection/management	<ul style="list-style-type: none"> • Identify all remaining large undeveloped/forest blocks and collect ownership/contact information. • Research best method of protection—cooperative agreements, acquisition, or easements from willing sellers

2. Monitor and enhance populations of high priority species.

Strategy	Task
Monitor priority species to determine population size, status and trends.	<ul style="list-style-type: none"> • Establish baseline locations and trends for rare mammal populations • Resurvey historical sites to reconfirm presence and status. • Coordinate specific population monitoring objectives and methods with regional partners (e.g., USFWS, neighboring state wildlife agencies).
Enhance populations of priority species	<ul style="list-style-type: none"> • Consider intensive population management such as transplanting individuals to isolated unoccupied habitat.

Table 34. Goals, Objectives, Threats, and Strategies for Priority Mammals by Habitat.

Deciduous and Mixed Forests (UD)

Associated Species:

SPECIES	PRIORITY	SPECIES	PRIORITY	SPECIES	PRIORITY
Canada Lynx	2	Eastern Red Bat	3	Puma	3
Eastern Small-footed Myotis	2	Hoary Bat	3	Silver-haired Bat	3
Wolf	2	Little Brown Myotis	3	Southern Flying Squirrel	3
Big Brown Bat	3	Long-tailed Shrew	3		
Eastern Pipistrelle	3	Northern Long-eared Myotis	3		

Species Specific Objectives:

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
Canada Lynx	See Shrub / Early Successional			
Eastern Small-footed Myotis	See Cliff Face and Rocky Outcrop			
Wolf	See Shrub / Early Successional			

Coniferous Forest (UC)

Associated Species:

SPECIES	PRIORITY	SPECIES	PRIORITY	SPECIES	PRIORITY
Canada Lynx	2	Caribou	3	Puma	3
Wolf	2	Hoary Bat	3		

Species Specific Objectives:

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
Canada Lynx	See Shrub / Early Successional			
Wolf	See Shrub / Early Successional			

Table 34. Goals, Objectives, Threats, and Strategies for Priority Mammals by Habitat.

Dry Woodland and Barrens (<60% canopy cover) (UB)

Associated Species:

SPECIES	PRIORITY
Puma	3

Mountaintop Forest (incl. Krummholz) (UM)

Associated Species:

SPECIES	PRIORITY	SPECIES	PRIORITY
Northern Bog Lemming	2	Long-tailed Shrew	3
Caribou	3	Puma	3

Species Specific Objectives:

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
Northern Bog Lemming	<ul style="list-style-type: none"> Known from 5 sites in Maine State threatened Federal special concern Flagged by NEWTC 	<ul style="list-style-type: none"> Limited distribution Development Isolated populations 	<ul style="list-style-type: none"> Protect known sites When potential sites are proposed for development, determine if NBLs are in the area and if so, work to minimize or prevent impact 	<ul style="list-style-type: none"> Search for additional sites Periodically monitor known sites

Table 34. Goals, Objectives, Threats, and Strategies for Priority Mammals by Habitat.

Alpine (summits & tablelands above treeline) (UA)

Associated Species:

SPECIES	PRIORITY
Rock Vole	3

Shrub / Early Successional (incl. regen. forest) (US)

Associated Species:

SPECIES	PRIORITY	SPECIES	PRIORITY	PRIORITY
New England Cottontail	1	Wolf	2	
Canada Lynx	2	Puma	3	

Species Specific Objectives:

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
Canada Lynx	<ul style="list-style-type: none"> • Edge of species range • Found primarily in northern and western Maine; • State Species of Special Concern • Federal Threatened • Numbers fluctuate with prey (snowshoe hare) 	<ul style="list-style-type: none"> • Edge of species range • Predation • Incidental take (e.g. roadkill, hunting, trapping, snaring) • Illegal take: currently low • Habitat loss: recent studies indicate that Maine forest currently has the greatest amount of early successional habitat as a result of budworm and related forest clearing. Forest maturation and current forest mgmt activities 	<ul style="list-style-type: none"> • Identify stand and sub-stand scale habitat needs • Identify lynx denning habitat • Provide recommendations/guidelines to private landowners to maintain and/or promote habitat for snowshoe hare and lynx • Provide information and education materials to trappers and hunters to minimize incidental take of lynx • Share data with USFWS to facilitate recovery and critical habitat planning. 	<ul style="list-style-type: none"> • Determine population status • Develop technique for estimating population • Develop long-term monitoring protocol/program • Determine if lynx and hare populations cycle at edge of range • Determine species distribution • Identify threats and limiting factors • Determine hare population trends • Determine hare densities in stands with different forest management

