

Appendix B



USFWS

Nelson's sharp-tailed sparrow and saltmarsh sharp-tailed sparrow

Resources of Concern

- Introduction
- Potential Resources of Concern for the Rachel Carson NWR
- Priority Resources of Concern
- Adaptive Management

I. Introduction

Congress has entrusted the Service with conserving and protecting migratory birds and fish, federally listed threatened and endangered species, inter-jurisdictional fishes, wetlands, and certain marine mammals. Those are known as “trust resources.” In addition to that mandate, each refuge has one or more purposes for which it was established that guide its management goals and objectives. Refuges also support other elements of biological diversity, including invertebrates, rare plants, unique natural communities, and ecological processes that contribute to biological diversity and integrity and environmental health at the refuge, ecosystem, and broader scales (USFWS 1999, 2003).

Given the many purposes, mandates, policies, regional, and national plans that can apply to a refuge, there is a need to identify the potential resources of concern and then prioritize those resources that the refuge is best suited to focus on in its management strategies. The Rachel Carson refuge used the process that follows in identifying priority resources of concern and developing habitat goals, objectives, and strategies to benefit these resources.

The Habitat Management Plan policy (620 FW) defines “resources of concern” as

“All plant and/or animal **species, species groups, or communities** specifically identified in Refuge purpose(s), System mission, or international, national, regional, State, or ecosystem conservation plans or acts. For example, waterfowl and shorebirds are a resource of concern on a refuge whose purpose is to protect ‘migrating waterfowl and shorebirds.’ Federal or State threatened and endangered species on that same refuge are also a resource of concern under terms of the respective endangered species acts.”

The phrases “resources of concern” and “conservation targets” are synonymous, and can be used interchangeably.

II. *Potential Resources of Concern for the Rachel Carson NWR*

In collaboration with other refuges in northeast New England, we developed a matrix of *potential* resources of concern for the region. To determine the potential resources of concern that would guide the management priorities at each refuge, we examined a multitude of guiding documents and other information sources. Those typically identify focal species, species groups, or habitats, and typically fall into three categories:

- Legal Mandates
- USFWS Trust Resources
- Biological Integrity, Diversity, and Environmental Health Policy

❖ Legal Mandates

Statutory Authority

The National Wildlife Refuge Improvement Act of 1997 states that each refuge shall be managed to fulfill the mission of the Refuge System: “*To administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.*” (Refuge Improvement Act; Public Law 105-57)

Enabling Legislation (Establishing Orders)

The enabling legislation is the legal authority by which the refuge was initially established and lands acquired within the refuge.

On December 16, 1966, Congress established the Coastal Maine refuge under the authority of the Migratory Bird Conservation Act of 1929, which authorizes the purchase of land “for use as an inviolate sanctuary, or for any other management purpose, for migratory birds” (16 U.S.C. 715d).

In a formal dedication ceremony on June 27, 1970, the refuge was renamed in honor of scientist and author Rachel Carson, who spent much of her life along the Maine Coast.

Refuge Purposes

The National Wildlife Refuge Improvement Act of 1997 also states that each refuge “...shall be managed to fulfill...the specific purposes for which the refuge was established...” The purposes of a refuge are those specified in or derived from the law, proclamation, executive order, agreement, public land order, donation document, or administrative memorandum establishing, authorizing, or expanding the refuge, refuge unit, or refuge sub-unit.

The relationship between the System Mission and the purpose(s) of each refuge is defined in Section 3 of Director’s Order No. 132: “we view the System mission, goals, and unit purpose(s) as symbiotic; however, we give priority to achieving a unit’s purpose(s) when conflicts with the System mission or a specific goal exist.” Section 13 of that order indicates “Where a refuge has multiple purposes related to fish, wildlife, and plant conservation, the more specific purpose will take precedence in instances of conflict.” As stated in Section 14, “When we acquire an addition to a unit under an authority different from the authority used to establish the original unit, the addition also takes on the purpose(s) of the original unit, but the original unit does not take on the purpose(s) of the addition.”

The Rachel Carson refuge was established for the following purposes:

- “use as an inviolate sanctuary, or for any other management purpose, for migratory birds” (Migratory Bird Conservation Act).
- “suitable for... 1) incidental fish and wildlife oriented recreational development, 2) protection of natural resources, 3) conservation of endangered or threatened species...” (16 USC 460k-1; Refuge Recreation Act)
- “conservation of wetlands of the Nation in order to maintain the public benefits they provide to help fulfill international obligations contained in various migratory bird treaties and conventions...” (16 U.S.C. 13901(b); 100 Stat 3583; Emergency Wetlands Resources Act of 1986)
- “for the development, advancement, management, conservation and protection of fish and wildlife resources...” (16 USC Section 742f(a)(1) Fish and Wildlife Act of 1956)

❖ USFWS Trust Resources

Although the refuge purposes are the first obligation, managing for trust resources is also a priority for the refuge. Trust resources are further defined as follows:

Migratory Birds

A list of all species of migratory birds protected by the Migratory Bird Treaty Act (16 U.S.C. 703–711) and subject to the regulations on migratory birds are contained in subchapter B of title 50 CFR §10.13. The Migratory Birds Program also maintains subsets of that list that provide priorities at the national, regional, and ecoregional (bird conservation region) scales.

