



U.S. Shorebird Conservation Plan

Northern Atlantic Regional Shorebird Plan

Version 1.0

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Executive Summary

The North Atlantic planning region is one of the most heavily populated areas in the U.S. Many wetland habitats have been affected by development, causing wetlands loss, pollution, and increased human access leading to disturbance. The Atlantic coast beaches and bays, however still have high quality habitats that have become more essential to shorebirds than ever before. The region is critical to the survival of hemispheric populations of some species (e.g., Red Knots, Piping Plovers, Whimbrels), which would be decimated by continued habitat degradation or catastrophic chemical or petroleum spills.

The North Atlantic region has a number of inherent strengths supporting effective shorebird protection: 1) a huge constituency with reasonably good access to shorebird viewing opportunities; 2) large portions of habitat in public ownership (averaging 60%-95% in most states); and 3) strong state land use regulations that affect actions on private land.

The potent threats in the region are almost the flip side of the strengths. Large human population centers create a substantial threat from development and disturbance, and cause a significant potential for resource conflicts. Further, the northeast Atlantic Coast is always under the threat of catastrophic oil spills and consequent damage to shorebird habitat or shorebirds themselves. The major weaknesses in existing protection center on inadequate funding for management and surveys, thus leading to an insufficient database on population, distribution, and habitats.

Combining these strengths, weaknesses and threats, our group developed a number of opportunities that may be unique to the North Atlantic region: First, strong state agencies create the potential for creative intra- and interstate shorebird projects; second, the large human population and easy access to important shorebird sites create a significant opportunity for improving recreational use of shorebirds with small increases in funding for developing access; and third, strong agency interest exists for developing interspecies management and protection.

The group considered the regional strengths and threats, and suggested the following high priority project:

1. Begin region-wide coastal surveys conducted by individual state agencies and coordinated by the USFWS throughout the region.
2. Work on-site at known important areas to reduce disturbance, identify and protect critical food resources, and control predation.
3. Significantly improve impoundment management, also coordinated throughout the region.
4. Create a strong emphasis on volunteer banding and wardening, as methods to increase awareness.
5. Develop coordinated state and federal satellite habitat mapping, delineating all important shorebird habitats.
6. Establish a number of "all bird" Joint Venture projects.
7. Improve spill prevention and emergency response.

1. Description of the Region

The North Atlantic planning region is within the Atlantic Flyway, and encompasses all or part of the following states: Virginia (VA), Maryland (MD), Delaware (DE), New Jersey (NJ), Pennsylvania (PA), New York (NY), Connecticut (CT), Rhode Island (RI), Massachusetts (MA), Vermont (VT), New Hampshire (NH), and Maine (ME). Habitats range from rocky shorelines to sandy bay beaches to tidal mudflats. The major habitat types are: 1) beach front, including high-energy beaches, sandy deltas, rock and gravel shorelines, and high beach/dune; 2) intertidal mudflats lacking vegetation (mudflats and muddy creek banks); 3) vegetated intertidal marshes (dominated by *Spartina cordgrass*); 4) managed impoundments, both brackish and freshwater; 5) inland habitats (such as forested wetlands and peninsulas that concentrate migrants), as well as managed uplands (airports and pastures).

The North Atlantic region is extremely important for transient shorebirds during both northbound and southbound migrations. The region is critical for the Western Hemisphere population of Red Knots (*Calidris canutus rufa*), which is extremely concentrated in Delaware Bay each spring. It also supports most of the Atlantic Flyway's breeding Piping Plover (*Charadrius melodus*), a federally threatened species. Shorebirds in this region face potential impacts from: 1) recreational disturbances to foraging and nesting birds, 2) oil spills, 3) extraction of resources affecting shorebird food supplies (e.g., horseshoe crabs), 4) habitat loss due to development, 5) predators, 6) contaminants, and 7) habitat management that lacks integration with shorebird needs.

The North Atlantic region includes two Bird Conservation Regions, the North Atlantic Coastal Plain and the Atlantic Northern Forests (Appendix A). Descriptions of these follow, taken from "A Proposed Framework for Delineating Ecologically-based Planning, Implementation, and Evaluation Units for Cooperative Bird Conservation in the U.S."

North Atlantic Coastal Plain — This BCR has the densest human population of any region in the country. Much land that was formerly cleared for agriculture is now either in forest or residential use. The highest priority birds are in coastal wetland and beach habitats. These include the Saltmarsh Sharp-tailed Sparrows and Nelson's Sharp-tailed Sparrows, Seaside Sparrows, Piping Plover, American Oystercatchers, wintering Black Ducks, and Black Rails. The region includes critical migration sites for Red Knot, and key staging areas for Ruddy Turnstones, Sanderlings, Semipalmated Sandpipers, and Dunlin. Most of the continental population of the endangered Roseate Terns nests on islands off NY and the southern New England states. Other terns, and gulls nest in large numbers and large mixed colonies of herons, egrets, and ibis may form on islands in the Delaware and Chesapeake Bay regions and Long Island. Estuarine complexes in this region are extremely important to wintering and migrating waterfowl, including Great Bay (NH), Long Island Sound, Peconic and Great South bays (NY), Delaware Bay, Chesapeake Bay, and embayments created behind barrier beaches. Approximately 65% of the total wintering Black Duck population can be found in coastal areas between Long Island and North Carolina. Exploitation and pollution of Chesapeake Bay and Absecon Bay (NJ), and the accompanying loss of submerged aquatic vegetation, have significantly reduced their value to waterfowl.

Atlantic Northern Forests — The nutrient-poor soils of northernmost New England and the Adirondack Mountains support spruce-fir forests on more northerly and higher sites and northern hardwoods elsewhere. Virtually all of the world's Bicknell's Thrush breed on mountaintops in this region. Other important forest birds include the Canada Warbler and Bay-breasted Warbler. Coastal wetlands are inhabited by Nelson's Sharp-tailed Sparrows, rocky intertidal areas are important for wintering Purple Sandpipers, and muddy intertidal habitats are critical as Semipalmated Sandpiper staging sites. Common Eiders and Black Guillemots breed in coastal habitats, while Leach's Storm-Petrels, gulls, terns, and the

southernmost populations of breeding alcids nest on offshore islands. Beaver ponds and shores of undisturbed lakes and ponds provide excellent waterfowl breeding habitat, particularly for American Black Ducks, Hooded and Common Mergansers, and Common Goldeneyes. The Hudson and Connecticut river valleys are important migration corridors for ducks and geese. Because inland wetlands freeze, coastal wetlands in Maine are used extensively by dabbling ducks, sea ducks and geese during winter and migration. Coastal wetlands in Maine (including Merrymeeting Bay and Cobscook Bay) are important wintering sites for waterfowl.

2. Shorebird Species Occurrence and Regional Species Priorities

Species of highest priority in this region include Piping Plover, American Oystercatcher (*Haematopus palliatus*), Red Knot, Whimbrel (*Numenius phaeopus*), American Woodcock (*Scolopax minor*), and Eskimo Curlew (*Numenius borealis*). The regional and national priority rankings are included in Table 1. Regional ranks of species may change as more information on their abundance and distribution (or concentration areas) is collected. The seasonal occurrence and guild category of significant shorebird species in this region are listed in Table 2.