Table 34. Goals, Objectives, Threats, and Strategies for Priority Mammals by Habitat.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
		<p>may reduce amt of early successional forest in the future.</p>		
<p>New England Cottontail (NEC)</p>	<ul style="list-style-type: none"> • Limited to small patches of habitat in York and Cumberland counties. • Only about 17% of former range in the state is currently occupied. • Many habitat patches are too small or too isolated to sustain populations of NEC • Populations outside of Maine in similar condition. • At northern edge of range • State special concern based on lack of information but recent surveys suggests higher listing status should be recommended. • Federal special concern, positive 90 day finding, 12 month finding pending. • Flagged by NEWDTC 	<ul style="list-style-type: none"> • Habitat fragmentation • Predation • Habitat loss by development or maturation • Road kill • Non-native invasive plants may result in habitat with adequate cover but low quality and quantity of food • Incidental take from hunting 	<ul style="list-style-type: none"> • Identify power line and roadside rights-of-way and other areas (i.e. riparian areas) that could be managed to provide travel corridors for NEC • Coordinate habitat protection and management of areas owned by federal, state, local government or NGO’s and willing private landowners to ensure that some patches supporting a metepopulation are within the stage that will support rabbits at all times. • Increase utilization of Farm Bill programs to benefit early successional species • Develop informational materials for use on land open to the public that is managed for NEC. • Develop outreach materials on NEC habitat management and habitat management/incentive programs available to landowners 	<ul style="list-style-type: none"> • Develop and implement a monitoring program for both rabbits and habitat. • Determine effectiveness of introducing New England cottontail into unoccupied habitats w/ no natural source population. • Develop habitat management protocols.
<p>Wolf</p>	<ul style="list-style-type: none"> • Believed extirpated but there are occasional reports/specimens of uncertain origin • State special concern • Federal threatened 	<ul style="list-style-type: none"> • Intolerance with resulting illegal take • Unlikely that a sufficient number of animals would naturally recolonize to form a self sustaining 	<ul style="list-style-type: none"> • Develop outreach materials on how trappers and hunters can avoid incidentally harming wolves, minimizing wolf depredation of pets and livestock, and understanding 	<ul style="list-style-type: none"> • Investigate reports of large canids to determine species and if possible origin

Table 34. Goals, Objectives, Threats, and Strategies for Priority Mammals by Habitat.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
	<ul style="list-style-type: none"> Nearby populations in quebec 	<ul style="list-style-type: none"> population Incidental take (e.g. roadkill, hunting, trapping, snaring) 	<ul style="list-style-type: none"> the role of wolf predation on other wildlife populations 	

Urban / Suburban (UU)

Associated Species:

SPECIES	PRIORITY	SPECIES	PRIORITY
Big Brown Bat	3	Little Brown Myotis	3

Cliff Face and Rocky Outcrop (incl. talus) (UR)

Associated Species:

SPECIES	PRIORITY	SPECIES	PRIORITY
Eastern Small-footed Myotis	2	Puma	3

Species Specific Objectives:

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
Eastern Small-footed Myotis	<ul style="list-style-type: none"> Only a few reports of this species in the state but monitoring has been minimal. It is believed to be rare but status is poorly known. Only 1 hibernaculum w/ a few animals known in state. May require out of state sites. State special concern 	<ul style="list-style-type: none"> Lack of information on this species precludes listing specific threats at this time. Effect of West Nile Virus on all bat species is unknown at this time. 	<ul style="list-style-type: none"> Protect known hibernacula Develop outreach materials to inform the public about the importance of not disturbing bat hibernacula 	<ul style="list-style-type: none"> Identify important roost/maternity habitat Continue search for hibernacula Determine range, abundance and trend w/in state

Table 34. Goals, Objectives, Threats, and Strategies for Priority Mammals by Habitat.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
	<ul style="list-style-type: none"> Federal special concern Flagged by NEWDTC 	<ul style="list-style-type: none"> Level of mercury contamination on all bat species is unknown at this time. 		