The primary sources of information that the refuge used to identify potential migratory birds species of concern included

- Bird Conservation Regions (BCR) 30 and 14 Plans (the Rachel Carson refuge lies in the transition zone between those two BCR regions).
- Continental and Regional Plans for land birds, waterfowl, shorebirds, and marsh birds

- Rocky Mountain Bird Observatory Species Assessment Database
- USFWS Birds of Conservation Concern
- Federal Threatened and Endangered species
- Status and Trend Information from refuge bird surveys

Interjurisdictional Fish

Those are “populations that two or more States, nations, or Native American tribal governments manage because of their geographic distribution or migratory patterns (710 FW 1.5H).” Examples include anadromous species of salmon and free-roaming species endemic to large river systems, such as paddlefish and sturgeon (Director’s Order No. 132, 6[c]).

A standard set of information resources is not available for fish. However, we used the best available information from the following sources:

- USFWS Regional Fisheries Office
- USFWS Gulf of Maine Coastal Program

Marine Mammals

The Marine Mammal Protection Act of 1972 (16 U.S.C. 1361–1421h) prohibits, with certain exceptions, the take of marine mammals in U.S. waters and by U.S. citizens on the high seas, and the importation of marine mammals and marine mammal products into the United States. The list of marine mammals under the jurisdiction of the Service follows:

- West Indian Manatee (Antillean and Florida)
- Polar Bear (AK Chukchi/Bering Seas and Beaufort Sea)
- Pacific Walrus (AK)
- Sea Otter (South Central AK, Southeast AK, Southwest AK, CA, and WA)

The Rachel Carson refuge is a coastal refuge in the Gulf of Maine, where many marine mammals are found; however, none of those are the species listed under Service jurisdiction.

Wetlands

The Emergency Wetlands Resources Act of 1986 (Pub. L. 99–645 (100 Stat. 3582). This act, approved November 10, 1986, authorizes the purchase of wetlands from Land and Water Conservation Fund monies, removing a prior prohibition on such acquisitions. It requires the Secretary to establish a National Wetlands Priority Conservation Plan, requires the States to include wetlands in their Comprehensive Outdoor Recreation Plans, and transfers to the Migratory Bird Conservation Fund amounts equal to the import duties on arms and ammunition.

The wetlands of the Rachel Carson refuge are included in the list of wetlands that warrant protection (USFWS Regional Wetlands Concept Plan, Emergency Wetlands Resources Act, October 1990).

Threatened and Endangered Species

The Endangered Species Act (16 U.S.C. 1531–1544, December 28, 1973, as amended 1976–1982, 1984 and 1988) states in Sec. 8A.(a) that “*The Secretary of the Interior (hereinafter in this section referred to as the “Secretary”) is designated as the Management Authority and the Scientific Authority for purposes of the Convention and the respective functions of each such Authority shall be carried out through the United States Fish and Wildlife*

Service.” The act also requires that all Federal departments and agencies shall seek to conserve endangered species and threatened species and shall utilize their authorities in furtherance of the purposes of this Act.

To identify Federal threatened or endangered species of relevance to the Rachel Carson refuge, we reviewed

- Federal Threatened and Endangered Species List
- Recovery Plans for Federal-listed species in our region

❖ **Biological Integrity, Diversity, and Environmental Health**

The National Wildlife Refuge System Improvement Act of 1997 states that, in administering the System, the Service shall “*ensure that the biological integrity, diversity, and environmental health of the System are maintained...*” (601 FW 3; also known as the “Integrity Policy”). The Service (2003) defines these terms as follows:

Biological Diversity—the variety of life and its processes, including the variety of living organisms, the genetic differences between them, and the communities and ecosystems in which they occur.

Biological Integrity—biotic composition, structure, and functioning at genetic, organism, and community levels comparable with historic conditions, including the natural biological processes that shape genomes, organisms, and communities.

Environmental Health—composition, structure, and functioning of soil, water, air, and other abiotic features comparable with historic conditions, including the natural abiotic processes that shape the environment.