Shorebird populations have been surveyed to varying degrees by states and non-governmental organizations in the North Atlantic region. Shorebird numbers fluctuate widely across seasons and habitats, however, making survey techniques difficult to apply broadly in the region. The group provided limited data on shorebird counts, and related those counts to estimated hemispheric populations (Table 3), to estimate importance of regional habitats. For many species, however, data on seasonal shorebird populations in the region are not available.

Populations of two high priority species, breeding Piping Plovers and migrating Red Knots, are known with some confidence. Piping plovers nesting in the region numbered 1,135 pairs in 1997, the majority (81%) of the Atlantic Coast population. An estimated 80% (and possibly more) of the New World populations of Red Knots and Whimbrels migrates through the region each spring, making the region critical to these species' survival.

We used the regional prioritization of species, combined with the importance of seasonal use in the region, to re-list the species by habitat types (Table 4). This table more clearly catalogues the highest priority species according to habitat, and suggests habitat and management objectives that follow.

3. Regional Goals

Population Goals and Objectives: Maintain or enhance current or historic population levels and diversity of shorebirds throughout the North Atlantic Region through cooperation and partnership with state, federal, private, and non-governmental conservation organizations.

Objectives:

- a) Estimate current or historic population levels, using the best available data subject to analysis and revision (e.g., area surveys, International Shorebird Survey, CBC data).
- b) Maintain or enhance shorebird populations, both abundance and species diversity, and monitor populations through reliable and cost-effective techniques.
- c) Develop and implement research priorities to create management and protection strategies.

4. Habitat Goals, Objectives and Management Needs

Habitat Goal: Protect and manage sufficient area of high priority habitats to support current populations of breeding, migrating, and wintering shorebirds.

A) Habitat Objectives:

Highest priority

- Identify and manage sufficient breeding habitat (beachfront) for PIPL, AMOY. Requires strict protection of known sites, as well as enhancement/restoration of other sites.
- Identify and manage foraging and roosting habitat (intertidal-mud) for WHIM, HUGO, REKN, SESA to maintain migration stopover integrity, by protecting and managing key concentration areas.
- Provide foraging and roosting habitat (intertidal-marsh) for WHIM through protection and management at key sites.
- Identify and manage sufficient foraging and roosting habitat (intertidal complexes and impoundments) to maintain and enhance regional populations important in the region, for species with overlapping requirements (RUTU, SESA, SBDO, SAND, DUNL, BBPL, WRSA).

High Priority

- Identify and manage breeding and foraging habitat (intertidal-marsh) for WILL throughout the region.
- Identify and manage inland habitats for UPSA, BBSA, and AMWO.
- Protect and enhance inland and migratory concentration areas for AMWO.
- Identify and protect offshore staging sites for RNPH.
- Acquire land through partnerships to protect and manage habitat that benefits shorebirds, rare species, waterfowl and migrant land birds.
- Identify and protect sufficient winter habitat for PUSA, including rock jetties and shorelines.

Moderate Priority

- Identify and manage sufficient breeding habitat (beachfront) for WIPL. Requires strict protection of known sites, as well as enhancement/restoration of other sites.

We categorized habitats used by shorebirds into five main types, listed below, and specified the major uses of each of these habitats by shorebirds (breeding=B, foraging=F, and roosting=R). How shorebirds use these habitats will help define management approaches and priorities.

Habitat types used by shorebirds in the N.A. region:

Beach Front

- High energy beach fronts (F,B)
- Sandy flats (*e.g.*, inlet interfaces at low tide) (F)
- Rock jetties and groins (F,R)
- High beach and dunes (B,F,R)

Intertidal -- non-vegetated

- Muddy flats (F)
- Muddy banks (F)

Intertidal -- vegetated

- Brackish and saline marshes (F,R)
- Salt pannes (B,F,R)

Managed wetlands

Impoundments (B,F,R)

Dredged material (B,F,R)

Inland habitats

Airports, sod farms, pastures, agricultural fields (B,F,R)

Forested wetlands and peninsulas (F,R)

Riparian, floodplain and lake shoreline (F)

We identified significant areas for shorebirds in the region (Table 5), known to support significant numbers of shorebirds in breeding, migrating, or foraging/roosting periods.

For purposes of this planning document we estimated habitat acreage, condition (and/or management issues) and ownership for each habitat type (Tables 6 and 7). However, many state biologists expressed concern with their estimates (or did not make them at all) because they lack a sufficient foundation of data. For many participants in the working group meetings, habitat delineation and assessing condition and ownership were high priority research needs. Thus, goals specific to acreage for habitat acquisition or management will not be available until an adequate inventory of habitats is conducted.

B) Management Objectives:

Highest priority

- Protect food resources by a) identifying food sources and habitat requirements, b) developing better understanding of invertebrate management, c) ranking habitats.
- Control disturbance through a) landowner outreach, b) visitor management [education, controlling access, providing viewing platforms, etc.], c) controlling recreational disturbance [from PWC, ATV, beachgoers, dogs, etc.] by regulations and area closures, d) new regulations where necessary.
- Reduce predation by a) habitat manipulation, b) predator control (fox, raccoon, crows, gulls, etc.) on a site-specific basis where needed.
- Work with regulatory agencies, researchers, and commissions to establish and maintain adequate and ecologically healthy population levels of horseshoe crabs in the mid-Atlantic region.

High priority

- Plan for oil spill response: a) do planning and simulations, b) monitor/quantify habitat and food resources prior to spill as preparation for quantifying the direct and indirect effects of spills, c) post-spill surveys to accurately quantify spill damages.
- Coordinate management among public lands, especially management of impoundments among states/refuges.

Moderate priority

- Influence dredged material management: a) placement and quality of dredged material, b) management of dredged material and water, c) reduce availability of contaminants at dredged material habitats.
- Identify key areas for Phragmites control in the region and target priority areas.
- Train land managers to manage habitat for shorebirds by increasing the number of Manomet habitat management workshops.

5. Management Coordination and Monitoring Needs

We determined there are significant needs in this area. Specifically, the region needs coordinated monitoring protocol that will help measure current population levels, and set the basis for population trend analysis. Monitoring procedures should make the best use of existing survey efforts wherever they occur, such as spring surveys and banding in Delaware Bay.

Goal: *Establish regional protocol for monitoring shorebird populations that is adaptable for continuing long-term monitoring.*

Existing monitoring includes: Delaware Bay spring migration, ISS (spring and fall), Delaware Bay banding, Breeding Bird Surveys (uplands), Breeding Bird Atlases (breeding species), Refuge surveys.

Currently recommended monitoring:

- a. Spring migration aerial surveys at all important areas, including beach and marsh, along specific survey routes to provide an index measure. Fall surveys focusing on marsh use. All surveys should be designed to be statistically robust.
- b. Surveys of impoundments - spring and fall, ground-based.
- c. Either a new winter beach survey (aerial) or use of Christmas Bird Count (CBC) data for analysis of trends of wintering populations.
- d. Breeding shorebird surveys. Assess adequacy of Breeding Bird Survey (BBS) and/or Breeding Bird Atlases (BBA). We recommend that this be done on a national level, with regional results.
- e. Develop and implement monitoring of significant prey populations in selected areas.

