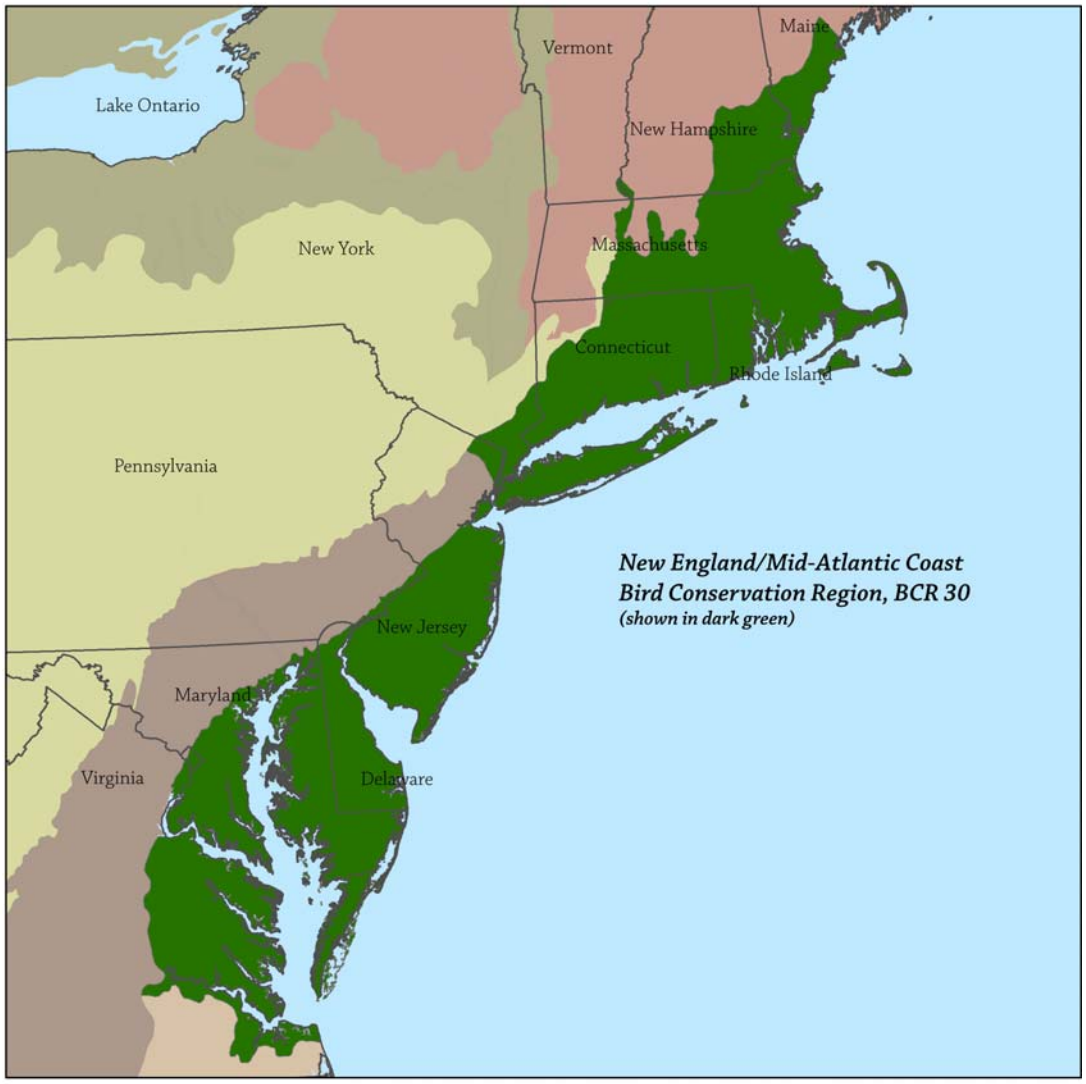
NEW ENGLAND/MID-ATLANTIC COAST BIRD CONSERVATION REGION (BCR 30) IMPLEMENTATION PLAN

Vision

Partnership-driven, science-based conservation efforts for all birds resulting in local efforts collectively achieving regional bird habitat and population goals and contributing to continental bird conservation.



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EXECUTIVE SUMMARY

The purpose of the New England/Mid Atlantic Coast Bird Conservation Region Implementation Plan (BCR 30) is to develop common regional goals for bird conservation by compiling and integrating information from continental and regional bird conservation initiatives (for waterfowl, landbirds, waterbirds, shorebirds and upland gamebirds) and state wildlife action plans, by developing consensus of bird conservation partners in the region and by analyzing available data on birds and habitats in the BCR. The specific goals are to: (1) identify the highest priority bird species and their specific habitat needs and threats; (2) delineate and define geographic focus areas for priority species; (3) use conservation design methods and modeling approaches to refine identification of important geographic areas; (4) develop models to estimate population and habitat goals for priority species; (5) identify the highest priority monitoring and research needs for birds and habitats; (6) focus resources towards the highest priority birds and the habitats they depend upon; and (7) create a communication platform encouraging dialogue on bird conservation activities both within and between states and partners at the BCR scale. Future plans include improving the efficiency of bird conservation efforts in the BCR by linking bird habitat conservation efforts to efforts focused on conserving other species groups, such as the Atlantic Coastal Fish Habitat Partnership.

The New England/Mid-Atlantic Coast Bird Conservation Region (BCR 30) provides important resources for migratory birds whose ranges span the western hemisphere. One hundred and thirty-four priority bird species were identified and placed into three tiers – highest, high and moderate priority. These species were grouped by 11 general habitat types. Most priority species are associated with *either* coastal ecosystems, including beach, sand, mud flats, estuaries, bays, and estuarine emergent wetlands *or* upland forested ecosystems. Geographic focus areas were identified for waterfowl, landbirds, waterbirds, and shorebirds. Priority conservation actions were cross-walked to actions in State Wildlife Action Plans.

Habitat loss and degradation, fragmentation, invasive species (plant and animal), predation, and human disturbance are the greatest threats to bird populations in BCR 30. To address threats and effectively manage priority bird species we must:

1. Estimate populations and set population targets
2. Assess how much habitat is presently available in the BCR
3. Estimate how much habitat is needed to sustain species at population targets.

4. Select where in the BCR to focus habitat conservation efforts based on conservation design decision support tools
5. Determine how to manage lands to best achieve species population targets, while minimizing inter-species conflicts
6. Control predation and human disturbance, and
7. Control invasive species.

CHAPTER 1: Introduction

BACKGROUND

Many individuals and organizations have worked diligently over the past two decades setting up the necessary structure and information base for implementing bird conservation in North America. In 1986, the North American Waterfowl Management Plan (NAWMP) created a model for implementing bird habitat conservation by setting population goals for waterfowl in North America, determining important geographic areas for conserving waterfowl to sustain these population levels and setting up regional self-directed partnerships called joint ventures to implement bird conservation. In the 1990s, several other continental or national bird conservation initiatives formed following the NAWMP model, including Partners in Flight, the U.S. Shorebird Conservation Plan and the North American Waterbird Conservation Plan. In 1998, the update of the North American Waterfowl Management Plan recommended that Plan partners broaden their partnerships with other bird conservation initiatives. As a result, joint ventures and other partnerships began adopting an all-bird approach. Also in 1998, the North American Bird Conservation Initiative (NABCI) was established to help integrate bird conservation efforts among the major bird conservation plans and many jurisdictions. The vision of the North American Bird Conservation Initiative is that "Populations and habitats of North America's birds are protected, restored, and enhanced through coordinated efforts at international, national, regional, state, and local levels, guided by sound science and effective management." NABCI developed a common geographic language for integrated bird conservation planning based on physiographic regions known as Bird Conservation Regions (BCRs) and joint Ventures agreed to coordinate integrated bird conservation planning in these BCRs. For the New England/Mid-Atlantic Coast Bird Conservation Region (BCR 30), the Atlantic Coast Joint Venture is coordinating bird conservation planning among the many partners in the region.

BCR 30 PLAN PURPOSE

The development of continental bird conservation plans set the stage for implementation at smaller geographic scales and led to the development of implementation plans specific to species groups and BCRs. Within the New England/Mid-Atlantic Coast Bird Conservation Region (BCR 30), the Partners in Flight initiative, the U.S. Shorebird Conservation Plan, the Waterbird Conservation of the Americas initiative, the North American Waterfowl Management Plan, and the Northern Bobwhite Conservation Initiative have identified bird conservation priorities by setting population goals at the either the continental, national, or regional scales.

States have developed State Wildlife Action Plans that identify what needs to be done to conserve wildlife and the natural lands and waters where they live, including species management needs and priorities. The purpose of the BCR 30 Plan is to bring the common goals of these plans together into one format that can be used by state agencies, NGOs, and other bird conservation interests to coordinate and implement bird conservation activities. This plan merges material from numerous plans and workshops, including Partners in Flight physiographic plans and BCR 30 Plan, Atlantic Coast Joint Venture Waterfowl Implementation Plan, Northern Atlantic Shorebird conservation Plan, Mid-Atlantic New England Maritimes Regional Waterbird Plan, State Wildlife Action Plans, and the results of the BCR 30 Coordinated Monitoring Workshop and the December 2004 BCR 30 All-Bird Conservation Workshop (summary in Appendix F).

BCR 30 Goals

1. Identify the highest priority bird species and their specific habitat needs and threats.
2. Delineate and define geographic focus areas for priority species.
3. Use conservation design methods and modeling approaches to refine identification of important geographic areas.
4. Develop models to estimate population and habitat goals for priority species.
5. Identify the highest priority monitoring and research needs for birds and habitats.
6. Focus resources towards the highest priority birds and the habitats they depend upon.
7. Create a communication platform encouraging dialogue on bird conservation activities both within and between states and partners at the BCR scale.
8. Link bird habitat conservation efforts to efforts focused on conserving other species, such as the Atlantic Coastal Fish Habitat Partnership.

Baltimore Oriole; High Priority Species

Great-crested Flycatcher; Highest Priority Species

CHAPTER 2: DESCRIPTION OF THE BCR

SPATIAL EXTENT

The New England/Mid-Atlantic Coast Bird Conservation Region (BCR 30) is approximately 9,885,700 hectares in size and extends from southern coastal Maine through coastal Virginia, encompassing several major estuaries, including Chesapeake Bay. Specifically, the BCR includes a small portion of the coast of Maine, the southeast corner of New Hampshire, eastern Massachusetts, most of Connecticut, all of Rhode Island, southern New York, including Long Island, most of New Jersey, all of Delaware, eastern Maryland, the District of Columbia, and all of coastal Virginia (with the exception of Back Bay). The BCR also includes marine habitats out to the continental shelf (see cover page for map of BCR boundaries).

LANDFORMS AND SOILS

Landforms

BCR 30 lies entirely within the Atlantic Coastal Plain (ACP), which extends 3200 miles from Cape Cod, Massachusetts to the Yucatan Peninsula in Mexico and gently slopes seaward from the inland highlands to the continental shelf in the Atlantic Ocean (USGS - Atlantic Plain Province). There is a small section of BCR 30 north of Cape Cod, Massachusetts that consists of long sand beaches interrupted intermittently by rocky promontories (Maine State Wildlife Action Plan and is part of the Gulf of Maine. The Embayed Section of the Atlantic Coastal Plain lies within a portion of BCR 30 and includes the New York Bight. This area is characterized by broad peninsular tracts, drowned river estuaries, and a series of coastal terraces that extend back to the piedmont. Landforms include coastal glaciated plains, terminal and ground moraines along the Long Island and Southern New England Coast and unglaciated coastal plains south of Long Island (Dettmers and Rosenberg 2000, Watts 1999). BCR 30 contains a variety of types of coastlines, from rocky shorelines in the northern portion of the BCR, to sandy, low-lying barrier islands in the middle and southern portion of the BCR.

Because BCR 30 is coastal in nature, water is one of the most dominant features. Rivers and bays are abundant, as are the wetlands that go hand-in-hand with these features. BCR 30 is characterized by the large number of significant bays and estuaries including Casco Bay, near Portland, ME, Great Bay, near Portsmouth, NH, Buzzards Bay, MA, Narragansett Bay, RI, Long Island Sound, Delaware Bay, and the Chesapeake Bay. In the lower portion of the BCR, barrier islands occur along most of the shoreline, separating the Atlantic Ocean from the mainland and

creating large coastal lagoon systems. Table One provides statistics on land cover composition for BCR 30, as depicted by the 1992 Land Cover dataset (NLCD).