Where possible management on the refuge restores or mimics natural ecosystem processes or functions and thereby maintains biological diversity, integrity, and environmental health. Given the continually changing environmental conditions and landscape patterns of the past and present (e.g., rapid development, climate change, sea level rise), relying on natural processes is not always feasible nor always the best management strategy for conserving wildlife resources. Uncertainty about the future requires that the refuge manage within a natural range of variability rather than emulating an arbitrary point in time. Rather than trying to maintain stability, we will maintain mechanisms that allow species, genetic strains, and natural communities to evolve with changing conditions.

As Meretsky et al. (2006) state, the Integrity Policy directs refuges to assess their importance across landscape scales and “forge solutions to problems arising outside refuge boundaries.” Regional land use problems include habitat fragmentation and lack of connectivity, high levels of contaminants, and incompatible development or recreational activities.

To assess the historical condition, site capability, current regional landscape conditions, and biological diversity and environmental health data pertinent to the refuge, we used the following resources:

- Maps and associated data on site capability
 - ◆ Kuchler’s (1964) potential natural vegetation
 - ◆ Soils, topography, and hydrology
 - ◆ History of natural disturbance patterns: e.g., fire, insect outbreaks, storms
- Map of current landscape condition showing conserved lands network, connectivity, land use patterns, and management/ownership trends surrounding the refuge
- Map of existing vegetation on the refuge, including distribution and abundance of invasive species

- Regional/Global Environmental Trends
 - ◆ Climate Change
 - ◆ Air pollution: e.g., mercury
 - ◆ Water pollution (Maine Department of Conservation)
- Maine Natural Areas Program information on rare, declining, or unique natural communities and plant populations
- Maine Wildlife Action Plan
- Status and Trend Information from refuge surveys and studies of sharp-tailed sparrows, waterfowl, shorebirds, breeding Neotropical land birds, marsh and wading birds, piping plovers and least terns, rare plants, anuran call counts, vernal pools, and New England cottontail.

❖ **Summary Table**

Table B.1 is a list of the *potential* wildlife species of concern for the refuge, based on the information compiled and analyzed under legal mandates, trust resources, and integrity policy. For rare plants and natural communities, we were able to identify the *priority rare plants and natural communities*, since those are more site-specific than wildlife (see table B.2).

Guide to Table B.1	
¹ Seasons on the Refuge	B =Breeding W =Wintering M =Migration YR =Year-Round
² Federal T&E	Federal Endangered Species List T =Threatened E =Endangered
³ State T&E	State of Maine Threatened and Endangered Species List T =Threatened E =Endangered SC =Special Concern
⁴ BCR30	December 6-9, 2004, Cape May, New Jersey Bird Conservation Region 30 Meeting HH =Highest Priority H =High Priority M =Moderate Priority
⁵ BCR 14	Bird Conservation Region 14: Atlantic Northern Forest; Dettmers 2004. Draft: Blueprint for the Design and Delivery of Bird Conservation in the Atlantic Northern Forest. USFWS.
⁶ USFWS Birds of Conservation Concern	USFWS 2002. Birds of conservation concern 2002 (for BCR 14 and BCR 30). Division of Migratory Birds, Arlington, Virginia.
⁷ Federal Trust Fish Species (USFWS Trend Data)	-----. 2003. Attachment I – Federal Trust Species and Trends – Atlantic Anadromous Species in the document called <i>Strategic Growth – Land Acquisition Priority System</i> , Fiscal Year 2005 – Budget Cycle. D =Decreasing I =Increasing
⁸ Maine Wildlife Action Plan Priorities (Draft 2005)	1 =Very High 2 =High
⁹ Shorebird Plan-Atlantic Flyway	Clark and Niles 2000 North Atlantic Regional Shorebird Plan .
¹⁰ Waterbird Plan	James A. Kushlan, Melanie J. Steinkamp, Katharine C. Parsons, Jack Capp, Martin Acosta Cruz, Malcolm Coulter, Ian Davidson, Loney Dickson, Naomi Edelson, Richard Elliot, R. Michael Erwin, Scott Hatch, Stephen Kress, Robert Milko, Steve Miller, Kyra Mills, Richard Paul, Roberto Phillips, Jorge E. Saliva, Bill Sydeman, John Trapp, Jennifer Wheeler, and Kent Wohl. 2002. Waterbird Conservation for the Americas: The North American Waterbird Conservation Plan, Version 1. Waterbird Conservation for the Americas. Washington, DC, U.S.A. H =High Risk M =Moderate Risk L =Low Risk NR =Not Currently At Risk
¹¹ Waterfowl Plan	North American Waterfowl Management Plan: Strengthening the Biological Foundation: 2004 Strategic Guidance. Population Trends. I =Increasing D =Decreasing NT =No Trend