Goal: *Coordinate management of impounded wetlands in the region to accommodate maximum use by migrating shorebirds, waterfowl and wading birds, through appropriate water management.*

- a. Create management partnerships among different agencies and groups to enhance habitat and improve management.
- b. Coordinate management among public lands: a) establish unified timing for management, and b) coordinate management of impoundments among states/refuges.
- c. Train land managers to manage habitat for shorebirds by increasing the number of Manomet habitat management workshops, and training managers to identify and survey shorebirds and control disturbance.

Coordinating personnel, by area and state (preliminary):

Delaware Bay, NJ and DE: Niles, Clark, Doolittle

Virginia Coastal Marshes and Barrier Islands (including Assateague): D. Schwab

Plymouth Beach, MA: S. Melvin

Plum Island/Merrimac River, MA: C. Hayes

Crane Beach, MA: S. Melvin

Third Cliff (Scituate), MA: S. Melvin

Sandy Neck (Barnstable), MA: S. Melvin

Monomoy NWR/South Beach, MA: S. Melvin, Refuge staff

Nauset Marsh (Eastham), MA: S. Melvin

Norton Point Beach (Edgartown), MA: S. Melvin

Smith Point (Nantucket), MA: S. Melvin

Long Island Atlantic Coast (and Jamaica Bay): B. Miller, H. Knoch, Refuge staff

Ripley Neck, ME: L. Tudor

Forsythe NWR, Brigantine, NJ: Refuge staff

Craney Island, VA: D. Schwab

Mainland Coastal VA: D. Schwab

Atlantic Coastal Salt Marshes (Northeastern MA south to VA): State and USFWS staff

Southern Maine coastal marshes (L. Tudor)

Cape May Peninsula (see Woodcock plan): C. Hayes, L. Niles, NJ State staff

Delmarva Peninsula uplands (see Woodcock plan): C. Hayes, DE State staff

Block Island (see Woodcock plan): C. Hayes, C. Raithel
Moosehorn NWR (see Woodcock plan): C. Hayes, ME State staff
Short grasslands (UPSA [B], BBSA [M]): State staff, private landowners
Atlantic Coastal Beaches (PIPL [B], SAND [M,W]): Defer to PIPL Recovery Plan
Lake Champlain, Lake Memphemagog, VT (J. Gobeille)
Connecticut River, VT (J. Gobeille)

6. Research Goals

Research is needed to effectively carry out the objectives of habitat protection and management in the region:

- Identify prey resources in significant shorebird areas such as stopovers and staging areas, and determine optimal management techniques to promote these resources;
- Determine the effects of environmental contaminants on shorebirds and their prey;
- Determine prey resources in impoundments, and optimal management for both prey populations and shorebird/waterbird management;
- Determine the effects of disturbance and minimum protection buffers to maintain and enhance shorebird habitat use of foraging and roosting areas;
- Determine the effects of aquaculture (lobster pounds, salmon pens, hard clam, etc.) on shorebird foraging habitats and shorebird habitat use, and identify needs for regulatory restrictions on these developments if necessary.
- Determine length of stay (turnover rates) at stopovers areas to allow population estimations.
- Determine limiting factors for priority shorebirds on breeding, migrating or wintering areas.
- Determine energetic and nutritional requirements of shorebirds.

7. Education Goals

The WASA (Western Atlantic Shorebird Association) initiative, coordinated by NOAA and USFWS, may meet region-wide education goals beyond on-site outreach needs. WASA includes a web site for shorebird-based education interests on the Atlantic Coast (www.vex.net/~hopscotc/shorebirds/). The web site allows tracking of migration routes of priority shorebirds such as Red Knot, Ruddy Turnstones and Sanderlings in the hemisphere, which can be accessed by students. Researchers and selected individuals can contribute data on flocks and banded birds. The web site would allow for multiple educational uses that involve students, classrooms, refuge managers and researchers, and may prove useful for a central point of data accessibility. There should be full coordination of efforts with the Sister Schools (sponsored by USFWS in the Pacific Flyway) and other educational initiatives.

On-site outreach is necessary at shorebird concentration areas (both migratory and breeding sites), to minimize impacts of wildlife watchers and recreational visitors. Sites where disturbance is an issue are prime areas for outreach and education efforts.

8. Funding Needs for Regional Goals (by State and Area)

Within each significant area, management and habitat needs and priorities were identified that are known needs in those areas. Each area representative estimated costs to accomplish those tasks on an annual or task basis. *More areas will be included as they are considered necessary by group members or reviewers.* The table of "significant areas" and costs is included in Appendix B.

9. Recognition of individuals and organizations who contributed to the regional report.

Stephen Brown, Manomet Center for Conservation Sciences, Manomet, MA
Kathleen Clark, NJ Division of Fish and Wildlife, Endangered Species Program, Woodbine, NJ
Jim Corven, Manomet Center for Conservation Sciences, Manomet, MA
Steve Eisenhauer, Natural Lands Trust, Fortescue, NJ
Lisa Gelvin-Innvaer (formerly with) DE Division of Fish and Wildlife, Dover, DE
John Gobeille, VT Dept. of Fish and Wildlife, Pittsford, VT
Chuck Hayes, Atlantic Coast Joint Venture, Charlestown, RI
John Kanter, NH Fish and Game
Scott Melvin, MA Division of Fisheries and Wildlife, Westborough, MA.
Bob Miller, NY Dept. of Environmental Conservation
Larry Niles, NJ Division of Fish and Wildlife, Endangered Species Program, Trenton, NJ
Chris Raithel, RI Division of Fish and Wildlife, West Kingston, RI
Ken Rosenberg, Cornell Laboratory of Ornithology, Ithaca, NY
Dan Rosenblatt, NY Dept. of Environmental Conservation (Stony Brook)
Don Schwab, VA Dept of Game and Inland Fisheries, Suffolk, VA
Barry Truitt, The Nature Conservancy, Nassawadox, VA
Lindsay Tudor, ME Dept. of Inland Fisheries and Wildlife, Bangor, ME
Joan Walsh, NJ Audubon Society, Cape May Court House, NJ

Table 1. Species priority list based on national scoring, and priority in the Northern Atlantic.