Soils

Soils within BCR 30 include marine sands, clays, gravels, and marls (Geomorphic Sections and Provinces of the New York Bight Watershed). This combination of soils supports a variety of habitats, including many high priority habitats such as maritime marshes and dunes, grasslands, pine savannahs, barrier and bay islands, forested wetlands, early successional grasslands/shrublands, and mature deciduous forests. From New Jersey to the south, the Coastal Plain is divided into inner and outer sections that are geographically distinct; the Inner Coastal Plain supports a larger proportion of clay within its soil matrix and supports fertile soils for agriculture. The larger Outer Coastal Plain is dominated by sandy, well drained soils and supports pinelands and extensive wetlands. Many of these wetlands have been ditched and drained to produce conditions favorable for agriculture.

BIRDS AND HABITAT TYPES

BCR 30 supports 79 species categorized by partners as highest and high priority (see Chapter 3 Table 2 for definitions of priorities). Because the BCR is coastal, many of the birds supported by the BCR are dependant on coastal wetland and beach habitats – both habitat types are under severe pressure by the rapidly growing human population. Therefore, it is no surprise that greater than 50% of the highest and high priority birds are in coastal wetland, beach, and marine habitats including species such as the Saltmarsh Sharp-tailed Sparrow, Nelson's Sharp-tailed Sparrow, Seaside Sparrow, Piping Plover, American Oystercatcher, American Black Duck, Gull-billed Tern and Black Rail. The region also acts as a critical migration corridor for migrants (Dettmers and Rosenberg 2000). Neotropical migrants such as Ruddy Turnstones, Sanderlings, Semipalmated Sandpipers, and Dunlin depend heavily on coastal habitats in BCR 30 when traveling from their breeding habitats in the arctic to their non-breeding sites in the Caribbean and Central and South America. The largest population of Roseate Terns (federally listed in the United States) in continental North America breed in colonies on islands off the coast of the southern New England states. The BCR contains both the Chesapeake and Delaware Bays – systems of critical importance to wetland-dependent birds in the Atlantic for breeding, migration, and wintering, including waterfowl, secretive marshbirds, waterbirds, seabirds, shorebirds and salt marsh seaside sparrows. Delaware Bay is a critical stopover site for many shorebirds, especially during the spring northward migration. Red Knots, a priority species

Figure 1: BCR 30 Land Cover

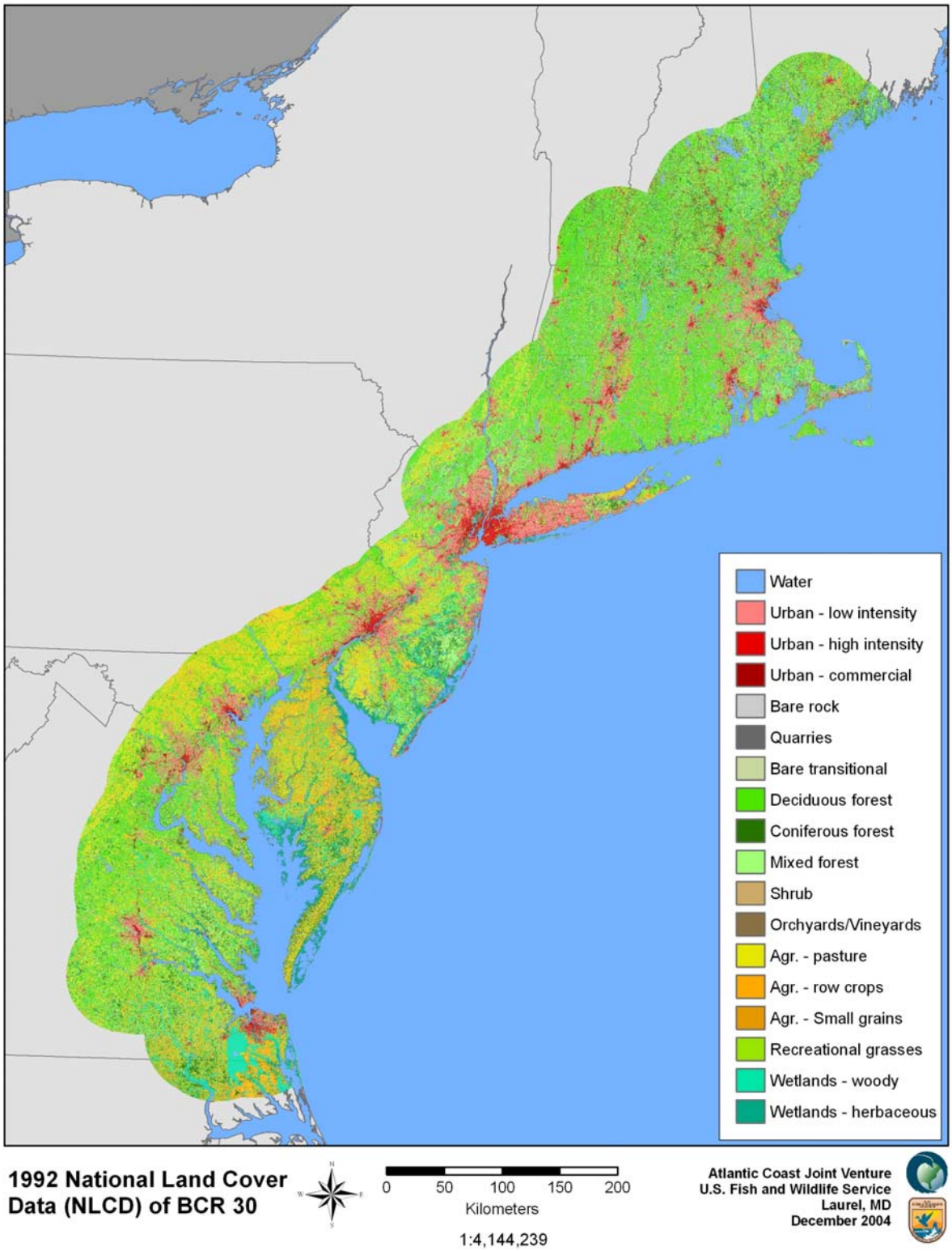


Table 1. Land cover composition for BCR 30 as depicted by the 1992 National Land Cover Dataset (NLCD, http://landcover.usgs.gov/prodescription.php).

Land Cover	Hectare	Acres	Percent
Open Water	499,078	1,233,244	6%
Low Intensity Residential	982,364	2,427,464	11%
High Intensity Residential	169,690	419,312	2%
Commercial/Industrial/Transportation	293,119	724,310	3%
Bare Rock/Sand/Clay	24,167	59,718	<1%
Quarries/Strip Mines/Gravel Pits	26,629	65,801	<1%
Transitional	52,363	129,392	1%
Deciduous Forest	1,998,994	4,939,60	23%
Evergreen Forest	674,962	1,667,862	8%
Mixed Forest	1,315,741	3,251,254	15%
Shrubland	2,054	5,076	<1%
Orchards/Vineyards/Other	1,879	4,643	<1%
Pasture/Hay	692,830	1,712,013	8%
Row Crops	843,997	2,085,553	10%
Urban/Recreational Grasses	181,654	448,875	2%
Woody Wetlands	554,480	1,370,145	6%
Emergent Herbaceous Wetlands	342,666	846,743	4%

undergoing serious population declines, stop in Delaware Bay to fatten up on horseshoe crab eggs before continuing their long flight to their arctic breeding grounds. Estuarine complexes and embayments created behind barrier beaches in this region are extremely important to wintering and migrating waterfowl and support approximately 65 percent of the total wintering American Black Duck population in the Atlantic Flyway, along with large numbers of Greater and Lesser Scaup, Tundra Swan, Gadwall, Brant, and Canvasback. Declining water quality of Chesapeake Bay and other coastal zones, and the accompanying loss of submerged aquatic vegetation have significantly reduced the value of these systems to most marshbirds, colonial waterbirds, shorebirds, and waterfowl. Many landbird species within the BCR (e.g., Wood Thrush, Baltimore Oriole, Black-and-White Warbler) depend heavily on remaining expanses and patches of forested upland in the BCR to support them; these communities have also undergone great changes as a result of urbanization, forestry, and agriculture. By the early 1900s, approximately 70% of the land had been cleared for agriculture. Since then, the abandonment of farms, reforestation, and urbanization have changed the landscape significantly and today approximately 46% of the land is in forest cover, 19% in agriculture, 10% in wetland, and 22% in urban/suburban. Birds dependent on early successional shrublands and pine barrens have shown steep population declines in the northeast over the last few decades (Dettmers and Rosenberg 2000). A significant proportion of the breeding population of Blue-winged Warblers (10%) is estimated to breed in early successional habitats in BCR 30 which remain in only remnant patches.

Table 2. Patch size for land cover in BCR 30. Only patches > 2 hectares (4.94 acres) were considered in this analysis. A patch is defined as contiguous pixels (queen's rule) of the same land cover type (e.g., deciduous forest). Land cover was buffered by 25km to minimize edge effects on patch size, although this tends to inflate patch size statistics for open water (due to increased extent into Atlantic Ocean).

Land Cover	Mean Patch Size		Maximum Patch Size		N
	ha	acres	ha	acres	
Open Water	1,557.37	7,696.66	1,173,671.37	5,800,387.19	2324
Low Intensity Residential	219.78	1,086.17	65,255.49	322,498.37	4120
High Intensity Residential	87.96	434.71	21,095.64	104,256.51	1592
Commercial/Industrial/ Trans.	72.91	360.33	4,292.10	21,211.94	2482
Bare Rock/Sand/Clay	40.78	201.54	2,114.19	10,448.51	593
Quarries/Strip Mines/Gravel Pits	37.12	183.45	765.00	3,780.70	703
Transitional	35.11	173.52	477.81	2,361.38	935
Deciduous Forest	304.33	1,504.03	121,050.00	598,239.75	6268
Evergreen Forest	73.20	361.76	2,891.43	14,289.70	3852
Mixed Forest	136.13	672.77	21,704.40	107,265.05	5230
Shrubland	6.64	32.82	103.59	511.95	86
Orchards/Vineyards/ Other	6.61	32.67	25.65	126.76	25
Pasture/Hay	125.88	622.11	39,037.86	192,928.54	3852
Row Crops	119.35	589.84	13,564.80	67,038.44	3829
Urban/Recreational Grasses	34.35	169.76	759.42	3,753.12	1907
Emergent Herbaceous Wetlands	139.07	687.30	20,449.80	101,064.71	1922
Woody Wetlands	81.85	404.51	5,594.22	27,647.13	3102

Louisiana Waterthrush; High Priority

THREATS

The greatest threat to BCR 30's ecological health is the growing human population and expansion of residential communities into remnant natural habitats (habitat loss and fragmentation). Habitats within BCR 30 have been affected by human settlement for hundreds of years, from Native American settlements prior to European colonization, to the shift to an agrarian society, to the dense urban centers supported in the BCR today. Presently, BCR 30 supports some of the highest densities of humans in the United States. From southern New Hampshire through Maryland, and again in southern Virginia, coastal lands support greater than 250 individuals per square mile, and the population is expanding. There is tremendous pressure on agricultural lands from developers where lands historically used for agriculture have been lost to suburban housing developments. Today, nearly 95% of the original habitat types have been lost to agriculture, forestry and urban development (Dettmers and Rosenburg 2000).

Greatest Threats to Birds in BCR 30

- **Habitat loss and fragmentation** is the number one threat to all habitat types. Coastal marsh and mature forested habitats are the highest priority habitats within the BCR due to pressures, rate of loss, or lack of information on rate of loss and present spatial distribution.
- **Declining habitat quality** is a threat for all habitat types, including salt marsh, early successional habitats, forested habitats and wetlands.
- **Invasive species** (plant and animal) threaten all habitats within the BCR.
- **Predation** is a threat throughout the BCR for beach-dependent species and many coastal marsh-dependent species such as breeding waterfowl, shorebirds, terns and rails.
- **Human disturbance** (including pedestrians, dogs off leash, and motorized vehicles) is a threat to species reliant on coastal, riparian and forest habitats in the BCR and makes habitats unavailable (Burger et al. 2004).