Table B.1. Potential Resources of Concern for Rachel Carson NWR

Species (gray highlight indicates focal species of concern identified in our habitat objectives)	Seasons on Refuge ¹	Federal T&E ²	Maine T&E ³	BCR 30 & PIF 9 ⁴	BCR 14 & PIF 27 ⁵	USFWS Birds of Conservation Concern ⁶	Federal Trust Fish Species (USFWS Trend Data) ⁷	Maine Wildlife Action Plan Priorities ⁸	Shorebird Plan-Atlantic Flyway ⁹	Waterbird Plan ¹⁰	Waterfowl Plan ¹¹
WATERBIRDS											
American bittern	B, M			HH	M			2			
American coot								2			
Arctic tern	M		T		H			2		H	
Black-crowned night-heron	B, M		SC	M	H			2		M	
Black tern	M		E					1		M	
Clapper rail	B, M			M							
Common loon	M, W				M			2			
Common moorhen	M		SC					2			
Common tern	B, M		SC		H	X		2		L	
Glossy ibis								2			
Great cormorant	W		SC		HH			2		M	
Horned grebe	W			H	M						
Least bittern								2			
Least tern	B, M		E	HH		X		1		H	
Little blue heron	B, M			H						H	
Northern gannet	M				H					NR	
Pied-billed grebe								2			
Red-necked grebe	W				H						
Red-throated loon	W			HH	M						
Roseate tern	B, M	E	E	HH	H			1		H	
Snowy egret	B, M			HH				2		H	
WATERFOWL											
American black duck	B, W			HH	HH			2			D
Atlantic brant	M?			HH	M						NT
Atlantic Canada goose	M, W			HH	H						I
Barrow's goldeneye	W		SC		HH			2			NT
Black scoter	M, W			H	H						D
Bufflehead	M, W			H							I
Common eider	B, M, W			HH	HH			2			D
Common goldeneye	M, W			M	M						NT
Greater scaup	M, W			H	M			2			NT
Harlequin duck	W		T	H	HH			2			NT
Hooded merganser	B, M			H							I
Lesser scaup	M, W			H							D
Long-tailed duck	M, W			H	M						D
Mallard	B, M, W			H							NT
North Atlantic Canada goose	M, W			H							NT
Red-breasted merganser	M, W			M							I
Ruddy duck								2			
Surf scoter	M, W			H	M						D
White-winged scoter	M, W			H							D
Wood duck	B, M				M						I
SHOREBIRDS											
American oystercatcher	B?, M			HH	M	X		1	5		
American golden plover	M			H	H				4		
American woodcock	B, M			HH	HH			2	5		
Black-bellied plover	M			H	H				3		
Buff-breasted sandpiper	M			H		X			4		
Common snipe	M								3		
Dunlin	M			H					3		
Greater yellowlegs	M			H				2	4		
Hudsonian godwit	M			H	M	X			4		
Killdeer	B, M			M	M				2		

Potential Resources of Concern for the Rachel Carson NWR

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Least sandpiper	M			M	M				3		
Lesser yellowlegs	M			M					2		
Long-billed dowitcher	M								2		
Marbled godwit	M			H		X			4		
Pectoral sandpiper	M								2		
Piping plover	B	T	E	HH	HH			1	5		
Purple sandpiper	M, W			H	HH	X		2	3		
Red-necked phalarope	M		SC	H	HH			2	3		
Red knot	M			HH	H	X		2	5		
Red phalarope	M			M	H				3		
Ruddy turnstone	M			HH				2	4		
Sanderling	M			HH	M			2	4		
Semipalmated plover	M			M	M				2		
Semipalmated sandpiper	M			H	HH			2	4		
Short-billed dowitcher	M			H	H				3		
Solitary sandpiper	M			H					3		
Spotted sandpiper	M			M					3		
Stilt sandpiper	M								3		
Upland sandpiper	M		T	M	H	X		1	4		
Whimbrel	M		SC	HH	H	X		2	5		
White-rumped sandpiper	M			H					3		
Willet	B, M			H	M			2	4		
Wilson's phalarope	M			M					4		
Wilson's plover	M			H		X			4		

LANDBIRDS											
American redstart	B				H						
American pipit	M?		E					2			
Bald eagle	M, W	T	T	M	M			2			
Baltimore oriole	B, M			H		X		2			
Bank swallow	B, M				M						
Barn swallow	B, M				M			2			
Barred owl								2			
Bay-breasted warbler	M				HH	X		2			
Black-and-white warbler	B, M			H				2			
Black-billed cuckoo	B, M				M			2			
Blackburnian warbler	B, M			M	M			2			
Blackpoll warbler	M				M	X					
Black-throated-blue warbler	M				H			2			
Black-throated-green warbler	B, M				M			2			
Blue-gray gnatcatcher								2			
Blue-winged warbler	B?		SC	HH	H	X		1			
Bobolink	B, M				H			2			
Broad-winged hawk	B, M			H							
Brown creeper	B, M				M						
Brown thrasher	B, M			H				2			
Canada warbler	B, M			M	HH	X		2			
Cape May warbler	M				H	X		2			
Chestnut-sided warbler	B, M				H	X		2			
Chimney swift	B, M				H			2			
Common nighthawk	B, M				H			2			
Cooper's hawk	B, M		SC								
Eastern screech owl	YR		SC								
Eastern kingbird	B, M			H				2			
Eastern meadowlark	B, M		SC					2			
Eastern screech owl								2			
Eastern towhee	B, M			H				2			
Eastern wood-pewee	B, M				H						