Species	National Scores ^a						National	Atlantic	Flyway
	PT	RA	TB	TN	BD	ND	Priority	N. Atlantic. ^b	Reg. Pr. ^c
Piping Plover	5	5	5	4	4	4	5	m,B	
Eskimo Curlew	5	5	3	4	5	5	5	M	
American Oystercatcher	3	5	4	4	3	4	4	B	5
Whimbrel	5	4	2	2	3	2	4	M	5
Red Knot	5	2	2	4	3	3	4	M	5
American Woodcock	5	1	4	3	2	3	4	M,W,B	5
American Golden-Plover	4	3	2	4	2	3	4	m	
Wilson's Plover	3	4	4	4	4	3	4	b	
Hudsonian Godwit	3	4	3	4	4	4	4	M	
Marbled Godwit	4	3	4	4	3	3	4	m	
Ruddy Turnstone	4	3	2	4	2	2	4	M,w	
Sanderling	5	2	2	4	2	1	4	M,w	
Buff-breasted Sandpiper	4	4	3	4	3	4	4	M	
Upland Sandpiper	2(5)	2	2	4	2	3	2	m,b	4
Greater Yellowlegs	3	4	2	2	2	1	3	M	4
Willet	3	3	3	3	3	3	3	M,B,w	4
Semipalmated Sandpiper	5	1	2	3	3	3	3	M	4
Wilson's Phalarope	4	1	3	4	2	5	4	m	3
Black-bellied Plover	5	3	2	2	2	1	3	M,w	
American Avocet	3	2	3	4	2	3	3	m	
Solitary Sandpiper	3	3	4	2	3	2	3	M	
Spotted Sandpiper	3	2	2	2	1	1	3	M,B	
Least Sandpiper	5	2	2	2	2	2	3	M	
Dunlin	5	1	2	3	2	3	3	M,W	
Stilt Sandpiper	3	3	3	4	3	3	3	m	
Short-billed Dowitcher	5	2	2	3	3	2	3	M	
Common Snipe	5	1	2	2	1	2	3	M,w,B	
Red-necked Phalarope	4	1	2	3	1	3	3	M	
Red Phalarope	4	1	2	3	2	1	3	M	
Purple Sandpiper	2	5	2	3	3	3	2	W	3
White-rumped Sandpiper	3	2	2	2	3	3	2	M	3
Killdeer	5	1	3	3	1	2	3	m,w,B	2
Western Sandpiper	3	1	2	4	4	2	3	M	2
Semipalmated Plover	3	3	2	2	1	1	2	M	
Lesser Yellowlegs	3	2	2	3	2	1	2	M	
Baird's Sandpiper	3	2	2	2	3	3	2	m	
Pectoral Sandpiper	3	2	2	2	2	3	2	m	
Long-billed Dowitcher	2	2	2	3	4	3	2	m	

^a Nat. Priority Variables: PT=Pop Trend; RA=Relative Abundance; TB=Threats in Breeding season; TN=Threats in Non-breeding season; BD=Breeding Distribution; ND=Non-breeding Distribution

^b Code: B = breeding, M = migration, and W = wintering. **B,M,W** = high concentrations, region extremely important to the species relative to the majority of other regions. B,M,W = common or locally abundant, region important to the species. b,m,w = uncommon to fairly common, region within species range but occurs in low relative abundance relative to other regions.

^c Reg. Pr. = Regional Priority, if different from national.

Table 2. Preliminary list of priority species by guild-group, for the North Atlantic planning region.

PRIORITY LEVEL ^a	SPECIES (and Seasons of Occurrence ^b)						
	TERR/AQUA GLEANERS	TERR/AQUA GLEANERS/ PROBERS	AQUA/TERR PROBERS/ GLEANERS	AQUA PROBERS	AQUA GLEANERS	AQUA GLEANERS/ SWEEPERS	PROBERS/ PRIERS
High (5)	PIPL (B , m)	ESCU (M) WHIM (M) AMWO (B,W,M)	REKN (M)				AMOY (B)
Moderate-High (4)	WIPL (b) AGPL (m)	RUTU (M,w) UPSA (m,b) HUGO (M)	SAND (M , w) BBSA (m)	MAGO (m)	GRYE (M) WILL (m,w, B)		
Moderate (3)	BBPL (M,w) KILL (m,w, B)	SPSA (M,B) PUSA (W)	SESA (M) SBDO (M) WRSA (M) LESA (M) DUNL (M,W) STSA (m) COSN (M,w,B)		SOSA (M)	AMAV (m) RNPH (M) REPH (M) WIPH (m)	
Moderate-Low (2)	SEPL (M)		WESA (m) BASA (m) PESA (m) LBDO (m)		LEYE (M)		

^a See Table 1 for actual scores for priority criteria.

^b B=breeding, W=winter, M=migration; when bold considered very important to species, lower case present but not in high numbers.

Species codes as follows:

BBPL=Black-bellied Plover	LBCU=Long-billed Curlew	PESA=Pectoral Sandpiper	HUGO=Hudsonian Godwit	PUSA=Purple Sandpiper
AMGP=American Golden Plover	SAND=Sanderling	STSA=Stilt Sandpiper	MAGO=Marbled Godwit	AMAV=American Avocet
WIPL=Wilson's Plover	SESP=Semipalmated Sandpiper	DUNL=Dunlin	GRYE=Greater Yellowlegs	WIPH=Wilson's Phalarope
SEPL=Semipalmated Plover	WESA=Western Sandpiper	SBDO=Short-billed Dowitcher	LEYE=Lesser Yellowlegs	RNPH=Red-necked Phalarope
PIPL=Piping Plover	LESA=Least Sandpiper	LBDO=Long-billed Dowitcher	SOSA=Solitary Sandpiper	REPH=Red Phalarope
KILL=Killdeer	WRSA=White-rumped Sandpiper	COSN=Common Snipe	WILL=Willet	AMOY=Am. Oystercatcher
WHIM=Whimbrel	BASA=Baird's Sandpiper	BBSA=Buff-breasted Sandpiper	RUTU=Ruddy Turnstone	AMWO=Am. Woodcock
REKN=Red Knot	UPSA=Upland Sandpiper	SPSA=Spotted Sandpiper		

Table 3. Estimated shorebird numbers (and % of Hemispheric population) in the North Atlantic region, from peak counts and survey data.

Species	Estimated Hemisphere Population ^a	Region Peak Counts	% in Region	Season	Site	Habitat
Piping Plover	6,000	2,270	38%	Breeding	Coastal ME to no. VA	Beach
Eskimo Curlew	?					
American Golden Plover	150,000	500 (1970)	<1%	Fall	NY	Inland
Wilson's Plover	30,000					
American Oystercatcher	3,200					
Whimbrel	50,000	41,000 (1995)	82%	Spring	VA Barrier Islands ^e	Mudflat
Hudsonian Godwit	45,500 ^b					
Marbled Godwit	160,000					
Ruddy Turnstone	235,000	127,600 (1999)	54%	Spring	Delaware Bay (NJ & DE) ^d	Beach
Red Knot	85,000 ^c	94,460 (1989) 8,955 (1996)	100% 11%	Spring Spring	Delaware Bay (NJ & DE) VA Barrier Islands ^e	Beach Beach
Sanderling	200,000	33,800 (1986) 3,971 (1995)	17% 2%	Spring Spring	Delaware Bay (NJ & DE) VA Barrier Islands	Beach Beach
Buff-breasted Sandpiper	25,000	89 (1995)	<1%	Fall	NJ	
American Woodcock						
Wilson's Phalarope	1,500,000					
Black-bellied Plover	120,000	25,000 (1994)	21%	Spring	VA Barrier Islands ^e	Mudflat
Killdeer	2,000,000 ^f					
American Avocet	450,000					
Greater Yellowlegs	124,000	3000 (1997)	2%	Fall	Forsythe NWR (NJ)	Mudflat
Solitary Sandpiper	184,000 ^f					
Willet	250,000	1000 (1979)	<1%	Fall	Forsythe NWR (NJ)	Beach
Spotted Sandpiper	650,000 ^f					
Semipalmated Sandpiper	1,600,000 ^b	267,300 (1986) 53950 (1994) 49,000 (1994)	17% 3% 3%	Spring Fall Spring	Delaware Bay (NJ & DE) ME Coast VA Barrier Islands	Beach Intertidal Mudflat