Climate change and sea level rise (occurring globally) threaten coastal habitats within BCR 30. During the last century sea level in the mid-Atlantic was 5-6 inches more than the global average (IPCC 2007). This is because lands within the mid-Atlantic are subsiding at the same time sea level rises (http://www.epa.gov/climatechange/effects/coastal/index.html#ref). The salt marshes that occur in BCR 30 are particularly vulnerable to rising sea level because they are generally within a few feet of sea level. Higher temperatures are expected to further raise sea

level by expanding ocean water and melting polar ice caps and glaciars. The Interpanel Government on Climate Change has estimated globally the average sea level will rise between 0.6 and 2 feet in the next century. A two foot rise in sea level would eliminate coastal lands equal in size to Massachusetts and Delaware (10,000 miles^2). This is important to consider within BCR 30 as we target lands to sustain bird populations into the future. As the sea rises, the outer boundary of the wetlands within BCR 30 will erode, and new wetlands will form inland as previously dry areas are flooded by the higher water levels. New wetlands will only form in areas that are not protected by bulkheads, dikes and other water maintenance structures (http://www.epa.gov/climatechange/effects/coastal/index.html#ref). Therefore, when considering habitat needs for birds, we need to include inland properties where new wetlands can form.

Invasive exotic species are a threat to biodiversity within BCR 30. Once invasive species are established in an area, it becomes very difficult to recover the native biodiversity. Removal is difficult and financially prohibitive (PA Department of Conservation and Natural Resources, Invasive Species Management Plan, 2005.) Most invasive plants reduce the availability and quality of native habitats, and these can have major impacts on priority bird species. For example, purple loosestrife has likely reduced the amount of habitat available to Least and American Bitterns, as well as most of the other rail, waterbird, and waterfowl species that use emergent wetlands. This species can be quite effectively controlled now through biocontrol (i.e., releasing insect predators), but it may take decades for a large proportion of native wetland plants to recover. In BCR 30, Phragmites control takes many resources and must be implemented year after year. Even with many ongoing efforts to eradicate phragmites from public lands, the plant continues to spread to new wetlands.

Disturbance of critical habitats is a big issue in coastal, forested and riparian habitats in BCR 30. For example, species such as Piping Plovers need undisturbed beach habitat during their nesting season and shorebirds need undisturbed habitats to forage and roost as they migrate from their northern breeding colonies to their southern 'wintering' grounds. It is highly likely that shorebird survival rates are impacted on migratory stopovers and overwintering areas by increased human/dog disturbance. With the rapid growth of the human population along the Atlantic coast, undisturbed habitats are difficult to find and maintain. Seasonal access to areas must restricted and enforced. This includes restricting use by pedestrians, dogs-off-leash, All-terrain vehicles, and pleasure boats.

CHAPTER 3: BCR 30 PRIORITY SPECIES AND HABITATS

For planning purposes, the BCR has been broken down into 11 general habitat types. They are beach/sand/mud flat (includes barrier islands), rocky coastline (includes rocky outcroppings offshore), estuaries and bays, estuarine emergent wetlands, freshwater emergent wetlands, forested wetlands, freshwater lakes, rivers and streams, scrub-shrub/early successional, marine open water, forested uplands, and grasslands. Bird species have been grouped according to their use of these habitats.

HABITATS

Table 3. Habitat types for BCR 30, with corresponding definitions and land cover classifications.

Category	***Definition***
Beach, Sand, Mud Flat (includes barrier islands)	Sandy shores, exposed sand flats, sandspits and gravel beaches; areas dominated by particles smaller than sand with virtually no vegetation; range of flooding regimes possible.
Rocky Coastline	Exposed unconsolidated rocky shore with little persistent or non-persistent vegetation.
Estuaries and Bays	Bays are large bodies of water partially enclosed by land but with a wide outlet to the ocean. Estuaries occur where fresh water rivers and streams reach the salt water areas of the coast. Defined by open water lacking any vegetation, or open water dominated by plants that grow principally at or under the surface of the water.
Estuarine Emergent Wetlands	Emergent marshes dominated by persistent and non-persistent vegetation – estuarine systems (includes salt marsh)
Freshwater Emergent Wetlands	Emergent marshes dominated by persistent and non-persistent vegetation. Contain ocean derived salts in concentrations of less than .05%, and include tidal fresh reaches.
Forested Wetlands	Wetlands dominated by woody vegetation ≥6 m tall. Generally associated with palustrine systems adjacent to riverine systems, including beaver flowages.
Freshwater Lakes, Rivers and Streams	Open water lacking any vegetation, or open water dominated by plants that grow principally at or under the surface of the water – freshwater systems (lacustrine, riverine, palustrine)
Marine Open Water	Open waters beyond 20 km of the coast out to the limit of 320 km (200 mile) Economic Exclusion Zone (offshore); Open waters within 20 km of the coast (nearshore).
Forested Uplands	Forest with either a diverse assemblage of deciduous hardwoods, a mix of deciduous and coniferous trees, or systems dominated by either coniferous evergreen or deciduous trees.

Table 3. Habitat types for BCR 30, with corresponding definitions and land cover classifications.

Category	***Definition***
Scrub-Shrub/ Early successional	Ephemeral upland areas dominated by low woody vegetation (generally <3 m tall) with varying amounts of herbaceous vegetation and sparse tree cover (includes regenerating forests, abandoned field sites, etc.). May be upland or wetland.
Grasslands	Includes pastures, hayfields, and fallow fields, as well as grasslands managed on public lands for wildlife.

SPECIES

There were 134 species categorized as priority for BCR 30 using the process described below. The majority of priority species use habitats associated with either coastal ecosystems, including beach, sand and mud flats, estuaries, bays, and estuarine emergent wetlands or forested uplands. Priority species are grouped by their general habitat types into species habitat suites along with conservation actions needed for these species and habitats.

Method

Priority bird species were identified using an objective method based on decision-rules and BCR-specific information provided in the continental and regional plans produced by the bird initiatives, State Wildlife Action Plans, results from previous workshops held by bird conservation initiatives, and results from the December 2004 BCR 30 All-bird Workshop. The specific process used was identical to the process developed and used for the Atlantic Northern Forest BCR (BCR 14) and can be reviewed in the BCR 14 Plan (BCR 14 Species Prioritization Method). In general, the BCR 30 implementation plan identifies priority bird species based on factors such as global and/or continental conservation concerns, the importance of the BCR to a species' global or continental distribution, and the population trend and threat level within the region. There are a number of native bird species, both common and rare, not specifically mentioned in this plan because they are considered lower priorities for conservation as compared to the species addressed by this plan. However, the exclusion of these species is not an indication that they are less valuable but that they are considered to have either robust or acceptable populations or trends not requiring further conservation action at this time. Table 4 describes the criteria used to place species into categories of highest, high and moderate concern.

Table 4. Conservation priority categories for bird species in BCR 30.

Priority	Criteria/Rule
HIGHEST	High BCR Concern and High BCR Responsibility and (High or Moderate Continental Concern)
HIGH	High Continental Concern and Moderate BCR Responsibility OR Moderate BCR Concern and High BCR Responsibility OR High BCR Concern and Moderate BCR Responsibility OR Non-breeding High Continental Concern species whose primary area of spring or fall migration overlaps the BCR (marked by*) (BCR 30 Rule)
MODERATE	Moderate BCR Concern and Moderate BCR responsibility OR High Continental Concern and Low BCR Responsibility OR High BCR Concern and Low BCR Responsibility and Regionally Threatened Species (PIF Tier IIC) OR High BCR Responsibility and Low BCR Concern OR Sub-species of Regional Importance (marked by **) (BCR 30 Rule)

Table 5. BCR 30 Priority Species

HIGHEST PRIORITY	HIGH PRIORITY	MODERATE PRIORITY
American Black Duck (B/W/M)	American Golden Plover (M)	American Avocet (M)
American Oystercatcher (B)	Audubon's Shearwater (M)	American Bittern (B/W/M)
American Woodcock (B/W/M)	Baltimore Oriole (B)	American Wigeon (W/M)
Atlantic Brant (W/M)	*Bay-breasted Warbler** (M)	Bachman's Sparrow (B)
Black Rail (B)	*Bicknell's Thrush** (M)	Bald Eagle (B/W/M)
Blue-winged Warbler (B)	Black Scoter (W/M)	Black Skimmer (B)
Canada Goose – Atl. Pop. (W/M)	Black-and-white Warbler (B)	Blackburnian Warbler (B)
Gull-billed Tern (B)	Black-bellied Plover (W/M)	Black-crowned Night Heron (B/W)
Piping Plover (B/M)	Bridled Tern (B/M)	Brown-headed Nuthatch (B/W)
Prairie Warbler (B)	Broad-winged Hawk (B)	Canada Warbler (B)
Red Knot (M)	Brown Thrasher (B)	Cerulean Warbler (B)
Red-throated Loon (W/M)	Buff-breasted Sandpiper (M)	*Coastal Plain Swamp Sparrow*** (B)
Roseate Tern (B/M)	Bufflehead (B/W/M)	Common Goldeneye (B/W/M)
Ruddy Turnstone (M)	Canada Goose - North Atl (W/M)	Common Snipe (B/W/M)
Saltmarsh Sharp-tailed Sparrow (B/W/M)	Canvasback (W/M)	Common Tern (B/M)

Table 5. BCR 30 Priority Species

HIGHEST PRIORITY	HIGH PRIORITY	MODERATE PRIORITY
Sanderling (W/M)	Chimney Swift (B)	Cory's Shearwater (M)
Whimbrel (M)	Clapper Rail (B)	Gadwall (B/W/M)
Wood Thrush (B)	*Common Eider (W/M)*	Golden-winged Warbler (B)
	Dunlin (W/M)	Grasshopper Sparrow (B)
	Eastern Kingbird (B)	Gray Catbird (B)
	Eastern Towhee (B/W/M)	Green-winged Teal (B/W/M)
	Field Sparrow (B/M)	Harlequin Duck (W/M)
	Forster's Tern (B/M)	Hooded Merganser (B/W/M)
	Glossy Ibis (B)	*Ipswich Savannah Sparrow*** (W/M)
	Great Crested Flycatcher (B)	Killdeer (B/W/M)
	Greater Scaup (W/M)	King Rail (B/W)
	Greater Shearwater (M)	Least Bittern (B)
	Greater Yellowlegs (W/M)	Least Sandpiper (M)
	Henslow's Sparrow (B)	Lesser Yellowlegs (W/M)
	Horned Grebe (W/M)	Little Blue Heron (B/W)
	Hudsonian Godwit (M)	Loggerhead Shrike (B)
	Kentucky Warbler (B)	Manx Shearwater (M)
	Least Tern (B/M)	Nelson's Sharp-tailed Sparrow (B/M)
	Lesser Scaup (W/M)	Northern Pintail (W/M)
	Long-tailed Duck (W/M)	*Razorbill (W)*
	Louisiana Waterthrush (B)	Red-necked Phalarope (M)
	Mallard (B/W/M)	Red Phalarope (M)
	Marbled Godwit (M)	Red-breasted Merganser (W/M)
	Marsh Wren (B)	Red-cockaded Woodpecker (B/W)
	Northern Bobwhite (B/W)	Red-headed Woodpecker (B/W/M)
	Northern Flicker (B/W/M)	*Royal Tern (B)*
	Northern Gannet (W/M)	Ruddy Duck (W/M)
	Prothonotary Warbler (B)	Seaside Sparrow (B/W/M)
	Purple Sandpiper (W/M)	Sedge Wren (B/W/M)
	*Rusty Blackbird** (W/M)	Semipalmated Plover (M)
	Scarlet Tanager (B)	Short-eared Owl (W/M)
	Semipalmated Sandpiper (M)	Snowy Egret (B/W)
	Short-billed Dowitcher (M)	*Sora (B/M)*
	Solitary Sandpiper (M)	Spotted Sandpiper (B/M)
	Surf Scoter (B/W/M)	Swainson's Warbler (B)
	Tundra Swan – Eastern (W/M)	Tricolored Heron (B)
	Whip-poor-will (B)	*Upland Sandpiper** (B/M)
	White-rumped Sandpiper (M)	Western Sandpiper (M)
	White-winged Scoter (W/M)	Wood Duck – Eastern (B/W/M)
	Willet (B/W/M)	*Yellow-crowned Night Heron (B/M)*
	Willow Flycatcher (B)	

Table 5. BCR 30 Priority Species

HIGHEST PRIORITY	HIGH PRIORITY	MODERATE PRIORITY
	Wilson's Phalarope (M) Wilson's Plover (B) Worm-eating Warbler (B) Yellow-throated Vireo (B)	

Note: Species in italics are those whose category of concern within the BCR differs from their continental initiative because of the relative importance of the BCR to the species. Species in italics* were added because of the importance of the BCR outside of the breeding season (migration). Sub-species denoted by italics** were added to the list because of the regional importance of the BCR to their populations.