Caves and Mines (UCM)

Associated Species:

SPECIES	PRIORITY	SPECIES	PRIORITY	SPECIES	PRIORITY
Eastern Small-footed Myotis	2	Eastern Pipistrelle	3	Northern Long-eared Myotis	3
Big Brown Bat	3	Little Brown Myotis	3		

Species Specific Objectives:

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
Eastern Small-footed Myotis	See Cliff Face and Rocky Outcrop			

Table 35. Goals, Objectives, Threats, and Strategies for Priority Diadromous Fish in Maine.

Featured Species

Atlantic Sturgeon	235
Shortnose Sturgeon.....	236
Striped Bass	237
Atlantic Salmon.....	238
American Shad	240

Table 35. Goals, Objectives, Threats, and Strategies for Priority Diadromous Fish in Maine.

SPECIES	PRIORITY
Atlantic Sturgeon	1

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
Atlantic Sturgeon	<ul style="list-style-type: none"> Known to occur in Kennebec, Androscoggin, and Sheepscot Rivers Current status unknown in Penobscot River NMFS Species of Concern Managed in accordance to Amendment 1 to the Interstate Fishery Management Plan For Atlantic Sturgeon, Atlantic States Marine Fisheries Commission. July, 1998 It is unlawful for any person to take, catch, or destroy any shortnose or Atlantic sturgeon from the coastal waters of Maine It is unlawful for any person to possess any shortnose or Atlantic sturgeon within the State of Maine 	<ul style="list-style-type: none"> Habitat loss or degradation Bycatch 	<ul style="list-style-type: none"> Restore spawning nursery habitat. Accomplished in Kennebec River system with removal of Edwards Dam. Support Penobscot initiative to remove Veazie and Great Works Dams. Establish 20 protected year classes of females. Keep fishery closed for sufficient time period to reestablish spawning stocks and increase numbers in current spawning stocks. Reduce or eliminate bycatch mortality. 	<ul style="list-style-type: none"> Determine abundance, age structure, and recruitment in the Kennebec River system and Penobscot River. Document distribution and map sturgeon concentration areas in the Kennebec River system and Penobscot. Identify critical habitat for population segments. Assess mortality factors and define take limits. Assess mortality from incidental capture.

Table 35. Goals, Objectives, Threats, and Strategies for Priority Diadromous Fish in Maine.

SPECIES	PRIORITY
Shortnose Sturgeon	1

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
Shortnose Sturgeon	<ul style="list-style-type: none"> Known to occur in Kennebec, Androscoggin, and Sheepscot Rivers One specimen captured in Penobscot on June 30, 1978 Listed as Endangered under the ESA. Distinct Population Segments in Kennbebec System and Penobscot Population estimates in Kennebec System: 1977-81, 7,222 (5046-10,765); 1998-2000, 9488 (6942-13,358). Spawning populations and habitat identified in Androscoggin and Kennebec Rivers. 17 miles additional habitat with removal of Edwards Dam. No assessments have been done. Directed survey for shortnose sturgeon was conducted in the Penobscot River during 1994 and 1995. No shortnose were captured in 409 net hours of gill net effort. 	<ul style="list-style-type: none"> Habitat degradation or loss (dams, bridge construction, channel dredging, and pollutant discharges). Mortality (dredging, impingement on cooling water intake screens, and incidental capture in other fisheries). 	<ul style="list-style-type: none"> Restore spawning and nursery habitat. Accomplished in Kennebec system with removal of Edwards Dam. Support Penobscot River initiative to remove Veazie and Great Works Dams. 	<ul style="list-style-type: none"> From Recovery Plan: Determine abundance, age structure, and recruitment in Penobscot River. Continue studies in Kennebec. Document distribution and map sturgeon concentration areas in Penobscot. Continue studies in Kennebec. Identify critical habitat for population segments. Assess mortality factors and define take limits. Assess mortality from incidental capture.

Table 35. Goals, Objectives, Threats, and Strategies for Priority Diadromous Fish in Maine.

SPECIES	PRIORITY
Striped Bass	1

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
Striped Bass	<ul style="list-style-type: none"> • Native Population known to occur in the Kennebec River system. • Current status unknown in Penobscot River 	<ul style="list-style-type: none"> • Habitat loss/ degradation • Overfishing 	<ul style="list-style-type: none"> • Restore spawning and nursery habitat in Penobscot River. • Continue management of striped bass through the Atlantic States Marine Fisheries Commission, 	<ul style="list-style-type: none"> • Locate, delineate, and map spawning and nursery areas for native striped bass in the Kennebec River system. • Determine migratory movements and habitat use for native striped bass in the Kennebec River system. Determine if native striped bass overwinter in historical sites and document new sites. • Continue to monitor population with ongoing beach seine survey to obtain index of juvenile abundance, • Assess whether striped bass are spawning in Penobscot river, • Determine potential for restoring striped bass to Penobscot with the removal of Veazie and Great Works dams.