Species	Estimated Hemisphere Population ^a	Region Peak Counts	% in Region	Season	Site	Habitat
Western Sandpiper	4,000,000	2,500 (1975)	<1%	Fall	Forsythe NWR (NJ)	Mudflat
Least Sandpiper	600,000	6,000 (1992)	1%	Fall	Forsythe NWR (NJ)	Mudflat
Dunlin	1,000,000	31,350 (1999) 83,000 (1994)	3% 8%	Spring Spring	Delaware Bay (NJ & DE) VA Barrier Islands	Beach Mudflat
Stilt Sandpiper	200,000	465 (1981)	<1%	Fall	Forsythe NWR (NJ)	
Short-billed Dowitcher	300,000	11,400 (1999) 48,000 (1994)	4% 16%	Spring Spring	Delaware Bay (NJ & DE) VA Barrier Islands	Beach Mudflat
Common Snipe	1,400,000					
Red-necked Phalarope	2,500,000	10,000 (1963) <2,000 (1990)	<1% <1%	Fall Fall	MA Coast ME Coast (early accounts of >1,000,000)	Offshore Offshore
Red Phalarope	1,000,000					
Semipalmated Plover	150,000	8,082 (1994)	5%	Fall	ME Coast	Beach
Lesser Yellowlegs	744,000	4,000 (1947) 1,500 (1994)	<1% <1%	Fall Fall	MA Coast ME Coast	Beach Beach
Upland Sandpiper	400,000 ^f	300 (1998)	2%	Breeding	ME	Agricultural fields
White-rumped Sandpiper	500,000	1,115 (1994) 1,000 (1990)	<1% <1%	Fall Fall	ME Coast Long Island, NY Coast	Beach Beach
Baird's Sandpiper	300,000					
Pectoral Sandpiper	450,000	620 (1986)	<1%	Spring	Inland NJ	Marsh
Purple Sandpiper	16,000					
Long-billed Dowitcher	500,000	1,000 (1993)	<1%	Fall	Forsythe NWR (NJ)	Mudflat

^a Estimates taken from Hunter et al., 1999, Southeastern Region Shorebird Habitat Plan, unless otherwise noted.

^b Morrison and Ross (1989).

^c Baker (unpubl. data)

^d Clark and Niles (unpubl. data)

^e Watts and Truitt (unpubl. data)

^f Rosenberg (BBS data)

Table 4. Priority 5, 4, and 3 shorebirds by habitat, with national and regional scoring and type of habitat use, in the North Atlantic region. Boldface indicates "focal species" for the habitat type.

Habitat	Species	National Priority	No. Atlantic Regional Priority (if different)	Season	Habitat Use
Beachfront	Piping Plover	5		m, B	B
	American Oystercatcher	4	5	B	B
	Red Knot	4	5	M	F,R
	Wilson's Plover	4		b	B
	Ruddy Turnstone	4		M,w	F,R
	Sanderling	4		M,w	F,R,W
	Purple Sandpiper (rocky beach)	2	3	W	F,W
Intertidal-Mud	Whimbrel	4	5	M	F
	Eskimo Curlew	5		M	F
	Red Knot	4	5	M	F,R
	Hudsonian Godwit	4		M	F,R
	American Golden-Plover	4		m	F
	Marbled Godwit	4		m	F
	Greater Yellowlegs	3	4	M	F
	Semipalmated Sandpiper	3	4	M	F,R
	Black-bellied Plover	3		M,w	F,W
	Least Sandpiper	3		M	F
	Dunlin	3		M,W	F,W
	Stilt Sandpiper	3		m	F
	Short-billed Dowitcher	3		M	F
White-rumped Sandpiper	2	3	M	F	
Intertidal-Marsh	Whimbrel	4	5	M	F,R
	Greater Yellowlegs	3	4	M	F,R
	Willet	3	4	M,B,w	B,F,R
	Black-bellied Plover	3		M,w	F,R,W
	American Avocet	3		m	F
	Common Snipe	3		M,w,B	F,B
Inland	American Woodcock	4	5	B,W,M	B,F,R
	American Golden-Plover	4		m	F,R
	Buff-breasted Sandpiper	4		M	F,R
	Upland Sandpiper	2	4	m,b	F,R
	Wilson's Phalarope	4	3	m	F,R
	Solitary Sandpiper	3		M	F
	Spotted Sandpiper	3		M,B	F,B
Offshore-Pelagic	Red-necked Phalarope	3		M	F
	Red Phalarope	3		M	F

Table 5. Significant areas for shorebirds within the Northern Atlantic region.

Virginia

Virginia Coastal Marshes and Mudflats
Virginia Barrier Islands (including Assateague)
Craney Island, VA
Mainland Coastal VA
*Delmarva Peninsula (uplands)

Maryland

Atlantic Coastal Salt Marshes
Atlantic Coastal Beaches
*Delmarva Peninsula (uplands)

Delaware

Delaware Bay
Atlantic Coastal Salt Marshes
Atlantic Coastal Beaches
*Delmarva Peninsula (uplands)

New Jersey

Delaware Bay
Forsythe NWR, Brigantine, NJ
Atlantic Coastal Salt Marshes
Atlantic Coastal Beaches
*Cape May Peninsula (uplands)

Pennsylvania

New York

Long Island Atlantic Coast (and Jamaica Bay)
Atlantic Coastal Salt Marshes
Atlantic Coastal Beaches

Connecticut

Atlantic Coastal Salt Marshes
Atlantic Coastal Beaches

Rhode Island

Atlantic Coastal Salt Marshes
Atlantic Coastal Beaches
*Block Island (uplands)

Vermont

Lakes Champlain and Memphremagog
Connecticut River

New Hampshire

Gulf of Maine Coastal Marshes
Great Bay Estuary

Isles of Shoals

Inland impoundments; Inland airports, sod farms, pastures

Atlantic Coastal Beaches

Massachusetts

Plymouth Beach / Monomoy, MA

Plum Island, MA

Atlantic Coastal Salt Marshes

Atlantic Coastal Beaches

Maine

Down East Intertidal Mudflats

Gulf of Maine coastal marshes

Atlantic Coastal Beaches

*Moosehorn NWR (uplands)

*Other plans exist for woodcock and piping plover that should be reviewed for a) consistency of goals and priorities, b) considering additions to benefit shorebirds, c) additional shorebird emphasis that may attract additional funding.

Table 6. Estimated acreage of major habitat types, and condition issues, in the North Atlantic region, by state.