Priority species were divided into a three-tier framework. Highest priority species are those requiring serious and/or immediate action and potentially given preference over other species when deciding where to focus efforts and resources for management or other conservation actions. High priority species are those for which attention in not as time-sensitive as highest priority species because continental concerns or observed population declines are not as grave. For moderate priority species, threats are assumed less serious, populations more secure, and/or a smaller proportion of the specie's continental distribution is supported by the BCR (e.g., species of conservation concern at the edge of their range and uncommon in the BCR). The conservation needs of moderate priority should be considered and, whenever possible, included in conservation management decisions to positively affect their populations when planning or managing for higher priority species.

BCR 30 PRIORITY SPECIES/HABITATS SUITES

Below are tables describing priority species associated with particular habitats. Under each habitat type, descriptions of species needs are included, with suggested projects for initiating change in species conservation status. Most species use more than one habitat type to complete their annual and/or life cycles and are listed under multiple habitats.

Beach, Sand and Mud Flats (includes barrier islands)

Table 6. Priority Bird Species Associated with Beach, Sand, and Mud Flats

	BEACH, SAND, MUD FLAT	
Highest Priority Species	*High Priority Species*	*Moderate Priority Species*
American Oystercatcher	*American Golden Plover*	American Avocet
American Black Duck	*Black-bellied Plover*	Common Tern
Piping Plover	*Buff-breasted Sandpiper*	Ipswich Savannah Sparrow
Red Knot	*Dunlin*	Least Sandpiper
Roseate Tern	*Greater Yellowlegs*	Lesser Yellowlegs
Ruddy Turnstone	*Hudsonian Godwit*	Royal Tern
Sanderling	*Least Tern*	Semi-palmated Plover
Whimbrel	*Marbled Godwit*	Western Sandpiper
	Semi-palmated Sandpiper	
	Short-billed Dowitcher	
	White-rumped Sandpiper	
	Wilson's Plover	
	Willet	

This collection of coastal habitat types supports the largest number of highest and high priority species within the BCR. Barrier islands provide important habitats within BCR 30, including beaches, dunes, shrublands, maritime forests and marshes and support a large proportion of the breeding waterbirds in BCR 30 (Watts 1999). One of the key characteristics of barrier islands is their dynamic nature, caused by winter storms that both erode and accrete sand and other materials across the islands. Birds using barrier islands depend upon the dynamic nature of the system and successional habitats created. Unfortunately, barrier islands, because of their aesthetic appeal, are cherished by man as places to play and live and BCR 30 is no exception. The Delmarva Peninsula is land bodered by the Chesapeake Bay on the west and the Atlantic Ocean and the Delaware Bay and Delaware River on the east. The peninsula provides critical beach and mud flat habitat for both breeding and wintering birds within BCR 30 and acts as a funnel for migratory birds traveling up and down the Atlantic coast during migration. Wetlands supported by the Peninsula provide important wintering habitat for waterfowl. It has been heavily developed for human habitation along the coastline as well as significant agriculture and poultry production in the interior.

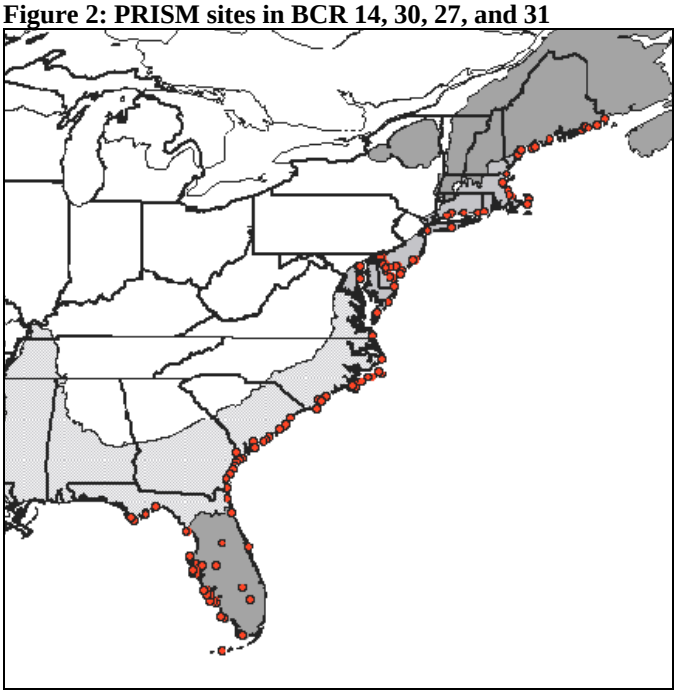
Almost all of the highest and high priority birds using beach, sand and mud flat communities fall within the shorebird guild. Beach-nesting priority birds, such as the Piping Plover and Roseate Tern (both federally-listed within the region) are dependent upon undisturbed beach habitats to successfully fledge young. Undisturbed habitats are becoming increasingly difficult to provide given human development of coastal areas within the BCR. In addition to

those species breeding in the BCR, many high priority shorebird species, such as the Red Knot, depend upon the beaches and mud flats of BCR 30 as staging areas during their long spring and fall migratory treks. Species affected by loss and/or disturbance of coastal habitats, such as terns and skimmers, are also priority species within these marine-linked habitats.

While American Black Ducks nest within a variety of habitats in BCR 30, including uplands near water, freshwater marshes, and salt marshes, they likely reach their highest densities on barrier and bay islands (Watts 1999). Black Ducks, whose populations have declined since the 1950's (Krements 1987), nest throughout the BCR.

The Atlantic Coast population of Piping Plovers (federally threatened) requires wide beaches with sparse vegetation in close proximity to preferred foraging areas. The mid-Atlantic population is near the southern limit of it's breeding range and accounted for approximately a quarter of the Atlantic Coast population between 1986 and 1994 (http://www.fws.gov/northeast/pipingplover/recplan/index.html). Wilson's Plovers reach their northern limit for breeding within the BCR and virtually 100% of the regional population now breeds on the Virginia barrier islands with only erratic reports from Maryland (Robbins and Blom 1996, Wilson et. Al 2007).

Figure 2: PRISM sites in BCR 14, 30, 27, and 31



Conservation Actions

1. Identify, restore, enhance and protect breeding habitats of highest and high priority species.
2. Identify, restore, enhance and protect nonbreeding habitats of highest and high priority species.
3. Fully implement PRISM surveys (see Figure 2) and other aerial surveys for inaccessible coastal habitats.
4. Implement targeted monitoring programs for highest priority species.
5. Implement selective predator control management programs. Explore cooperative relationship between U.S. Department of Agriculture for sand/or disturbance control at sites used by priority species.
6. Implement improved coastal development zoning laws by working through states, in cooperation with local governments, NGOs and federal agencies. Develop cooperative habitat management programs with agencies responsible for beach renourishment, beach protection, and use of dredge spoil material.
7. Develop a comprehensive Colonial Waterbird Monitoring Program utilizing a standardized, sampled program for wading birds and seabirds. The monitoring program will include inventories conducted every 10 years and sampled surveys conducted every 1-3 years.
8. Reduce human disturbance of nesting beaches for beach nesting species and on coastal migratory stopovers and wintering locations for shorebirds, including American Oystercatchers (includes foraging and roosting areas).

Research Priorities

Shorebirds

1. Conduct an analysis of threats to key sites.
2. Determine the abundance of shorebirds during spring and fall migration at low tide foraging sites and high tide roosting sites (provides indices of populations) such that there is a high probability of discriminating between sites that vary at least five fold in abundance.
    a. Conduct aerial surveys to develop a more comprehensive assessment of shorebird stopover site use. This involves developing a sampling protocol for marsh complexes too large to be sampled completely.
    b. Develop a model to predict use in areas not surveyed.
    c. Conduct ground surveys to determine species composition, behavior patterns (e.g., foraging, roosting), habitat use. Collect habitat variables data.
    d. Develop a model to predict use in areas unable to be comprehensively surveyed using standard techniques.
3. Conduct coastal aerial and ground surveys for migratory and wintering shorebirds including American Oystercatcher, especially low-tide foraging and high-tide roosts.
    a. Identify and map critical sites in need of protection from human disturbance (including: pedestrian beach recreation and off-leash dogs, beach use by four-wheel drives and All-terrain Vehicles, disturbance caused by personal watercraft (PWC) (physical presence and noise effects), boat and PWC access to isolated barrier islands).
    b. Identify sites proximate to suitable foraging areas that may serve for creation of undisturbed/protected roost sites (see Peters and Otis, 2007).

Mud Flats Species:

1. Determine the abundance of breeding birds during breeding and non-breeding periods.
    a. Develop models that predict abundance and productivity as a function of tidal tidal flat manipulations.
        i. Identify the independent variables to be evaluated for possible inclusion in the model development: impoundment management, creation, and enhancement; grid ditching; tidal flow restrictions; burning; aquaculture; development; fisheries; chemical treatment; patch size.
        ii. Design a sampling plan (e.g., involving stratification, experimental design) to insure that variation in each independent variable is similar to the variation that occurs in the population of interest (i.e., manipulated or natural sites) and may vary across the region.
        iii. Select methods to measure abundance and nesting success on the sample plots.
        iv. Conduct the field surveys.
        v. Develop the initial models including sample size estimation needed to complete model development and testing.
        vi. Gather additional field data as needed for model development and testing.

Rocky Coastline (includes rocky outcroppings/islands)

Table 7. Priority Bird Species Associated with Rocky Coastline

ROCKY COASTLINE		
Highest	*High*	*Moderate*
Roseate Tern	*Common Eider*	Common Tern
Ruddy Turnstone	*Purple Sandpiper*	Harlequin Duck
	Semipalmated Sandpiper	Razorbill

Conservation Actions

1. Conduct annual surveys for Common Eider (wintering and breeding) to determine range, abundance, and distribution;
2. Improve the accuracy of numbers of harvested sea ducks;
3. Protect rocky coastlines from on-shore development, excessive recreational use, and construction of docks, piers, jetties, and other structures in the water near shore;
4. Research the natural history of priority species using rocky coastlines – pay attention to food sources and possible deleterious effects of human uses of these coasts and the immediately adjacent waters;
5. Educate/inform the public about the value of the habitat.

Estuaries and Bays

Table 8. Priority Bird Species Associated with Estuaries and Bays.

ESTUARIES AND BAYS		
Highest	*High*	*Moderate*
American Black Duck	*Bufflehead*	Common Goldeneye
American Oystercatcher	*Canada Goose - North Atl.*	Common Tern
Atlantic Brant	*Canvasback*	Hooded Merganser
Canada Goose – Atl. Pop.	*Common Eider*	Northern Pintail
Roseate Tern	*Forster's Tern*	Red-breasted Merganser
	Greater Scaup	Red-necked Phalarope
	Horned Grebe	Royal Tern
	Least Tern	Ruddy Duck
	Lesser Scaup	
	Surf Scoter	
	Tundra Swan – Eastern	

BCR 30 is characterized by the large number of significant bays and estuaries including the Chesapeake Bay, the largest estuary in the nation. In the lower portion of the BCR, barrier islands occur along most of the shoreline, separating the Atlantic Ocean from the mainland and creating large coastal lagoon systems. Estuaries and bays provide critical foraging areas for a number of priority species of waterfowl wintering in BCR 30 (e.g., Canvasback, Redhead and Tundra Swan). These birds are dependent on the presence of submerged aquatic vegetation (SAV) beds which once covered more than 80,900 ha (200,000 acres) of the Chesapeake Bay. As of 2003, an estimated 26,187 ha (64,709 acres) of SAV beds remained in the bay – a loss of seventy percent (Chesapeake Bay Program). Such declines have had a dramatic impact on wintering waterfowl populations, as well as other waterbird species. The populations of many species of waterbirds (waterfowl, colonially nesting wading and seabirds) and shorebirds have declined over the past 20 years, likely in response to regional degradation of estuarine habitats (Erwin 1996).

Conservation Actions

1. Reduce sediment and nutrient input from the watershed to improve water quality.
2. Control invasive species.
3. Reestablish beds of submerged aquatic vegetation in areas where they formerly occurred and where water quality has improved since their disappearance.
4. Improve hydrologic connections whenever possible.
5. Identify and protect offshore habitat needs.
6. Develop and improve oil spill response and contingency planning and capabilities. Seek policies that reduce oil spill likelihood (e.g., vessel mandates).
7. Mitigate fishery activities detrimental to waterfowl.
8. Improve the protection, enhancement, and creation of small bay islands for nesting and brooding birds, especially colonial species;

9. Establish sanctuaries that are protected from human disturbance.
10. Support policies to preclude point and nonpoint source runoff of chemicals and nutrients to enable submerged aquatic vegetation to recover in many coastal bays.
11. Improve environmental education concerning disturbance to wildlife for boaters and recreationists using the coastal zone.
12. Assess the impact of aquaculture on all birds in all states where significant activity is underway, and predict probable impacts of proposed aquaculture development.