Potential Resources of Concern for the Rachel Carson NWR

Species (gray highlight indicates focal species of concern identified in our habitat objectives)	Seasons on Refuge ¹	Federal T&E ²	Maine T&E ³	BCR 30 & PIF 9 ⁴	BCR 14 & PIF 27 ⁵	USFWS Birds of Conservation Concern ⁶	Federal Trust Fish Species (USFWS Trend Data) ⁷	Maine Wildlife Action Plan Priorities ⁸	Shorebird Plan-Atlantic Flyway ⁹	Waterbird Plan ¹⁰	Waterfowl Plan ¹¹
Field sparrow	B, M		SC	H				2			
Golden eagle	M, W		E					2			
Grasshopper sparrow								2			
Gray catbird	B, M			M							
Great-crested flycatcher	B, M			H				2			
Hairy woodpecker	YR										
Horned lark	M, W				M			2			
Ipswich savannah sparrow	W				HH						
Loggerhead shrike	M, W		SC	M				2			
Long-eared owl								2			
Louisiana waterthrush	B?, M			H				2			
Marsh wren	B, M			H		X		2			
Nelson's sharp-tailed sparrow	B, M			M	HH	X		2			
Northern bobwhite	B?			H							
Northern flicker	B, M				M			2			
Northern goshawk	B, M				M						
Northern harrier	M				M						
Northern parula	B, M				M			2			
Olive-sided flycatcher	B, M		SC		H	X		2			
Ovenbird	B, M				M						
Palm warbler	M				M						
Peregrine falcon	M		E		M	X		1			
Pine grosbeak	B, M				M						
Purple finch	B, M				H			2			
Purple martin	B		SC					2			
Prairie warbler	B, M			HH		X		2			
Red-shouldered hawk	B, M		SC								
Rose-breasted grosbeak	B, M				M			2			
Ruffed grouse	YR				M						
Rusty blackbird								2			
Saltmarsh sharp-tailed sparrow	B, M		SC	HH		X		1			
Scarlet tanager	B, M			H				2			
Seaside sparrow			SC	HH		X					
Sedge wren			E	M		X		1			
Short-eared owl								1			
Veery	B, M				H			2			
Vesper sparrow	B, M				M			2			
Whip-poor-will	B, M		SC	H	M	X		2			
Willow flycatcher	B, M			H				2			
Wood thrush	B, M			HH	HH	X		2			
Yellow-bellied flycatcher	M				M						
Yellow-bellied sapsucker	M				H			2			
Yellow-throated vireo								2			

MAMMALS											
Eastern red bat	B, M		SC								
Eastern small-footed bat	YR?		SC					2			
Eastern pipistrelle	B, M		SC								
Southern flying squirrel	YR		SC								
Hoary bat	B, M		SC								
Harbor porpoise	YR										
New England cottontail	YR		SC					1			
Northern bog lemming	YR		T					2			
Silver-haired bat	B, M		SC								

Potential Resources of Concern for the Rachel Carson NWR

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AMPHIBIANS											
Blue-spotted salamander	YR							2			
Northern leopard frog	YR										
REPTILES											
Black racer	?		E					2			
Blanding's turtle	YR		E					1			
Brown snake	YR		SC								
Eastern hognose snake	?										
Eastern ribbon snake	YR		SC								
Spotted turtle	YR		T					2			
Wood turtle	YR ?		SC					2			
FISH											
Alewife	YR						D				
American eel	YR						D	1			
American shad	YR						D	2			
Atlantic salmon	YR						D	1			
Blueback herring	YR						D				
Rainbow smelt	YR						D	2			
Shortnose sturgeon	?	E					D	1			
Striped bass	YR						I	1			
INVERTEBRATES											
Ringed boghaunter	YR		E					1			
Ebony boghaunter	YR		SC								

Guide to Table B.2

¹State Status

State of Maine Threatened and Endangered Species List

T=Threatened **E**=Endangered **SC**=Special Concern

²Srank

State Rarity Ranks (determined by the Maine Natural Areas Program)

S1=Critically imperiled in Maine because of extreme rarity (five or fewer occurrences or very few remaining individuals or acres) or because some aspect of its biology makes it especially vulnerable to extirpation from the State of Maine

S2=Imperiled in Maine because of rarity (6-20 occurrences or few remaining individuals or acres) or because of other factors making it vulnerable to further decline

S3=Rare in Maine (on the order of 20-100 occurrences)

S4=Apparently secure in Maine

S5=Demonstrably secure in Maine

SH=Occurred historically in Maine, and could be rediscovered; not known to have been extirpated.