Table 35. Goals, Objectives, Threats, and Strategies for Priority Diadromous Fish in Maine.

SPECIES	PRIORITY
Atlantic Salmon	1

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
Atlantic Salmon	The Gulf of Maine Distinct Population Segment (GOM DPS) was listed as Endangered by NMFS and USFWS on November 17, 2000, effective December 18, 2000 (61 FR 69459). The GOM DPS was defined as all naturally reproducing wild populations and populations of river-specific hatchery Atlantic salmon found north of and including tributaries of the lower Kennebec River to, but not including the mouth of the St. Croix River at the United States-Canada border. The rule excludes populations in the Penobscot and Kennebec Rivers above legal head of tide. However, Atlantic salmon inhabiting any stream or river within the geographic range are listed, including know populations in the Dennys, East Machias, Machias, Pleasant, Narraguagus, Sheepscot, Ducktrap, and Cove Brook.	<ul style="list-style-type: none"> • Habitat loss and degradation • Dams and other fish passage obstructions • Introduced non-native fish species • Poaching and by catch • Acid deposition • Contaminants, Pesticides • Predation, Disease, Parasites • Low populations of other diadromous fishes • Land use (agriculture, forestry, urbanization) • Consumptive water use • Climate change 	<ul style="list-style-type: none"> • Keep the people of Maine connected to the species • Reduce non point source sediment input to rivers • Connect habitat throughout watersheds • Improve or install upstream and downstream passage facilities at dams and other obstacles to provide access to and from historic spawning areas, or remove these obstacles entirely. • Education on the importance of restoring native diadromous fish communities to Maine’s Atlantic salmon rivers 	<ul style="list-style-type: none"> • Document quantity and quality of habitat in rivers within the GOM DPS and other known salmon rivers • Document adult returns and juvenile and smolt production in selected watersheds • Understand population dynamics of Maine Atlantic salmon in freshwater, estuary, and ocean • Understand migratory behavior of smolt and adult Atlantic salmon in Maine Rivers • Understand physiology of Atlantic salmon in Maine Rivers • Evaluate effectiveness of stocking strategies to establish reproducing populations

Table 35. Goals, Objectives, Threats, and Strategies for Priority Diadromous Fish in Maine.

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH ACTIONS	SURVEY & RESEARCH ACTIONS
	<p>Outside the listed geographic range, Atlantic salmon are also known to occur in the St. Croix, Penobscot, Kennebec, and Saco Rivers.</p> <p>The MASC compiles and reports adult returns annually to the US Atlantic Salmon Assessment Committee. http://www.nefsc.noaa.gov/USASAC/</p> <p>Returns to selected rivers in the GOM DPS less than 100 in last 5 years.</p>			

Table 35. Goals, Objectives, Threats, and Strategies for Priority Diadromous Fish in Maine.

SPECIES	PRIORITY
American Shad	2

SPECIES	STATUS & DISTRIBUTION	THREATS	HABITAT & OUTREACH OBJECTIVES	SURVEY & RESEARCH OBJECTIVES
American Shad	<ul style="list-style-type: none"> • Remnant Populations in Piscataqua (Salmon Falls), Nonesuch, Royal, Sheepscot, St. George, Penobscot, Union, Tunk, Narraguagus, Pleasant, East Machias, and Dennys rivers. • Prespawning adult American shad are stocked in the Androscoggin River, and cultured • American shad fry are being stocked in the Kennebec, Androscoggin, Medomak, and Saco Rivers. Fish passage present in the Saco River. Ineffective fish passage on the Androscoggin is being assessed. Shad restoration plan is being prepared for the Penobscot River. 	<ul style="list-style-type: none"> • Dams and other physical obstructions • Land use (farming, logging and urbanization) • Overfishing 	<ul style="list-style-type: none"> • Improve or install passage facilities at dams and other obstacles to provide upstream • Passage to historic spawning areas, or remove these obstacles entirely. • Improve water quality in areas where water quality degradation may have affected stocks • Continue shad stocking programs for the interim 	<ul style="list-style-type: none"> • Evaluate current fish passage facilities for efficiency. • Evaluate and improve downstream passage for adults and juveniles. • Evaluate effectiveness of shad stocking program. • Continue beach seine survey in Kennebec River system to monitor abundance of juvenile alosines, • Locate, delineate, and map spawning and nursery areas for shad in all coastal streams and rivers. • Assess the magnitude of shad bycatch • Discard mortality (including hook and release mortality) in marine fisheries.