Estuarine Emergent Wetlands

Table 9. Priority Bird Species Associated with Estuarine Emergent Wetlands.

ESTUARINE EMERGENT WETLANDS		
Highest	*High*	*Moderate*
American Black Duck	*Black-bellied Plover*	American Avocet
American Oystercatcher	*CanadaGoose – North Atl*	Common Snipe
Atlantic Brant	*Clapper Rail*	Common Tern
Black Rail	Henslow's Sparrow	King Rail
Canada Goose – Atl Pop	*Marsh Wren*	Nelson's Sharp-tailed Sparrow
Saltmarsh Sharp-tailed Sparrow	*Greater Yellowlegs*	Northern Pintail
Whimbrel	*Henslow's Sparrow*	Seaside Sparrow
	Willet	Sedge Wren
		Short-eared Owl

Estuarine emergent marshes are distributed along the BCR coastline in association with lagoon systems and barrier islands, bays and estuaries, and along tidal tributaries. They vary by soil type, salinity, elevation and geographic location. Brackish marshes occur along tidal tributaries within the transition zone between outer salt marshes and tidal fresh marshes. Salt marshes are abundant within the BCR and are situated at the edges of lagoons and bays. Vegetation zones within salt marshes are influenced by the frequency of inundation and determine the suite of birds dependant on the system. Low marsh is inundated diurnally and supports grasses and rushes while high marsh experiences inundation only irregularly during spring tides or storm events and therefore often supports scattered shrubs in addition to grasses and rushes.

Sea level rise is one of the greatest future threats to estuarine emergent wetlands within the BCR. Sedimentation rates must exceed the rate of sea level rise or a significant proportion of the marshes will be lost to erosion and subsidence over the next century (Tiner 1984). High marsh habitats are particularly susceptible because plants within them are very sensitive to the frequency of inundation and these habitats are already very limited within the region (Watts 1999). The ability of coastal wetlands to keep up the vertical pace (through marsh accretion) with sea level rise will vary locally and regionally (Erwin 2002) and is partially dependent upon the

position of the wetland relative to the mainland and/or barrier island. Within BCR 30, the effects of sea level rise will be more severe in some areas than others. For example, marshes attached to mainland areas may increase in area with gradual sea level rise, whereas lagoonal marshes may rapidly erode and/or submerge. In the northern portions of the BCR where marshes are attached to the mainland, marsh accretion rates appear to be keeping up with sea level rise. However, in the Chesapeake Bay, where barrier islands lie between the mainland and the ocean, marshes are experiencing subsidence and a rapid reversion of marsh to open water because marsh accretion cannot keep up with sea level rise. Erwin (2006) predicts that in 100 years, lagoonal marshes in the mid-Atlantic region will experience a net elevational loss of about 20 cm. This will result in all lagoonal marsh areas and a portion of fringing marsh areas to be submerged between mid and high-tide during each cycle.

The vast saltmarsh habitats within BCR 30 support the regional stronghold of rails and saltmarsh sparrows, such as Black Rail and Coastal Plain Swamp Sparrow (Rosenberg 2000). Mosquito control efforts and contaminants from agricultural and residential runoff into marsh habitats can be a problem for bird species dependent upon marshes for breeding. Many of the marshes within BCR 30 have been ditched and their hydrology altered for mosquito control. There have been efforts to restore the hydrology to some of these systems – with varying degrees of success. The spread of exotic or introduced species is degrading habitats and leading to competition for resources for species like American Black Ducks and Black Rails. Exotic species, including phragmites, are another significant threat to estuarine emergent wetlands that must be managed immediately to sustain the quality and quantity of remaining marshes within the BCR.

Conservation Actions

1. Assess the carrying capacity for priority species – this will be needed to accomplish many of the conservation actions identified for priority species.
2. Identify and protect the most critical coastal marsh habitats and buffers for priority species, taking into consideration projected sea level rise, within the BCR to reduce threats from habitat loss, coastal development, and sea level rise.
3. Enhance/restore degraded wetlands and adjacent upland habitats (including buffers and marsh islands).
4. Improve nesting and wintering habitat quality at multiple geographic scales. For example, at an individual site improve habitat quality by controlling water levels and vegetation, reducing erosion and runoff to the area, and conserving or improving nesting or roosting habitats or buffer habitats (e.g., their width and vegetative composition) adjacent to wetlands. At the larger scale, protect or improve water quality throughout the watershed, and increase the number, size, and connectivity of habitat patches (nesting, roosting, stopover, wintering, etc.) in the landscape.

5. Restore hydrological conditions of saltmarshes supporting highest and high breeding and nonbreeding priority species.
6. Determine the affects of marsh management (mosquito control, marsh burning, open marsh water management, ditch plugging, phragmites control, etc.) and choose management programs with the most benefit to estuarine emergent wetland species.
7. Incorporate protection of buffers into conservation planning.
8. Control invasive species.
9. Fee or easement acquisition of priority high-quality habitats including nesting, migratory stopover, and wintering areas, and the upstream headwaters and adjacent buffer habitats throughout the watershed that are central to improving and maintaining water quality in coastal marshes.
10. Control erosion in coastal marshes.
11. Reduce negative impacts of Greater Snow Goose on coastal marshes.
12. Reduce human intrusion into sensitive habitats through fencing, posting, wardens, and public outreach.
13. Increase avian productivity in high-quality habitats by implementing predator exclusion and control programs.
14. Through public outreach and partnerships with municipal governments and local conservation organizations, improve wetland protection and zoning laws to benefit avian habitat conservation.
15. Prioritize high marsh sites (>50 ha) coupled with field surveys of high marsh species and habitats.
16. Develop a targeted monitoring program for marsh species following a standardized regional (or national) protocol for both breeding and nonbreeding habitats.
17. Create dredge spoil material islands/marshes.

Research Priorities

Saltmarsh Sharp-tailed Sparrow and Seaside Sparrow

1. Determine the impacts of mosquito control and pesticides on populations.
2. Determine the role of mercury deposition on populations.
3. Conduct research on food availability and food habits for both species.
4. Conduct research on niche separation between sympatric species.
5. Research impacts of marsh management techniques on populations.
6. Research techniques to increase productivity and survival.

Tidal Marsh and Flats Species:

1. Determine the abundance of breeding birds during breeding and non-breeding periods.
    a. Develop models that predict abundance and productivity as a function of tidal marsh or tidal flat manipulations.
        vii. Identify the independent variables to be evaluated for possible inclusion in the model development: impoundment management, creation, and enhancement; grid ditching; tidal flow restrictions; burning; aquaculture; development; fisheries; chemical treatment; patch size.
        viii. Design a sampling plan (e.g., involving stratification, experimental design) to insure that variation in each independent variable is similar to the variation that occurs in the population of interest (i.e., manipulated or natural sites) and may vary across the region.
        ix. Select methods to measure abundance and nesting success on the sample plots.
        x. Conduct the field surveys.

xi. Develop the initial models including sample size estimation needed to complete model development and testing.
xii. Gather additional field data as needed for model development and testing.

Waterbirds/Waterfowl

1. Determine the effects of invasive species on habitat availability to marshbirds.
2. Gain better understanding of the spatial and temporal effects of sea level rise on saltmarsh habitats.
3. Improve understanding of the relationship between habitats and species during all life stages to allow managers to better predict where species will be found.
4. Assess the impact of contaminants on waterbird populations.
5. Evaluate the effectiveness of wetland restoration programs and incorporate this knowledge into future decision-making.
6. Identification and selection suitable habitat in participating states
7. Develop and implement the use of standardized playback techniques.
8. Develop additional sampling techniques to detect other priority waterbirds.
9. Evaluate new automated digital detection technologies.
10. Develop sampling method to address each management issue, stratified by wetland acreage, vegetative composition, and management activities
11. Develop model to estimate population size.
12. Select methods of evaluating vegetative composition (remote sensing, mapping)
13. Determine the carrying capacity of marshes to support wintering waterfowl species and tie this information into estimates of post hunting season survival.

Freshwater Emergent Wetlands

Table 10. Priority Bird Species Associated with Freshwater Emergent Wetlands.

FRESHWATER EMERGENT WETLANDS		
Highest	***High***	***Moderate***
American Black Duck	*Canada Goose- North Atl*	American Bittern
Black Rail	*Forster's Tern*	American Wigeon
Canada Goose – Atl Pop	*Glossy Ibis*	Black-crowned Night Heron
	Mallard	Coastal Plain Swamp Sparrow
	Marsh Wren	Common Snipe
	Solitary Sandpiper	Gadwall
	Wilson's Phalarope	Green-winged Teal
		King Rail
		Least Bittern
		Least Sandpiper
		Little Blue Heron
		Sedge Wren
		Short-eared Owl
		Snowy Egret
		Sora
		Spotted Sandpiper
		Tricolored Heron
		Wood Duck – Eastern

Within BCR 30, freshwater emergent wetlands include ponds and shallow lakes in which the dominant vegetation is floating or submerged (aquatic-bed wetlands) and tidal and non-tidal freshwater marshes, fens, and bogs dominated by herbaceous plants such as cattails, rushes and sedges. Tidal fresh marshes are found inland of salt marshes and have salinity levels below 0.5 parts per thousand. The Black Rail, a highest priority species within the BCR uses high marsh, or infrequently inundated marsh habitats. Coastal populations of Black Rails probably declined drastically between 1920s and 1970s, prior to enaction of laws protecting coastal wetlands (Eddleman et. al 1994).

Conservation Actions

1. Identification and protection of largest unprotected wetland complexes, including adjacent uplands/buffers.
2. Manage impoundments for priority bird species.
3. Map invasive species (current & historical).
4. Control invasive species (plant and animal).
5. Map throughout the BCR, previously converted cropland and degraded areas.
6. Restore prior converted & other degraded wetlands (encourage private land programs, Partners for Fish and Wildlife, Wetlands Reserve Program, etc.)
7. Determine ownership of wetland areas.
8. Integrate wetland trend data for BCR (e.g., Koneff & Royle)
9. Determine carrying capacity for various bird groups using freshwater wetlands
    a. Seasonal variability
    b. Effects on water quality & downstream habitats (e.g., SAV)
10. Identify areas of groundwater depletion and its effects on wetland ecology/sustainability.
11. Fee or easement acquisition of priority high-quality habitats including the upstream headwaters and adjacent buffer habitats throughout the watershed that are central to improving and maintaining water quality.
12. Protect wetlands from contamination, siltation and eutrophication through improved stormwater management practices and emergent control measures.
13. Incorporate wetland conservation actions into local land planning efforts.

Research Priorities

Waterfowl

1. Late winter-spring ecology and physiology "spring bottleneck hypothesis."
2. Migration and wintering area carrying capacity by habitat type (impoundment, salt marsh, benthic, mud flat, etc.).
3. Continue research on biological control of phragmites and purple loosestrife.

Waterbirds

1. Determine the effects of invasive species on habitat availability to marshbirds.
2. Gain better understanding of the spatial and temporal effects of sea level rise on saltmarsh habitats.
3. Improve understanding of the relationship between habitats and species during all life stages to allow managers to better predict where species will be found.

4. Assess the impact of contaminants on waterbird populations.
5. Evaluate the effectiveness of wetland restoration programs and incorporate this knowledge into future decision-making.
6. Identification and selection suitable habitat in participating states
7. Develop and implement the use of standardized playback techniques.
8. Develop additional sampling techniques to detect other priority waterbirds.
9. Evaluate new automated digital detection technologies.
10. Develop sampling method to address each management issue, stratified by wetland acreage, vegetative composition, and management activities
11. Develop model to estimate population size.
12. Select methods of evaluating vegetative composition (remote sensing, mapping)

Forested Wetlands

Table 11. Priority Species Associated with Forested Wetland Communities

FORESTED WETLAND COMMUNITIES		
Highest	***High***	***Moderate***
American Black Duck	*Glossy Ibis* *Louisiana Waterthrush* *Mallard* *Prothonotary Warbler* *Worm-eating Warbler*	Canada Warbler Cerulean Warbler Common Goldeneye Hooded Merganser Little Blue Heron Red-breasted Merganser Red-headed Woodpecker Snowy Egret Swainson's Warbler Tricolored Heron Wood Duck – Eastern Yellow-crowned Night Heron

This broadly-defined habitat is characterized by vegetation that can tolerate saturation of the root zone for varying periods of time during the growing season (CCB BCR 30 Habitat Assessment/Wet Forest) and accounts for the greatest amount of wetland loss in the United States. Between 1950 and 1980, nearly 2.5 million hectares were lost through tree harvest and conversion to agriculture and urban and suburban development (Dahl 2000). In 1991, the mid-Atlantic Coastal Plain (a portion of BCR 30) contained nearly 7.4% of the nations total of forested wetlands (more than 550,000 ha). Presently, there are approximately 135,000 hectares of forested wetlands in public ownership within BCR 30 (CCB BCR 30 Habitat Assessment/Wet Forest).