SU=Possibly in peril in Maine, but status uncertain; need more information

SX=Apparently extirpated in Maine (historically occurring species for which habitat no longer exists in Maine)

³Grank

Global Rarity Ranks (determined by The Nature Conservancy)

G1=Critically imperiled globally because of extreme rarity (five or fewer occurrences or very few remaining individuals or acres) or because some aspect of its biology makes it especially vulnerable to extirpation from the State of Maine

G2=Globally imperiled because of rarity (6-20 occurrences or few remaining individuals or acres) or because of other factors making it vulnerable to further decline

G3=Globally rare (on the order of 20-100 occurrences)

G4=Apparently secure globally

G5=Demonstrably secure globally

T=Subspecies rank

Q=Questionable rank

HYB=Hybrid species

Table B.2. Rare Plants and Exemplary Natural Communities on Rachel Carson NWR*

<i>Rare Plant Species</i>	<i>State Status¹</i>	<i>Srank²</i>	<i>Grank³</i>
American Sea Blight, <i>Suaeda calceoliformis</i>	T	S1	G5
Beach Plum, <i>Prunus Maritima</i>	E	S1	G4
Dwarf Glasswort, <i>Salicornia Bigelovii</i>	SC	S1	G5Q
Eastern Joe Pye Weed, <i>Eupatorium dubium</i>	E	S2	G5
Hollow Joe Pye Weed, <i>Eupatorium fistulosum</i>	E	S2	G5?
Pale Green Orchis, <i>Platanthera flava</i>	SC	S2	G4T4
Rich's Sea Blight, <i>Suaeda maritima ssp Richii</i>	SC	S1	G5T3
Sassafras, <i>Sassafras albidum</i>	SC	S2	G5
Sea-beach Sedge, <i>Carex silicea</i>	SC	S3	G5
Slender Blue Flag Iris, <i>Iris prismatica</i>	E	S2	G4/G5
Smooth Winterberry Holly, <i>Ilex laevigata</i>	SC	S3	G5
White Wood Aster, <i>Aster divaricatus</i>	T	S3	G5
Wild Coffee, <i>Triosteum aurantiacum</i>	E	S1	G4

Exemplary Natural Communities

Coastal Dune-Marsh Ecosystem		S3	
Dune Grassland		S2	G4?
Pitch Pine Bog		S2	G3G5
White Oak – Red Oak forest		S3	

*Special thanks to Don Cameron, Maine Natural Areas Program for reviewing our list and providing clarification on occurrences

III. Priority Resources of Concern

The table of potential resources of concern (B.1) that was developed in Section II contains a large number of species with a broad array of habitat needs. We need to prioritize those species and their habitats to determine where to focus refuge management strategies. To guide us in prioritizing that list, we considered the following concepts:

- Achieving refuge purposes and managing for trust resources as well as biological diversity, integrity, and environmental health can be addressed through the habitat requirements of "focal species" or species that may represent guilds that are highly associated with important attributes or conditions within habitat types. The use of focal species is particularly valuable in addressing Service trust resources such as migratory birds.
- The Bird Conservation Region (BCR) plans are increasing their effectiveness at ranking and prioritizing those migratory birds most in need of management of conservation focus. Although all species that make it to a ranked BCR priority list are in need of conservation attention, we selected **focal species** that ranked as High or Moderate in Continental Concern with a High to Moderate BCR Responsibility. See www.abcbirds.org/nabci for BCR rules used to rank birds.
- Focal species selected that were not birds (e.g., New England cottontail, American eel, Blanding's turtle) were identified as resources of concern due to concern over their population status rangewide or because they are under review for inclusion on the Federal Endangered or Threatened Species list. Fish species were reviewed using criteria from the Service Land Acquisition Priority System, Federal Trust Species and Trends—Atlantic Anadromous Species.

- Habitat conditions on or around the refuge may limit its capability to support or manage for a potential species of concern. We evaluated the following site-specific factors.
 - ◆ Patch size requirements
 - ◆ Habitat connectivity
 - ◆ Incompatibility surrounding land uses
 - ◆ Environmental conditions: soils, hydrology, disturbance patterns, contaminants, predation, invasive species
 - ◆ Specific life history needs
- The likelihood that a potential species of concern would have a positive reaction to management strategies.
- The ability to rely on natural processes to maintain habitat conditions within a natural range of variability suitable to the focal species
- The ability to use adaptive management (flexibility and responsiveness of the refuge and the habitats) in the face of changing environmental conditions (e.g., climate change).