5.2 THREATS TO KEY HABITATS

Because of the complexity of species-specific habitat threats, we did not attempt to summarize and discuss all threats, but refer the reader to Tables 30-35. However, for ease of reference, we developed Table 36, which is a summary of threats and potential threats to the 21 habitats used throughout this document, including threats that are common to more than one habitat type (e.g. climate change, pollution, development, contaminants, etc.), and threats that are unique to a particular habitat. Threats to the habitats were identified based on their potential effect on SGCN. Threats such as disturbance from human activity are included under species-specific threats and not under threats to the habitat. None of the lists are comprehensive, but they are designed to serve as an indicator of the scope of threats and potential threats that are affecting, or may affect, each habitat. For additional information, please refer to the *State Overview* (Chapter 2.4), *Key Habitats and Natural Communities* (Chapter 4.1), and *Beginning with Habitat* (Chapter 6.2.2, Appendix 12) sections of this Strategy.

Table 36. Summary of Threats and Potential Threats to 21 Key Habitats in Maine.	
HABITAT TYPE	THREATS AND POTENTIAL THREATS
COASTAL	
Marine Open Water (CO)	Climate change / rising sea level; Gulf Stream or current shift or weakening; oil spills; non-point and point source pollution, and other sources of contaminants; invasive aquatic plants and animals; impacts to benthic substrate (e.g. dredging, dragging, sedimentation); over-harvest of commercial resources).
Estuaries and Bays (CE)	Habitat loss or degradation from development and road-building in riparian zone and adjacent uplands; watershed conversion to impervious surfaces (e.g. pavement, roofs); impacts to hydrology (e.g. impoundments, dredging channelization); impacts to benthic substrate (e.g. dredging, sedimentation, dragging); degraded stream morphology and riparian buffers; eelgrass loss; oil spills; non-point and point source pollution, and other sources of contaminants; invasive aquatic plants and animals; aquatic vegetation control and/or removal; intensive forestry operations in riparian zones and adjacent uplands; erosion; climate changes / rising sea levels; aquaculture; over-harvest of commercial resources.
Rocky Coastline and Islands (CC)	Habitat loss or degradation from development and road-building in riparian zone and adjacent uplands; oil spills; non-point and point source pollution, and other sources of contaminants; intensive forestry operations in riparian zones and adjacent uplands; erosion; commercial resource extraction (e.g. gravel and other mining activities); climate changes / rising sea level; over-harvest of commercial resources (e.g. over-fishing, over-harvest of seaweeds); aquaculture.
Unconsolidated Shore (beaches and mudflats) (CU)	Beach cleaning activities; habitat loss or degradation from development and road-building in riparian zones and adjacent uplands; watershed conversion to impervious surfaces (e.g. pavement, roofs); impacts to benthic substrate (e.g. dredging, sedimentation); dredge spoil deposition; oil spills; non-point and point source pollution, and other sources of contaminants; invasive plants and animals; aquatic vegetation control and/or removal; intensive forestry operations in riparian zones and adjacent uplands; erosion; storm events; climate changes / rising sea levels; habitat degradation from incompatible recreational activity; over-harvest of commercial resources.
Estuarine Emergent Salt Marsh (CS)	Habitat loss or degradation from development and road-building in riparian zone and adjacent uplands; watershed conversion to impervious surfaces (e.g. pavement, roofs); impacts to hydrology (e.g. draining, ditching); impacts to benthic substrate (e.g. dredging, ditching, sedimentation); oil spills; non-point and point source pollution, and other sources of contaminants; invasive aquatic plants and animals; aquatic vegetation control and/or removal; intensive forestry operations in riparian zones and adjacent uplands; erosion; some forms of marsh restoration and enhancement; climate changes / rise in sea level.