The species composition of forested wetlands is determined in large part by hydroperiod. Within the BCR, cypress swamps occur in regions with extended hydroperiods, evergreen forested wetlands are commonly dominated by Atlantic white cedar within the Atlantic coastal

plain, and hemlock outside of the coastal plain. Regions with short hydroperiods support forest species that are similar to upland hardwood forests, making it difficult to delineate the wetland boundary. Another important forest community within the mid-Atlantic region is maritime forests influenced by proximity to the ocean. These ecosystems historically occurred on barrier and bay islands, as well as along edges of salt or brackish marshes, and was maintained by fire and hydrology. Today, maritime forests have been fragmented by changes in land use and have been degraded by hardwood encroachment. Radar studies have shown forested wetlands within BCR 30 to be important to migratory stopover habitats for migratory birds.

Conservation Actions

1. Use fee or easements to acquire and/or protect priority high-quality forested wetland habitats including the upstream headwaters and adjacent buffer habitats throughout the watershed that are central to the integrity of the region to support forested wetland species.
2. Enhance/restore degraded forested wetlands and adjacent upland habitats (including 300 meter buffers).
3. Control invasive plants.
4. Direct mitigation to highest priority areas within forested wetlands.
5. Restore riparian bottomland forest.
6. Develop a targeted monitoring program for forested wetland species, such as Swainson's Warbler, Prothonotary Warbler, Cerulean Warbler, and Louisiana Waterthrush.
7. Manage for cavity nesting species.

Research Priorities

Forest-dependent species (ALSO appropriate for upland forest)
Develop models that predict abundance and productivity as a function of patch size, forest type, structural variables affected by management, and other factors.

1. Identify the independent variables to be evaluated for possible inclusion in the model.
2. Design a sampling plan (e.g., involving stratification) to insure that variation in each independent variable is similar to the variation that occurs in the population of interest (i.e., naturally occurring sites, managed sites).
3. Select methods to measure abundance and nesting success on the sample plots.
4. Conduct the field surveys.
5. Develop the initial models including sample size estimation needed to complete model development and testing.
6. Gather additional field data as needed for model development and testing.

Freshwater Lakes, Rivers and Streams

Table 12. Priority Species Associated with Freshwater Lakes, Rivers and Streams.

FRESHWATER LAKES, RIVERS, AND STREAMS		
Highest	***High***	***Moderate***
Canada Goose – Atl. Pop.	*Canada Goose - North Atlantic* *Louisiana Waterthrush*	American Wigeon Bald Eagle Gadwall Spotted Sandpiper

Present throughout the BCR, wetlands and open water associated with lakes, reservoirs, rivers and streams make up only a small percentage of the total wetland area within the BCR. Freshwater wetlands are generally restricted to the channel or the shallow zone between the shore and the deeper water lacustrine or riverine habitat. If vegetated, they have only aquatic bed or nonpersistent emergent vegetation. Riverine wetlands are most abundant within the freshwater tidal areas of the rivers emptying into the Atlantic. Nontidal marshes are associated with impounded water and the upper reaches of small tributaries throughout the BCR, and have increased due to construction of water storage facilities such as reservoirs.

Conservation Actions

1. Restore natural character of the water body, where possible (e.g., restore natural flow patterns and volumes, restore banks, etc.).
2. Identify and protect the largest wetland habitat tracts.
3. Restore degraded and prior converted wetlands bordering lakes, rivers and streams.
4. Control invasive species (plant and animal).
5. Encourage local and county planning agencies to maintain and increase vegetated buffers along rivers, streams and lakes to protect wildlife, habitat, and water quality and to create habitat. Buffers should be a minimum of 300 feet.

Marine Open Water

Table 13. Priority Species Associated with Marine Open Water Habitats.

MARINE OPEN WATER		
Highest	***High***	***Moderate***
Red-throated Loon **Roseate Tern**	*Audubon's Shearwater* *Black Scoter* *Bridled Tern* *Common Eider* *Greater Shearwater* *Horned Grebe* *Long-tailed Duck* *Northern Gannet* *Surf Scoter* *White-winged Scoter*	Cory's Shearwater Harlequin Duck Manx Shearwater Razorbill Red-necked Phalarope Red Phalarope

Marine open water habitats with respect to marine-dependent bird species have not received as much focus as terrestrial habitats in the bird conservation initiatives. At the same time, the populations of many pelagic birds appear to be declining (Waterbird Initiative). Recognizing the need to address the needs of seabirds and sea ducks in their marine environments, a new effort, the Northwestern Atlantic Birds at Sea Conservation Cooperative (Cooperative) was recently initiated (Northwestern Birds at Sea Conservation Cooperative). Those actions identified by the Cooperative mirror the responsibilities within BCR 30 for marine bird species. Therefore, the BCR 30 Implementation Plan is adopting the actions laid out by The Cooperative, as well as priorities identified by BCR 30 partners at the December 2004 all-bird workshop.

Conservation Actions

1. Identify and protect offshore habitat needs.
2. Develop baseline data and mapping of offshore habitats and migration corridors to evaluate the effects of proposed offshore wind turbine projects.
3. Review existing offshore bird use data and determine areas or conditions that birds are keying into.
4. Where no information on offshore bird data use exists, create new monitoring programs to fill in gaps. These programs may focus initially on primarily shoal areas.
5. Consider marine protected -area designations for those sites identified as key to marine birds in the offshore environment.
6. Initiate better communication and shared responsibilities to track offshore populations and habitat use between agencies (e.g., USFWS, USGS, coastal state contributions, NOAA, etc).
7. Develop and implement improved oil response plans. Oil spill response simulation workshops (computer simulations) would help identify where preparedness and response could be improved and times of year that species/groups would be most vulnerable. Make GIS mapping of sensitive habitats and important migratory/breeding/wintering areas available to responders.

Greater Shearwater; High Priority Species

8. Develop a comprehensive offshore monitoring program composed of three parts as follows: a) determine trends based on spatial and temporal habitat use by birds offshore, b) analyze existing ship and aerial data sets for Atlantic and develop a GIS database, and) develop survey area priorities, species and techniques to fill in data gaps. (Focal species: Red-throated Loon, Bridled Tern, Audubon's Shearwater, Greater Shearwater, sea ducks)
9. Bycatch/Gear Interactions – conduct data collection and monitoring of species affected and relative numbers through a dedicated observer program or through existing observer programs. (Focal species: Red-throated Loon, Bridled Tern, Audubon's and Greater Shearwaters, sea ducks).

Red-throated Loon; Highest Priority Species

Forested Upland Communities (Mixed species, Coniferous and Deciduous)

Table 14. Priority Species Associated with Forested Upland Communities

FORESTED UPLAND COMMUNITIES		
Highest	***High***	***Moderate***
Wood Thrush	*Baltimore Oriole* *Bay-breasted Warbler* *Bicknell's Thrush* *Black-and-white Warbler* *Broad-winged Hawk* *Chimney Swift* *Great Crested Flycatcher* *Kentucky Warbler* *Louisiana Waterthrush* *Northern Flicker* *Rusty Blackbird* *Scarlet Tanager* *Whip-poor-will* *Yellow-throated Vireo*	Bachman's Sparrow Bald Eagle Blackburnian Warbler Brown-headed Nuthatch Canada Warbler Cerulean Warbler Red-cockaded Woodpecker Red-headed Woodpecker Swainson's Warbler

Within the BCR, forested upland communities provide habitat for the second highest number of priority bird species. Coastal forests and woodlands within BCR 30 are crucial as migratory stops for neotropical migrants. Historically, the coastal communities within BCR 30 were dominated by a contiguous forest. Today, these forests have become highly fragmented by 300 years of land clearing, agriculture, and human development (TNC North Atlantic Coast Ecoregional Plan). Destruction and fragmentation of forests in both breeding and wintering areas are factors in forest bird species (such as the Wood Thrush) declining abundance (Roth et. al 1996). Many declining forest birds are also associated with dense understory conditions created

by local disturbance; such conditions have become less common due to lack of forest management and overbrowsing by white-tailed deer (PIF Continental Plan). The Cerulean Warbler is an example of a very specialized species in need of conservation action throughout its range, including BCR 30.

Remaining remnant tracts of upland forest contain a mix of species with dominant species changing from north to south, as well as from coastal to inland areas. In the north, mixed forests consist of oak-hickory or mixed hardwoods, white pine-red forest and pine-oak woodlands or barrens. In the mid-Atlantic coastal plain, extending from south of Long Island to the southern Virginia border, upland forests are dominated by pines close to the coast (PIF Physiographic Area 44) and hardwood forests such as coastal oaks, beech-oak-tulip tree, and oak-beech-blackgum further inland (TNC North Atlantic Coast Ecoregional Plan). Extensive pine barrens still exist in the NJ Pinelands and the Long Island Pine Barrens. The conversion of hardwoods to pine plantations in portions of the BCR, as well as fire suppression, has modified the distribution and abundance of upland forest community types. Pine plantations, which have increased dramatically in their distribution and abundance over the past 30 years occur throughout the BCR, but are most prevalent in the southern portion.

The mid-Atlantic Coastal Plain is the northern limit of distribution for the historic southeastern pine ecosystem (inland pine savannahs) which occurs on only approximately 1% of their former range (CCB BCR 30 Habitat Assessment/Pine Savannah) and can be found in both inland and maritime systems within BCR 30. Pine savannahs require disturbance, via fires, to maintain their balance; three centuries of fire suppression has resulted in declines in their abundance and distribution. Bachman's Sparrows are an example of a species dependent upon the proper management of Pine-Savannah forests.

Conservation Actions

1. Identify largest and highest quality forest habitat patches within the BCR as targets for coordinated efforts in acquisition, easements, and management.
2. Increase/improve active management of forests to improve habitat quality within existing and high priority upland forest (e.g., loss of shrub layer). For example, promote uneven-aged management, thinning to open canopies, etc…
3. Manage upland forest communities to provide post-fledging habitat (habitat mosaic, including shrubby areas and openings). Targeted species: Wood Thrush
4. Develop and implement programs to control invasive plant species.
5. Develop cooperative programs among agencies, NGOs and local governments to reduce the impacts of deer overabundance on forested communities.

6. Through public outreach and partnerships with municipal governments and local conservation organizations, develop new/improved policies regarding urban sprawl (e.g., Smart Growth, open space protection, etc.).
7. Expand the use of radar and other techniques to identify and protect important migration stopover habitat throughout the BCR.
8. Incorporate the long-term effects of acid precipitation into upland forest management and conservation programs.
9. Gather demographic data on forested upland dependent species to identify limiting factors, such as forest fragmentation, that are causing population declines in priority forest birds, such as Wood Thrush, Cerulean Warbler, Kentucky Warbler, and Scarlet Tanager.
10. Develop a Farm Bill program for priority forest birds (e.g., similar to CRP Practice CP33, for Upland Bird habitat) and encourage Farm Bill funding for private forest management.
11. Reduce habitat loss and fragmentation due to development/sprawl
    a. Outreach to public about easements, smart growth
    b. Identify high priority landscapes and sites
12. Encourage properly timed and sufficiently hot fires in pine savannahs.

<u>Research Priorities</u>

Wood Thrush:

1. Gather additional life history information.
2. Determine the effects of invasive plant species, if any, on populations.
3. Determine the limiting factors.

Whip-poor-will

1. Conduct research comparing natural and managed habitat suitability and effects on breeding densities and demographics.
2. Determine whether biological control of Gypsy Moths is limiting food.

Forest-dependent species (ALSO appropriate for forested wetlands)

Develop models that predict abundance and productivity as a function of patch size, forest type, structural variables affected by management, and other factors.