Habitat type	ME	Con*	NH	Con	VT	Con	MA	Con	RI	Con	CT	Con	NY	Con	PA	Con	NJ	Con	DE	Con	MD	Con	VA**	Con	Total by Habitat
Beach Front (high/low energy, sandflats, rocky beach)	38400	1, 2					26000		1852				37200	1,2,3	0		6872	2	120	2			2050		110,642
Intertidal--non-vegetated (mudflats, mud banks)	53760	1					44000		1536				800000		500	3	28060	4	3800				166000		1,096,120
Intertidal--vegetated (salt marshes)	19840	1					47000		2176				25100	4	1000	3,4	250000	4	34100	4			206000		583,040
Managed wetlands (impoundments, dredge)	0						na		na				600		500	4	1500	4	1030				5200		8,830
Inland habitats (airports, pastures)	31360	2					135000		4160				10000	2	500	2	50000	1,2	2400	1			2200		231,460

* *Known Condition Issues:*

1. Development threats
2. Human disturbance/Alternate management
3. Degraded-pollution, etc.
4. Exotic vegetation

** Figures for VA refer to seaside of VA Eastern Shore, not Ches Bay.

Table 7. Major habitat types and estimated public ownership (%) in the North Atlantic region, by state.

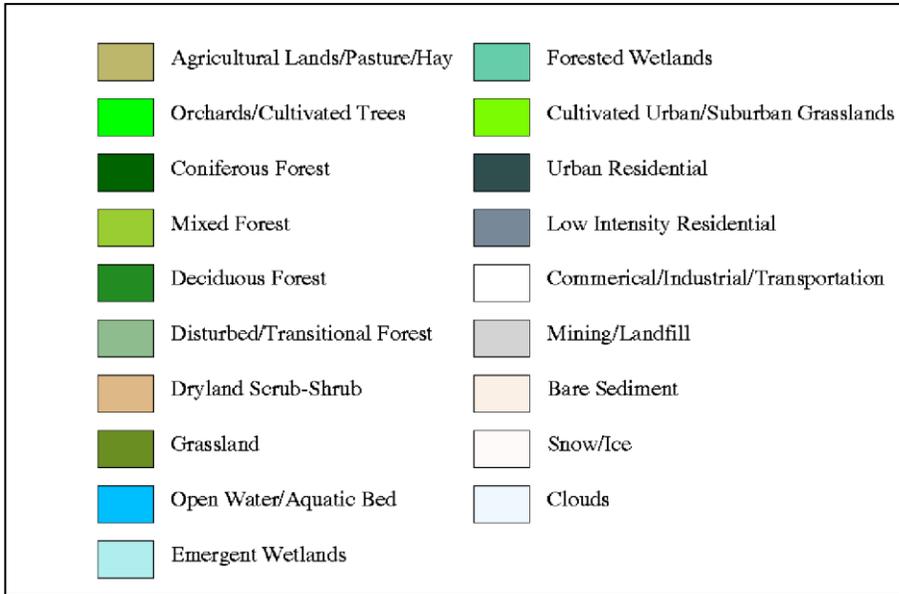
Habitat types	ME	Own*	NH	Own	VT	Own	MA	Own	RI	Own	CT	Own	NY	Own	PA	Own	NJ	Own	DE	Own	MD	Own	VA**	Own	Acres Public	%
Beach Front (high/low energy, sandflats, rocky beach)	38400	5					26000	unk.	1852	80			37200	20	0		6872	80	120	40			2050	93	16812	15
Intertidal--non-vegetated (mudflats, mud banks)	53760	5					44000	unk.	1536	99			800000	70	500	20	28060	80	3800	60			166000	80	720316	66
Intertidal--vegetated (salt marshes)	19840	45					47000	unk.	2176	99			25100	70	1000	90	250000	80	34100	60			206000	40	330258	57
Managed wetlands (impoundments,etc)	0						unk.	unk.	na.				600	100	500	80	1500	100	1030	90			5200	95	8367	95
Inland habitats (airports, pastures)	31360	0					135000	unk.	4160	100			10000	0	500	10	50000	10	2500	30			2200	0	5800	3

* Ownership: Estimated % in Public or Conservation ownership

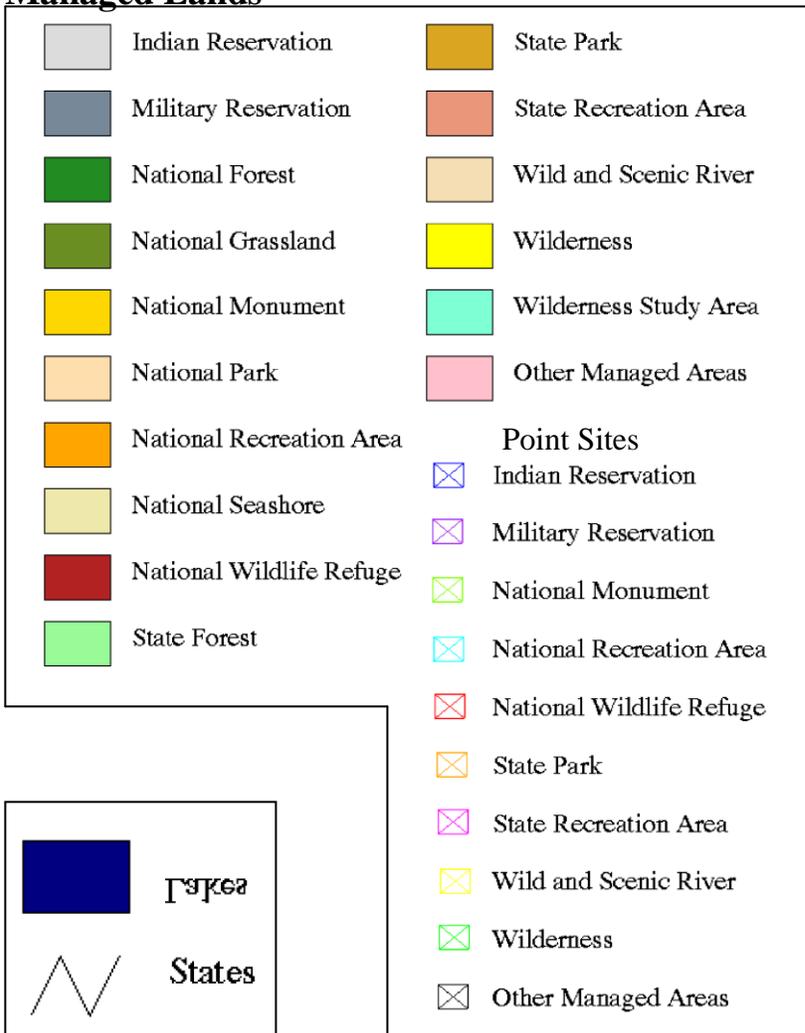
** Figures for VA refer to seaside of VA Eastern Shore, not Chesapeake Bay

Appendix A. Maps of two BCRs found in the North Atlantic region.