❖ **High and Moderate Priority Habitat Types**

Refuge management most often focuses on restoring, managing, or maintaining habitats or certain habitat conditions to benefit a suite of focal species or a suite of plants and animals associated with a particular habitat. We identified the high and moderate priority habitats on the Rachel Carson refuge based on information compiled in Section I (e.g., site capability, historic condition, current vegetation, conservation needs of wildlife associates). As part of that process, we identified any limiting factors that affect the refuge's ability to maintain those habitats (see table B.3).

Table B.3. High and Moderate Priority Habitats on Rachel Carson NWR

<i>High Priority Habitat Types</i>	<i>Reason for Selecting as High Priority*</i>	<i>Limiting Factors for Maintaining this Habitat</i>
Dune grassland, beach, rocky shore, subtidal and intertidal	1=Purposes: Migratory Birds (shorebirds) 2=Threatened, Endangered and candidate Species (piping plover) 3=Trust Resources (multiple focal species) 4=BIDEH (marine ecosystem)	Keeping pace with sea level rise, overuse by public, development, climate change, invasive species.
Salt marsh	1=Purposes: Migratory birds (wading and shorebirds); Wetlands 2=Trust Resources (multiple focal species) 4=BIDEH (marine ecosystem)	Keeping pace with sea level rise, development, climate change, invasive species, and contaminants.
Tidal rivers	1=Purposes: Migratory Birds (waterfowl) 2=Threatened, Endangered, and candidate Species (American eel under review for listing) 3=Trust Resources (interjurisdictional fish) 4=BIDEH (marine ecosystem)	Contaminants, residential/commercial development, siltation, water quantity and quality.
Freshwater wetlands: emergent marsh, scrub shrub wetland, bog, vernal pool, forested wetland	1=Purposes: Wetlands, Migratory Birds (breeding landbirds) 4=BIDEH (wetland ecosystems, Blandings turtle)	Invasive species, residential and commercial development, water quantity and quality.
Early Successional: Shrubland	1=Purposes: Migratory Birds (migrating and breeding landbirds) 2=Threatened, Endangered, and candidate Species (New England cottontail – under review for Federal listing) 3=Trust Resources (priority breeding landbirds)	Invasive species, succession to forest.
Mixed forest	1=Purposes: Migratory Birds (landbirds) 3=Trust Resources (breeding focal landbirds),	Invasive species, forest fragmentation.
<i>Moderate Priority Habitat Types Reason for Selecting as a Moderate Priority</i>		
Freshwater rivers	Minimal freshwater river habitats available on refuge 4=BIDEH	Water quality and quantity and invasive species.
Nearshore and marine open water	Limited capacity to influence Trust Resources 4=BIDEH	Climate change, invasive species, water quality.
Early Successional: Grassland	Minimal habitat available on refuge 3=Trust Resources (1 focal species)	Invasive species, succession.

* 1=Legal Mandates: Purposes 2=Federal Endangered, Threatened, and candidate species
3=USFWS Trust Resources/Focal Species 3=Biological Integrity, Diversity, and Environmental Health Policy (BIDEH)

Based on the habitat types described in table B.3, we then developed a table of the priority species of concern with their associated habitat types (table B.4). This table also describes the habitat structured required by each priority or “focal” species, and identifies other species that would benefit from the same or similar habitat conditions.

Table B.4 Priority Resources of Concern, Habitat Structure, and Other Benefitting Species on Rachel Carson NWR