1. Identify the independent variables to be evaluated for possible inclusion in the model.
2. Design a sampling plan (e.g., involving stratification) to insure that variation in each independent variable is similar to the variation that occurs in the population of interest (i.e., naturally occurring sites, managed sites).
3. Select methods to measure abundance and nesting success on the sample plots.
4. Conduct the field surveys.
5. Develop the initial models including sample size estimation needed to complete model development and testing.
6. Gather additional field data as needed for model development and testing.

Scrub-Shrub/Early Successional Communities

Table 15. Priority Species Associated with Scrub-shrub/Early Successional Habitats.

SCRUB-SHRUB/EARLY SUCCESSIONAL		
Highest	***High***	***Moderate***
American Woodcock	*Brown Thrasher*	Golden-winged Warbler
Prairie Warbler	*Eastern Towhee*	Gray Catbird
Blue-winged Warbler	*Field Sparrow*	
	Northern Bobwhite	
	Whip-poor-will	
	Willow Flycatcher	

Historically, the abundance of early successional habitats was probably less than 10% of the land area in much of the Northeast. Among inland forests, small openings were created by frequent windstorms or beaver impoundments. Coastal areas with their sandy soils and exposure to the ocean were more susceptible to large disturbances, like wild fires and hurricanes and, as a result, patches of early successional forests, barrens, and grasslands represented at least 20% of coastal New England, Long Island, New Jersey, Maryland, and Delaware (Litvaitis 2006). Agricultural practices resulted in the clearing of many forests in the 1800s, creating conditions appropriate for bird species dependent upon early successional habitats.. During the 20th century, changing land use patterns have reduced the amount of early successional habitat available to birds depending on these systems. For example, in BCR 30, the abandonment of farmlands, control of beaver activity, fire suppression and forest succession have resulted in a reduction in amount and a shift in the spatial distribution and extent of shrub and early successional habitats available to birds. Pine plantations provide a diversity of ecosystem types as they succeed through growing cycles. Early successional pine plantations are likely important to the regional avifauna, such as woodcock, providing grassland and shrublands during the early successional stages. Young clearcuts now represent the primary habitat for many shrub-dependent species. Within BCR 30, there are a total of eight highest and high priority species dependent on scrub-shrub and early successional habitats.

Conservation Actions

1. Accurate identification of the types of early successional habitats and bordering parcels (requires current high-resolution photos) for acquisition, management and conservation.
2. Conduct a spatial analysis of habitats within the BCR to inform decisions by managers of the most appropriate sites within the BCR to manage for early-successional habitats at the state and BCR scale.
3. Create and/or maintain early successional habitats where identified appropriate.
4. Incorporate priority bird benefits into existing state farmland preservation and forest stewardship programs for private landowners.

5. Protect and restore sandplain/pine barrens/xeric ridges, including preventing their conversion to loblolly pine plantations.
6. Acquire and restore maritime scrub-shrub and interdune forests, including scrubby islands.
7. Slow the loss of breeding habitat as a result of suburban sprawl and forest succession.
8. Protect the largest remaining tracts of early successional habitats within the BCR.
9. Re-create, where possible, natural disturbance processes that maintain critical patches of early successional habitats.
10. Define optimal management regimes for shrubland mosaic management.
11. Improve habitat quality of existing protected early successional habitats.
12. Control invasive species (e.g., Viburnum leaf beetle).
13. Explore using Farm Bill options to improve/increase successional habitat throughout the BCR.
14. Manage and monitor beaver populations to encourage wetland development.
15. Develop and implement incentive programs to create/maintain early successional habitats.
16. Expand traditional game management in early successional habitats to include nongame bird priorities and objectives. Recommended Project – Develop management recommendations for maintaining power line rights-of-way in a manner beneficial to priority early successional birds.

Research Priorities

Blue-winged Warbler and Prairie Warbler

1. Compare natural and managed habitat suitability (breeding densities, demographics) in early successional habitats.
2. Determine whether invasive plant species influence populations.
3. Gather additional life cycle information.
4. Conduct research to better inform managers of limiting factors influencing populations.

ROW and Non-ROW species (ALSO appropriate for Grassland species)

For ROW species*:*

Conduct projection evaluations of ROWs to assess how management history, size and dimension of ROW, vegetational composition, and landscape context affect current abundance, diversity, and productivity of the early successional suite of bird species.

For Non-ROW:

Develop models that predict abundance and productivity as function of patch size, vegetative composition, landscape context, land use history, water level and quality (if applicable).

1. Identify the independent variables to be evaluated for possible inclusion in the model.
2. Design a sampling plan (e.g., involving stratification) to insure that variation in each independent variable is similar to the variation that occurs in the population of interest (i.e., naturally occurring sites, managed sites).
3. Select methods to measure abundance and nesting success on the sample plots.
4. Conduct the field surveys.
5. Develop the initial models including sample size estimation needed to complete model development and testing.
6. Gather additional field data as needed for model development and testing.

Grasslands

Table 16. Priority Species Associated with Grassland Communities

GRASSLAND COMMUNITIES		
Highest	***High***	***Moderate***
American Woodcock	*American Golden Plover* *Black-bellied Plover* *Buff-breasted Sandpiper* *Eastern Kingbird* *Henslow's Sparrow*	Common Snipe Grasshopper Sparrow Ipswich Savannah Sparrow* Killdeer Loggerhead Shrike Red-headed Woodpecker Sedge Wren Short-eared Owl Upland Sandpiper

Similar to shrub/scrub habitats, historically, grasslands were uncommon in BCR 30 as the region was dominated by forested ecosystems. When Europeans settled the area and formed agrarian societies, open agricultural areas were created. During the 19th century, many forests were converted to agricultural fields and provided open areas for grasses to persist. Presently, fallow agricultural fields as well as pasturelands provide most of the grassland habitat available to birds within BCR 30. These grasslands require constant maintenance or they quickly succeed to shrublands and eventually, upland forested communities. With the loss of agricultural lands over the past few decades, fewer grasslands are available to birds throughout the BCR. Military installations, airports, golf courses, parks, recreational fields and other man-made and maintained grasslands provide some additional habitat in the BCR. Grassland birds are of moderate concern within the BCR. There are opportunities to affect grassland communities that should be implemented, when practical. Today, grassland dependent birds within BCR 30 depend upon agricultural landscapes and other artificial habitats to maintain populations. Mechanized agriculture is a threat to breeding populations of grassland birds and should be addressed through best management practices.

Conservation Actions

1. Identification, protection and active management of the largest tracts of grasslands remaining in the BCR.
2. Map invasive species (current & historical).
3. Control invasive species (plant and animal).
4. Map throughout the BCR, previously converted cropland areas.
5. Develop detailed atlas of existing and potential Henslow's Sparrow breeding sites, following techniques recently used for other priority species such as Cerulean Warbler and Golden-winged Warbler.

6. Develop and implement integrated management plans for grasslands on civilian and military airfields.
7. Increase utilization of Farm Bill programs to benefit priority grassland and shrubland birds.

RESEARCH PRIORITIES FOR MIGRANTS

Determine the abundance of landbirds during spring and fall migration.

1. Develop models using NEXRAD data that predict abundance as a function of several habitat and landscape characteristics (e.g., land cover type, patch size, connectivity of suitable patches).
    a. Representative coverage for mid-Atlantic region needs to be completed (CT, NY).
    b. Ground truth the stopover occupancy models based on radar data in the area covered by specific radar station. This includes designing sampling plan (e.g., model areas versus non-model areas), selecting appropriate methods to measure abundance, and conducting the field surveys
    c. Develop stopover occupancy models for region. This will allow identification of areas not covered by the radar.
    d. Ground truth the regional stopover occupancy model. This includes designing sampling plan (e.g., model areas versus non-model areas), selecting appropriate methods to measure abundance, and conducting the field surveys
2. Develop best Management Practices for grassland breeding birds.
3. Determine patch size needed for area sensitive species.

CHAPTER 4: BCR 30 PRIORITY MONITORING NEEDS

Research and monitoring needs have been identified by numerous groups working to conserve birds within BCR 30. Most recently, in 2006, an effort to coordinate bird monitoring programs at the regional scale, the Northeast Coordinated Bird Monitoring Partnership (NECBM Partnership) was initiated. The purpose of the Northeast Coordinated Bird Monitoring Partnership is to support development and implementation of regional bird monitoring (framework) to assist bird conservation partners (state wildlife departments, federal natural resource agencies, and other organizations) in improving the coordination and effectiveness of their monitoring efforts. The NECBM Partnership will build consensus on monitoring priorities and catalogue existing bird surveys. It will draw on bird conservation plans and state wildlife action plans to identify key management issues that can be addressed through monitoring. Annual workshops will foster opportunities for coordination among existing surveys, and support statistical survey design and analyses. A project website (http://www.nebirdmonitor.org/) provides access to resources for coordinating bird surveys throughout the northeast region, including data management and storage. By providing new tools and collaborative opportunities, the NECBM will help build the fundamental basis for science-based bird conservation in the Northeast. Implementation of regional bird monitoring programs within BCR 30 will be conducted in cooperation with the NECBM.

Monitoring programs are an important spoke in the wheel of bird conservation. For many species, information on species distribution, abundance and population trends are needed to assess species status. For other species, detailed information on demography, population structure and other life history parameters are needed to run population and habitat models and to make management decisions. The utility of information coming out of well-designed, targeted monitoring programs is boundless. One of the highest bird conservation prioriteies within BCR 30 is to design coordinated, standardized monitoring programs focused on answering specific questions. Furthermore, monitoring efforts to assess the effectiveness of bird conservation activities within the BCR need to be developed and implemented as part of every project. Often, a lack of resources results in efforts being undertaken to effect bird conservation without the use of assessment tools to evaluate the success of these efforts. If we adopt an adaptive management approach for bird conservation we need to evaluate whether our land acquisition, habitat restoration and enhancement, monitoring programs, or policy changes are achieving their desired outcomes. The cost of evaluation must be built into project budgets.

Prior to implementation of the Northeast Coordinated Bird Monitoring Partnership, high priority monitoring projects were identified for BCR 30 during a number of meetings and workshops and are presented below. Keep in mind that recommendations and standardized methods developed through the NECBM Partnership effort will be adopted for use in BCR 30. For the most up-to-date information and products developed through the NECBM effort use this link (http://www.nebirdmonitor.org/).

GENERAL MONITORING

1. Improve (regional) monitoring programs for priority species.

MIGRATION STOP-OVER MONITORING

1. Use radar and GIS as tools to identify and evaluate migratory stop-over sites.
2. Conduct studies of energetics to help evaluate relative quality of stop-over sites.
3. Expand the "Cape May stop-over project" concept to the entire northern Atlantic coast.

Potential Project

*Topic***:** Migration Stopover Habitat

Management Issues or Decisions

1. Identification and protection of migration stopover habitat for passerines
2. Identification and protection of migration stopover habitat for shorebirds
3. Identification and protection of migration stopover habitat for migrating raptors.

Objectives (passerines)

Species: Landbirds - Numerous species of conservation concern are likely to be addressed by this effort.

Parameter: Abundance of landbirds during spring and fall migration

Accuracy Target: High probability of discriminating between sites that vary at least two-four fold in abundance.

Objectives (shorebirds)

Species: Shorebirds. Necessary to address species suites that use mud flats or beaches. This may include focal species of concern such as Red Knot and Semipalmated Sandpiper.

Parameter: Abundance of shorebirds during spring and fall migration at low tide foraging sites and high tide roosting sites (provides indices of populations)

Accuracy Target: High probability of discriminating between sites that vary at least five fold in abundance.

Objectives (raptors)

Species: Raptors

Parameter: Abundance of raptors during spring and fall migration
Accuracy Target: High probability of discriminating between sites that vary at least two-four fold in abundance.

Methods (passerines)

Develop models using NEXRAD data that predict abundance as a function of several habitat and landscape characteristics (e.g., land cover type, patch size, connectivity of suitable patches).

1. Representative coverage for mid-Atlantic region needs to be completed (CT, NY).
2. Ground truth the stopover occupancy models based on radar data in the area covered by specific radar station. This includes designing sampling plan (e.g., model areas versus non-model areas), selecting appropriate methods to measure abundance, and conducting the field surveys
3. Develop stopover occupancy models for region. This will allow identification of areas not covered by the radar.
4. Ground truth the regional stopover occupancy model. This includes designing sampling plan (e.g., model areas versus non-model areas), selecting appropriate methods to measure abundance, and conducting the field surveys

Methods (shorebirds)

1. Aerial surveys to develop a more comprehensive assessment of shorebird stopover site use. This involves development of a sampling protocol for marsh complexes too large to be sampled completely. A model will be developed to predict use in areas not surveyed.
2. Ground surveys to determine species composition, behavior patterns (e.g., foraging, roosting), habitat use. Collect habitat variables data.
3. A model will be developed to predict use in areas unable to be comprehensively surveyed using standard techniques.