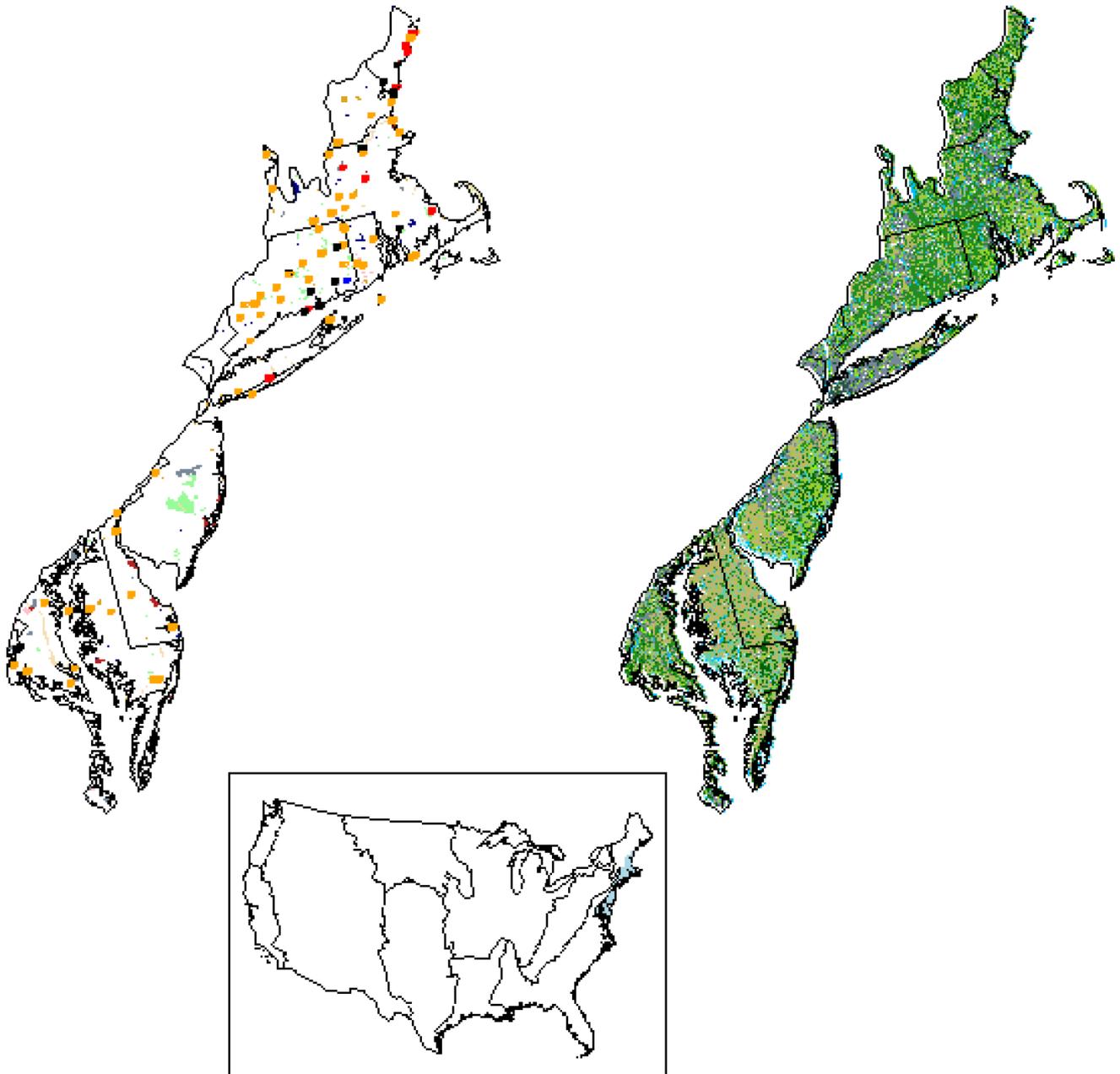
Land Cover



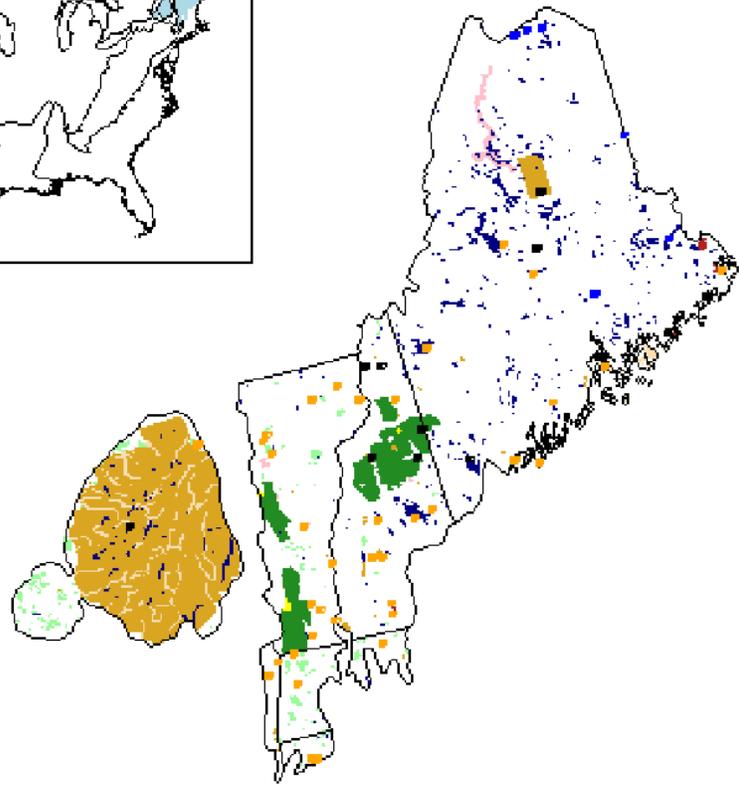
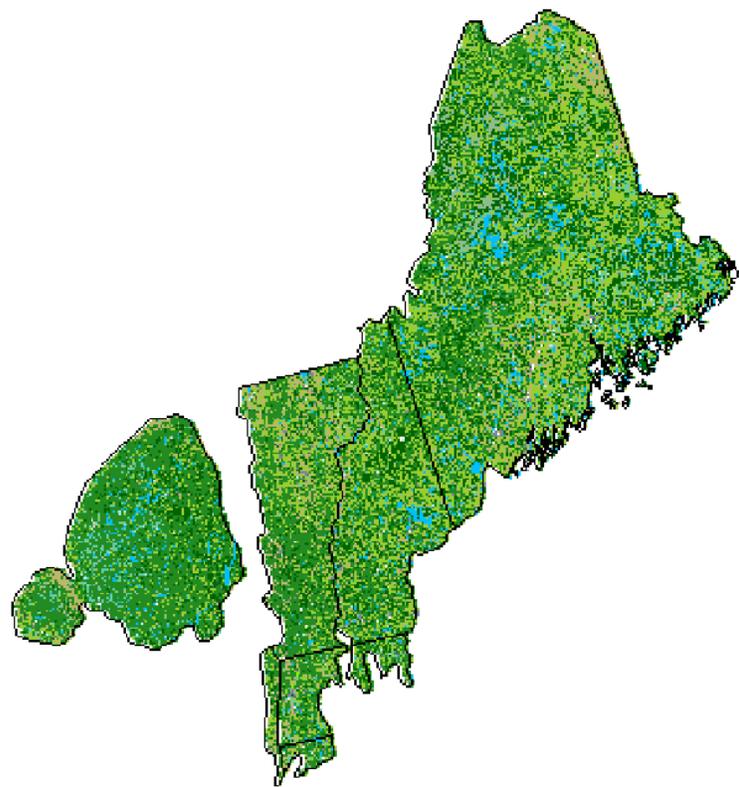
Managed Lands



Bird Conservation Region 14: New England/Mid Atlantic Coast



Bird Conservation Region 30: Atlantic Northern Forest



Appendix B. Estimated costs for monitoring, management and research needs by area.