Table 36. Summary of Threats and Potential Threats to 21 Key Habitats in Maine.	
HABITAT TYPE	THREATS AND POTENTIAL THREATS
FRESHWATER	
Lakes and Ponds (WL)	Habitat loss/alteration from development and road building in associated wetlands, riparian zones, and adjacent uplands; impacts to hydrology (e.g. draining); inappropriate water level management on lakes controlled by dams; watershed conversion to impervious surfaces (e.g. pavement, roofs); impacts to benthic substrate (e.g. scouring, sedimentation, loss of fine sediments); invasive aquatic plants and animals; aquatic vegetation control and/or removal; intensive forestry practices in riparian zones and adjacent uplands; commercial resource extraction (e.g. sunken log salvage); oil spills; aerial pesticide spraying, acid precipitation, air-borne mercury, and other sources of non-point and point contaminants and pollution; climate changes; inadequate regulatory protection for associated habitat types (e.g. headwater streams, forested wetlands, and pocket swamps); habitat degradation from incompatible or intensive recreational activity (e.g. motor boat wave-wash).
Emergent Marsh and Wet Meadows (WM)	Habitat loss/alteration from development and road building in wetland, riparian zones, and adjacent uplands; impacts to hydrology (e.g. impoundments, ditching, draining); watershed conversion to impervious surfaces (e.g. pavement, roofs); impacts to benthic substrate (e.g. scouring, sedimentation, loss of fine sediments, disturbance); invasive aquatic plants and animals; aquatic vegetation control and/or removal; intensive forestry practices in riparian zones and adjacent uplands; aerial pesticide spraying, acid precipitation, air-borne mercury, and other sources of point and non-point contaminants and pollution; motor boat wave-wash; climatic changes; inadequate regulatory protection for associated habitat types (e.g. headwater streams, forested wetlands, and pocket swamps); flooding and inappropriate water level management in marshes affected by an impoundment.
Forested Wetland (WF)	Habitat loss/alteration from development and road building in wetland, riparian zones, and adjacent uplands; impacts to hydrology (e.g. impoundments, ditching, draining, road building); watershed conversion to impervious surfaces (e.g. pavement, roofs); intensive forestry practices in wetland, riparian zone, and adjacent uplands; aerial pesticide spraying, acid precipitation, air-borne mercury, and other point and non-point sources of contaminants and pollution; climate changes; inadequate regulatory protection for forested wetlands; flooding and inappropriate water level management in forested wetlands affected by an impoundment.
Shrub-scrub Wetland (WS)	Habitat loss/alteration from development and road building in wetland, riparian zone, and adjacent uplands; impacts to hydrology (e.g. impoundments, ditching, draining, road building); watershed conversion to impervious surfaces (e.g. pavement, roofs); intensive forestry practices in riparian zone and adjacent uplands; aerial pesticide spraying, acid precipitation, air-borne mercury, and

Table 36. Summary of Threats and Potential Threats to 21 Key Habitats in Maine.	
HABITAT TYPE	THREATS AND POTENTIAL THREATS
	other point and non-point sources of contaminants and pollution; motor boat wave-wash; climate changes; inadequate regulatory protection for associated habitat types (e.g. headwater streams, forested wetlands, and pocket swamps); flooding and inappropriate water level management in wetlands affected by an impoundment.
Peatlands (WP)	Habitat loss/alteration from development and road building in wetland, riparian zone, and adjacent uplands; impacts to hydrology (e.g. ditching, draining); watershed conversion to impervious surfaces (e.g. pavement, roofs); invasive plants; intensive forestry practices in riparian zone and adjacent uplands; commercial resource extraction (e.g. peat mining); aerial pesticide spraying, acid precipitation, air-borne mercury, and other point and non-point sources of contaminants and pollution; climate changes; inadequate regulatory protection for associated habitat types (e.g. headwater streams, forested wetlands, and pocket swamps).
Rivers and Streams (WR)	Habitat loss/alteration from development and road building in associated wetlands, riparian zones, and adjacent uplands; impacts to hydrology (e.g. impoundments, draining, channelization); watershed conversion to impervious surfaces (e.g. pavement, roofs); impacts to benthic substrate (e.g. scouring, sedimentation, loss of fine sediments); invasive plants and animals; aquatic vegetation control and/or removal; intensive forestry practices in riparian zones and adjacent uplands; commercial resource extraction (e.g. sunken log salvage, sand and gravel mining); oil spills; aerial pesticide spraying, acid precipitation, air-borne mercury, and other point and non-point sources of contaminants and pollution; motor boat wave-wash; climate changes; inadequate regulatory protection for associated habitat types (e.g. headwater streams, forested wetlands, and pocket swamps); flooding and ice jams; inappropriate flow regimes on rivers and streams affected by dams.
UPLAND	
Deciduous and Mixed Forest (UD)	Large-scale forestry operations that result in habitat fragmentation, change in over- and under-story species composition (stand conversion); significant reduction in rotation length resulting in reduction in area of mature forest stands; loss of large blocks of forested habitat (> 10,000 acres) and connectivity between large blocks; habitat loss and fragmentation associated with development and building of permanent roads; acid precipitation, aerial pesticide spraying, mercury deposition and other sources of point and non-point contaminants and pollution; climate changes; commercial resource extraction (e.g. sand and gravel and other mining activities); disease and insect outbreaks, especially of exotic pathogens and invertebrates (e.g. Gypsy moth, Asian long-horned beetle, emerald ash borer); erosion from overstory removal and soil compaction; wildfire, severe storms, or other catastrophic events.