<i>Priority Resources of Concern</i>		<i>Habitat Structure</i>	<i>Other Benefitting Species</i>
<i>Species or Species Group</i>	<i>Habitat Type</i>		
Piping plover	Dune grassland – beach – rocky shore, tidal and intertidal	Breeding: Nest above the high tide line on open sand, gravel or shell-covered beaches, especially on sand spits and blowout areas in dunes. Feed in the “splash zone” and in wrack piles at the high tide line.	Waterfowl and wading birds
Least tern		Breeding: Nest on open sand, gravel, or shell-covered beaches above the high tide line.	
Migratory shorebirds		Migration: feeding and roosting	
Nelson’s sharp-tailed sparrow	Saltmarsh, tidal creeks, estuaries, and bays	Breeds in salt, freshwater, and brackish marshes; Females wedge or suspend a nest in medium high cordgrass just above the substrate or water near the mean high-tide line.	Willet, wading birds, anadromous fish, other migratory waterfowl
Saltmarsh sharp-tailed sparrow		Breeds almost exclusively in salt marsh; Females wedge or suspend a nest in medium high cordgrass just above the substrate or water near the mean high-tide line.	
Black duck		Migration, Wintering: In winter in New England and Maritime Provinces of Canada, uses tidal habitats exclusively. Tides, icing, time of day, and human disturbance interact to affect use of coastal habitats. During spring and fall migration use estuarine wetlands, tidal flats, shallow freshwater wetlands, among other wetlands	
Roseate and common terns		Migration: feeding	
Common eider		Year-round: feeding areas utilized extensively	
Blanding’s turtle	Freshwater wetlands	Year-round: Vernal pool complexes and small wetlands; wetlands in a matrix of intact upland forest; shallow, dark, heavily-vegetated waters with soft muddy bottoms; nests in sandy or loamy uplands including plowed fields; basks on logs, stumps, and banks; May travel to as many as 6 different wetlands in a year, traveling as far as a mile or more	Spotted turtle
Willow flycatcher		Breeding: Fairly open areas with scattered shrubs or forest edges; moist or wet shrubby areas; dense stands of shrubs > 2.1 m in height; nest is ~1.2 m off the ground. Territory size 2.6 to 4.5 acres	Marsh wren

Priority Resources of Concern

<i>Priority Resources of Concern</i>		<i>Habitat Structure</i>	<i>Other Benefiting Species</i>
<i>Species or Species Group</i>	<i>Habitat Type</i>		
New England cottontail	Early successional: shrubland	Year-Round: Patches > 10 ha; Native shrublands and regenerating forests with dense understory cover at least 0.5 m tall and less than 7.5 cm (3 inches) in diameter and stem densities of ~10,000 stems/ha	Willow flycatcher; blue-winged warbler; field sparrow; migrating songbirds
Eastern towhee		Breeding: Dense, brushy dry areas, pitch pine-scrub oak forests, utility rights-of-way; nests on or near ground; well-developed litter layer	
American woodcock		Breeding: Open second growth, young forests in close proximity to singing grounds	
Prairie warbler		Breeding: Usually associated with poor soils, shrublands and thickets, overgrown fields with scattered trees, pine plantations (especially Christmas tree plantings), oak clearcuts, and powerline right-of-ways	
Rose-breasted grosbeak	Mixed forest	Breeding: Edges of mature moist deciduous or mixed forests with understory of shrubs or saplings; closed canopy (~85%); canopy height ~70 feet	Baltimore oriole, blackburnian warbler, eastern wood pewee, hairy woodpecker, broad-winged hawk, indigo bunting, black-and-white warbler
Black-billed cuckoo		Breeding: Shrublands, thickets, and other woodlands with dense, shrubby vegetation; Numbers fluctuate with caterpillar outbreaks	
Scarlet tanager		Breeding: Mixed and deciduous mature forest (particularly oak-pine forests); closed canopy; trees > 23 cm (9 inches) dbh; minimum forest area needed to sustain a viable population 10–12 ha	
Wood thrush		Breeding: Mature deciduous and mixed forests, particularly near wetlands; tall trees (~53 feet or more); a shrub-subcanopy layer, shade, moist soil and leaf litter; closed canopy	
Veery		Breeding: Damp, second growth, young forests with open canopy and dense understory. Will use hardwood and hemlock forests	
American eel	Freshwater rivers	Migration: females migrate upstream to mature in freshwater wetlands. Males prefer freshwater rivers and brackish waters until both mature males and females return to the Sargasso Sea to breed.	Freshwater mussels, wood turtle
Louisiana waterthrush		Breeding: Extensive deciduous and mixed bottomland forests along fast-flowing streams; moss covered logs, thick understory; area sensitive – minimum 250 acres to sustain breeding population	
Bobolink	Early successional: grassland	Breeding: Prefers a mixture of grasses and broad-leaved forbs with high grass-forb ratio. Densities significantly higher in fields with relatively low amounts of total vegetative cover, low alfalfa cover, and low total legume cover. These vegetative characteristics occur in hay fields ≥ 8 yr old. Fields > 10 ha (~25 acres) preferred	Eastern meadowlark

IV. Adaptive Management

The priority resources of concern and their respective habitat attributes were used to develop specific habitat objectives. Refuge habitat management objectives must be achievable. Many factors, such as the lack of resources, existing habitat conditions, species response to habitat manipulations, climatic changes, contaminants or invasive species, may reduce or eliminate the ability of the refuge to achieve objectives. Although these limiting factors were considered during the development of refuge objectives, conditions are likely to change over the next 15 years and beyond.

The refuge will use adaptive management to respond to changing conditions that impair our ability to measure and achieve the habitat objectives. That will require us to establish and maintain a monitoring program to ensure that we can detect and respond to changing conditions.

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