New Jersey and Delaware: Delaware Bay Niles, Clark, Gelvin-Innvaer, Eisenhauer

Long-term, statistically robust surveys of shorebirds (by aircraft) on bay beaches	25,000 /yr
Annual survey of horseshoe crabs and eggs in sediment	70,000 /yr
Surveys of shorebirds in marshes and impoundments	50,000 /yr
Annual banding / color-marking of shorebirds and resighting surveys	30,000 /yr
Food resources: Maintain HSCrab eggs at or above 1990 levels (including research and implementation)	150,000 /yr
Control disturbance through on-site outreach and law enforcement	100,000 /yr
Oil spill response - implement existing plan	200,000 /yr
Coordination -	
- increase state land manager focus re: impoundments	100,000 /yr
- ID prey preferences of shorebirds, monitor invert pops. and manage impoundments for optimal foraging	50,000 /yr
Land manager training & developing trainers	25,000 /yr
Dredged material - Develop parameters for beach replenishment with dredge for HSCrab and shorebirds	80,000 /yr
Acquisition - Identify priority lands	20,000
- Land acquisition and easements	? (open-ended)
Phragmites control -	50,000 /yr
- map and identify areas and target priorities	
- restore priority areas	
Predator control -	20,000 /yr
- liberalize regs for states to control	

Virginia: VA Coastal Marshes and Barrier Islands Schwab

Acquisition	500,000 /yr
Easements and/or development rights	200,000 /yr
Education/Outreach	30,000 /yr
Surveys/Monitoring - Aerial survey annually	50,000
Research	260,000 /yr
- benthos / shorebird use / prey quality	
- breeding species	
- dredge material - disposal and use	
Disturbance	50,000 /yr
- signage	
- enforcement	
Phragmites control	250,000/yr

Craney Island, VA Schwab

Surveys / Monitoring	10,000 /yr
Research	120,000 /yr
- contaminants	
- benthos	
Outreach / Education	10,000 /yr

Mainland Chesapeake Bay, VA

Schwab

Acquisition	500,000 /yr
Training (60 people)	50,000
Education/Outreach	30,000 /yr
Surveys/Monitoring - Aerial survey annually	50,000/yr
Research - benthos / inverts in impoundments - benthos / inverts in open marsh	120,000
Phragmites / cattail control	100,000
Impoundment creation / enhancement / operation	200,000 /yr
Identify important sites	60,000

New York: Long Island Atlantic Coast

McDougal

Ecological Assessment - determine key shorebird areas (breeding, staging, etc.) - assess pop. status of shorebirds (migr. and breeding) - investigate food resources, habitat, predation/other mortality	200,000
Management Partnerships - Control/manage disturbance - Habitat management, restoration, creation at selected/target sites	50,000 /yr
Predation - research and control, monitoring, analysis	30,000 /yr

All States: Atlantic Coastal Salt Marsh (local actions)

Walsh

Enhance habitat in areas with water control structures	200,000 /yr
Identify areas with Phragmites that could support good habitat if managed	50,000 /yr
Conduct surveys of winter shorebird use	60,000 /yr
Conduct surveys of summer, breeding shorebird use and productivity (e.g., willets)	30,000 /yr

Rhode Island

Raithel

Assessment: Assess existing data on known shorebird areas (breeding and migratory) Quantify migratory shorebird populations: - Develop/implement annual survey protocols - Assess importance of Narragansett Bay to migratory shorebirds - Assess importance of south shore marshes to migratory shorebirds - Develop and implement invertebrate monitoring in shorebird habitats	
Protect migratory shorebird habitat 1. Treat current shorebird concentration points as focal areas and develop site-specific management plans to maintain or enhance habitat quality for migratory shorebirds. - Protect surrounding upland habitats via acquisition or easement - Regulate, prevent, or mitigate process (e.g., dredging and shoreline	

<p>stabilization) that can degrade habitat. Apply Special Area Management Plans (SAM) to enforce more stringent envir. review, and identify all significant shorebird areas in CZM regulations.</p> <ul style="list-style-type: none"> - Work to improve management of adjacent private lands. - Mitigate risk of contaminants and other degradations from ag/urban run-off, etc. - Develop private landowners guide to describe effects of vegetation clearing, pesticides, failed septic systems, etc.
<p>Management Options</p> <ul style="list-style-type: none"> - Investigate feasibility of natural pond drawdowns to create habitat during peak shorebird migration. - Restore or recover degraded coastal wetlands.

New Hampshire

Kanter, Palaschuk

<p>Assessment:</p> <p>Assess existing data on known shorebird areas (breeding and migratory)</p> <p>Conduct surveys of breeding shorebird (i.e., PIPL, UPSA, SPSA, WILL, COSN) populations, habitat use, and productivity.</p> <p>Document migratory shorebird populations, feeding areas, and roosting sites.</p> <p>Develop and implement invertebrate monitoring in shorebird habitats.</p> <p>Evaluate use of state waterfowl management areas by migrating shorebirds.</p>	50,000/yr
<p>Protection:</p> <p>Promote saltmarsh restoration efforts.</p> <p>Develop and implement site-specific management plans for Hampton-Seabrook estuary, Great Bay estuary, Little Harbor estuary, Rye Harbor estuary, coastal beaches, and other identified areas of importance.</p> <p>Protect coastal marshes and adjacent uplands via acquisition or easements.</p> <p>Develop and implement regulatory and non-regulatory approaches to reduce impacts from recreational activities.</p>	100,000/yr

Massachusetts

Melvin

Breeding shorebirds: monitoring, protection, and habitat management	250,000/yr
Migratory shorebirds: monitoring, protection, and habitat management.	100,000/yr
Statewide coordination of monitoring and management, data management, technical assistance to managers and landowners, environmental review and permitting.	150,000/yr
Research: Breeding shorebirds (100,000/yr) Migratory shorebirds (200,000/yr)	300,000/yr
Predator monitoring, research, and control.	150,000/yr
Education and outreach.	30,000/yr

Maine: Ripley Neck Area, Maine

Tudor

Assess existing data on shorebird staging areas to determine key areas on Ripley Neck and adjacent intertidal flats. Develop and implement annual survey protocols to quantify migratory shorebird populations using the area.	30,000 /yr
Investigate / implement protection through land acquisition, easements, and landowner agreements.	?
Develop and implement invertebrate monitoring in shorebird feeding habitats.	10,000 /yr
Research the effects of aquaculture (lobster pounds, salmon pens, etc.) on or near shorebird feeding habitats.	20,000 /yr
Develop and implement education / outreach programs.	10,000 /yr

Maine: Lubec Sand Bar, Maine

Tudor

Develop and implement annual survey protocols to quantify migratory shorebird populations using Lubec Sand Bar.	15,000 /yr
Develop and implement invertebrate monitoring in shorebird foraging areas	10,000 /yr
Determine the effects of disturbance and establish necessary buffer/protection zones for roosting areas.	10,000 /yr
Develop and implement education / outreach programs.	10,000 /yr