HABITAT TYPE	THREATS AND POTENTIAL THREATS
Coniferous Forest (UC)	Large-scale forestry operations that result in habitat fragmentation, change in over- and under-story species composition (stand conversion); significant reduction in rotation length resulting in reduction in area of mature forest stands; loss of large blocks of forested habitat (> 10,000 acres) and connectivity between large blocks; habitat loss and fragmentation associated with development and building of permanent roads; acid precipitation, aerial pesticide spraying, mercury deposition and other sources of point and non-point contaminants and pollution; climate change; commercial resource extraction (e.g. sand and gravel and other mining activities); disease and insect outbreaks, especially of exotic pathogens and invertebrates (e.g. Hemlock wooly adelgid); erosion from overstory removal and soil compaction; wildfire, severe storms, or other catastrophic events.
Dry Woodland and Barrens (<60% canopy cover) (UB)	Large-scale forestry operations that result in habitat fragmentation, change in over- and under-story species composition (stand conversion); reduction in rotation length, and reduction in mature forest stands; habitat loss and fragmentation associated with development and road building; point and non-point sources of contaminants and pollution; climate change; acid precipitation; commercial resource extraction (e.g. sand and gravel and other mining activities); aerial pesticide spraying; incompatible fire management (e.g. fire suppression, seasonality of burns, wildfire); disease and insect infestation; erosion from overstory removal and soil compaction; severe storms or other catastrophic events.
Mountaintop Forest (includes Krummholz) (UM)	Habitat loss and degradation from development and building of permanent roads; climate change; acid precipitation, mercury deposition, and other point and non-point sources of contaminants and pollution; communication towers; wind energy development; disease and insect infestation.
Alpine (summits & tablelands above tree line) (UA)	Habitat degradation from incompatible recreational activity; climate change; acid precipitation, mercury deposition, and other point and non-point contamination and pollution; communication towers; wind energy developments.
Shrub / Early Successional (includes regenerating forest) (US)	Habitat loss and fragmentation from development and road building; loss of large clearcuts that create large, even-aged, early successional stands; forest management practices that accelerate succession (pre-commercial thinning, tree planting); natural succession; acid precipitation, mercury deposition and other point and non-point contaminants and pollution; habitat loss associated with commercial resource extraction (e.g. gravel and other mining activities); incompatible fire management (e.g. fire suppression, seasonality of burns, wildfire); disease and insect infestation.
Grassland / Agriculture / Old Field (shrubs <50%) (UG)	Loss of open land associated with a decline in farming, human development, and successional reversion to forest; habitat loss/alteration and fragmentation development and road building; changes in agricultural practices; pesticide

HABITAT TYPE	THREATS AND POTENTIAL THREATS
	application and other point and non-point sources of contaminants and pollution; incompatible mowing schedules.
Urban / Suburban (UU)	Changes in building construction (e.g. loss of flat roofs used by Night Hawks); loss / alteration to remaining habitats from development and road building; pesticide and herbicide application (e.g. mosquito control and lawn management) and other point and non-point sources of contaminants and pollution; “sterilization” of open space for lawns, groomed landscapes, etc.
Cliff Face and Rocky Outcrop (including talus) (UR)	Inappropriate or intensive recreational activities (e.g. rock climbing); erosion.
Caves and Mines (UCM)	Pollution; excessive recreational use; changes in surrounding habitats that affect subterranean temperatures and/or humidity; closing of mines (bulldozed of otherwise filled in).