Methods (raptors)

Need to be developed.

SPECIES-SPECIFIC MONITORING

Waterfowl

1. Establish Visibility Correction Factors for eastern surveys.
2. Continue and improve Mid-Winter Waterfowl Survey.
3. Develop and implement Sea Duck Survey.

Landbirds

1. Develop targeted monitoring programs on priority grassland bird demographics and area-habitat relationships, building on and expanding the techniques developed by Massachusetts Audubon.

2. Develop a regional Whip-Poor-Will monitoring program.

Shorebirds

1. Fully implement PRISM surveys and aerial surveys for inaccessible coastal habitats.
2. Implement targeted monitoring programs for high priority shorebird species.
3. Begin region-wide coastal surveys conducted by individual state agencies and coordinated by USFWS throughout the BCR to identify and map important stopover and wintering areas for various species groups.

Waterbirds

1. Develop a targeted monitoring program for marsh birds using a standardized regional approach and remote acoustical techniques.
2. Develop a comprehensive colonial waterbird monitoring program using standardized techniques and a sampling framework for wading birds and seabirds. Conduct inventories every 10 years and sampled surveys every 1-3 years.
3. Develop an offshore monitoring program composed of three parts:
    a. protocol to get at trends of habitat use (spatial and temporal) offshore
    b. analyze existing ship and aerial datasets for the Atlantic and develop a GIS database using the collected information
    c. develop survey area priorities, list of targeted species, and techniques to fill in data gaps.
4. Determine the impacts of fisheries bycatch/gear interaction through dedicated observer programs and utilizing existing observer programs, whenever possible.

HABITAT-SPECIFIC MONITORING

Potential Project

Topic: Tidal Marsh and Flats

Management Issues or Decisions

1. Identification of important tidal marsh areas
2. Effects of tidal marsh manipulation and fisheries

Objectives

Species: e.g,. sharp-tailed sparrow, other passerines, herons, secretive marsh birds, osprey, terns

Parameter: Abundance of breeding birds during breeding and non-breeding periods. Productivity for selected species (based on management issues and level of concern)

Accuracy Target: CVs 25% within treatments

Methods

Develop models that predict abundance and productivity as a function of tidal marsh or tidal flat manipulations.

1. Identify the independent variables to be evaluated for possible inclusion in the model development: impoundment management, creation, and enhancement; grid ditching;

tidal flow restrictions; burning; aquaculture; development; fisheries; chemical treatment; patch size.

2. Design a sampling plan (e.g., involving stratification, experimental design) to insure that variation in each independent variable is similar to the variation that occurs in the population of interest (i.e., manipulated or natural sites) and may vary across the region.
3. Select methods to measure abundance and nesting success on the sample plots.
4. Conduct the field surveys.
5. Develop the initial models including sample size estimation needed to complete model development and testing.
6. Gather additional field data as needed for model development and testing.

Potential Project

*Topic***:** Forest health

Management Issues or Decisions

1. Identification of forested areas to protect.
2. Selection of forest management practices.

Objectives

Species: Species that use forested environments at any time of year.

Parameter: Abundance of breeding birds; average number present during non-breeding periods). Productivity for selected species (based on abundance and level of concern)

Accuracy Target: High probability of discriminating between sites that vary at least two-fold in abundance or 50% in nesting success.

Methods

Develop models that predict abundance and productivity as a function of patch size, forest type, structural variables affected by management, and other factors.

1. Identify the independent variables to be evaluated for possible inclusion in the model.
2. Design a sampling plan (e.g., involving stratification) to insure that variation in each independent variable is similar to the variation that occurs in the population of interest (i.e., naturally occurring sites, managed sites).
3. Select methods to measure abundance and nesting success on the sample plots.
4. Conduct the field surveys.
5. Develop the initial models including sample size estimation needed to complete model development and testing.
6. Gather additional field data as needed for model development and testing.

Potential Project

Topic: Early Successional Habitats

Management Issues or Decisions

1. Determine the best management practices available to create appropriate habitat in rights-of-way for the suite of early successional bird species

2. Identify key non-ROW early successional areas in need of protection or management

Objectives

Species: Species that use early successional habitats at any time of year.
Parameter: Abundance of breeding birds; average number present during non-breeding periods. Productivity for selected species (based on abundance and level of concern).
Accuracy Target:
For ROWs: Coefficient of Variations of 30% for regression coefficients of independent variables that are highly correlated with bird abundance or nest success.
For Non-ROWs: High probability of discriminating between sites that vary at least two-fold in abundance or 50% in nesting success.

Methods

For *ROW Best Management Practices*:
Conduct projection evaluations of ROWs to assess how management history, size and dimension of ROW, vegetational composition, and landscape context affect current abundance, diversity, and productivity of the early successional suite of bird species.

For *Non-ROW*:
Develop models that predict abundance and productivity as function of patch size, vegetative composition, landscape context, land use history, water level and quality (if applicable).

1. Identify the independent variables to be evaluated for possible inclusion in the model.
2. Design a sampling plan (e.g., involving stratification) to insure that variation in each independent variable is similar to the variation that occurs in the population of interest (i.e., naturally occurring sites, managed sites).
3. Select methods to measure abundance and nesting success on the sample plots.
4. Conduct the field surveys.
5. Develop the initial models including sample size estimation needed to complete model development and testing.
6. Gather additional field data as needed for model development and testing.

Potential Project

Topic: Freshwater Wetlands

Management Issues or Decisions

1. Conservation status and distribution (abundance) of wetland birds.
2. Response to invasive vegetation
3. Water management avian response

Objectives

Species: Emergent marsh birds (e.g., rails, bitterns, grebes)
Parameters: Occurrence, distribution, and abundance of breeding birds

Accuracy target: 50% Coefficient of Variation
Auxiliary information: Size, vegetation composition, structure, management (y/n),

Methods

1. Identification and selection suitable habitat in participating states
2. Use of standardized playback techniques
3. Develop additional sampling techniques to detect other priority waterbirds
4. Evaluate new automated digital detection technologies
5. Develop sampling method to address each management issue, stratified by wetland acreage, vegetative composition, and management activities
6. Develop model to estimate population size
7. Select methods of evaluating vegetative composition (remote sensing, mapping)

ISSUE-SPECIFIC MONITORING

Potential Project

Topic: Wind Power Development

Management Issues or Decisions

Importance of potential wind power development areas, inland and near-shore, as migration and/or movement corridors

Objectives

Species: Hawks, nocturnal migrants and seabirds (e.g., scoters and gannets) during spring and fall migration and during winter (seabirds)
Parameter: Abundance of migrating/moving birds; potential use of rate. Abundance of seabirds in foraging and roost sites.
Accuracy Target: To be determined after consultation with experts in radar ornithology and seabird surveys. High probability of discriminating between sites that vary at least two-fold in abundance

Methods

Develop regional models that predict abundance/rate of movement as a function of altitude, landscape features, weather conditions, ridge orientation, distance from roost or foraging sites, distance from shore and seasonal effects.

1. Identify the independent variables to be evaluated for possible inclusion in the model.
2. Design a sampling plan (e.g., involving stratification) to insure that variation in each independent variable is similar to the variation that occurs in the population of interest (i.e., naturally occurring sites, managed sites) using Wind Resource wind speed map.
3. Select methods to measure abundance/rates on the sample plots.
4. Conduct the field surveys.
5. Develop the initial models including sample size estimation needed to complete model development and testing.
6. Gather additional field data as needed for model development and testing.

CHAPTER 5: BCR 30 SPECIES POPULATION AND HABITAT OBJECTIVES

SPECIES AND HABITATS

Important components of any bird conservation plan are setting quantitative population objectives and estimating the habitat necessary to sustain desired population levels. However, for most species, the ability to determine, quantitatively, species population sizes, densities, distribution and habitat needs is limited by the information available and by the precision, bias and error associated with existing survey and habitat data. These limitations also affect our understanding of how species respond to changes in habitat management scenarios, landscape patterns, and the dynamic ecosystems in which they persist. For example we know the coastal landscapes within BCR 30 are important to neotropical migrants. However, even though we know the importance of the coast to migrants, we have limited information on the distribution and exact locations of specific sites needed or precisely how much habitat in a particular pattern across the landscape is necessary from year-to-year to support migrants flying to and from breeding and non-breeding sites. When survey data indicate trends in populations, it is not always possible to attribute changes to particular factors because bird populations naturally fluctuate over time in response to changing habitat conditions and other factors present at their breeding, migration and wintering grounds. Tracking bird populations relative to changing conditions and, more importantly, predicting bird population response to future conditions is an imprecise science at this time and one monitoring programs are not yet designed to capture. Another complicating factor is that many species utilizing the same habitats are limited by different variables making it very difficult to set habitat objectives or species population objectives (based on population estimates). Therefore, when values are derived, they must be used with an awareness of the complexity associated with them and assumptions upon which the calculations are based. As we determine species' habitat needs, we cannot simply add the amount of habitat needed for each species to reach the total because habitat for any given species almost always serves as habitat for some other species – the total amount of habitat needed is not the sum of the needs of all species but an integration of each species' needs, which accounts for the overlap among species and results in an overall goal for each habitat type. In short, BCR 30 should provide the breeding, wintering and migratory habitat that is estimated to be needed to support bird populations at levels to sustain their populations.

Despite the difficulties and inherent error associated with species population and habitat targets, there is value to having quantifiable targets for planning purposes, fundraising, and assessing how well resources devoted to bird conservation are performing – as long as the methodology and assumptions are stated clearly. Therefore, where possible, bird conservation

initiatives have developed species population and *breeding* habitat goals (Table 17). For some species, directional population goals have been developed (increase, maintain, decrease populations, double populations, etc.). For other species, specifically those with sufficient data from Breeding Bird Survey routes, preliminary quantitative targets for both species populations and habitat have been developed and translated directly to habitat objectives based on abundance indices and density estimates. However, the density estimates that have been developed are not sensitive to differences among habitats. Therefore, habitat estimates calculated with these density estimates must be used with caution and a full awareness of their preliminary nature. For those species without qualitative or quantitative targets, one of the tasks for BCR 30 will be to develop, over the long term, indices and/or numbers for population and habitat goals. Setting and using population or habitat objectives should be viewed as an ongoing exercise requiring refinement, research into underlying assumptions, and improvement over time.

Regional species population and habitat goals developed for BCR 30 need to represent the sum of goals developed at smaller scales, as well as fit into the larger scale. For example, goals developed for BCR 30 need to work in concert with goals developed for other BCRs to achieve continental goals. At the same time, goals developed at scales smaller than the BCR, such as within States, need to 'add up' to BCR goals. It is a two-way continuum, with smaller-scale geographic goals informing larger-scale goals, and vice-versa. The long-term goal for conservation scientists working within BCR 30 is to assess and validate population and habitat objectives already developed at the BCR scale, (e.g., landbirds) and develop, where practical, population and habitat goals for priority species presently lacking goals. Priority research and monitoring activities needed to set quantitative objectives will be identified, and factors limiting bird populations will be incorporated into short and long-term conservation planning and implementation. An assessment of the capacity of the BCR to provide habitat for priority species at present and in the future also needs to be conducted and compared to the population objectives that are stepped down from the continental level and used to define these goals as necessary.

Table 17. BCR 30 Preliminary Population Estimates, Population Objectives, and Habitat Estimates to Sustain Populations at Estimated Levels and to Meet Preliminary Population Objectives.

Species	Current BCR Population Estimate	BCR 30 Prelim. Population Objective	Habitat Type	Density[c] (# breed ind/acre)	BCR 30 Habitat Estimates[c]/ Sustain Current Pop (acres)	BCR 30 Habitat Estimates/ Meet Prelim. Population Objectives (acres)
Highest Priority Species						
American Black Duck	185000[a]	Increase	------	------	------	------
American Oystercatcher	2,649	Not available	------	------	------	------
American Woodcock	Not available	Not available	------	------	------	------
Atlantic Brant	Not Available	Not Available	------	------	------	------
Black Rail	Not Available	Not Available	------	------	------	------
Blue-winged Warbler	40000	60000 (1.5)	Shrub-scrub/ Early Succ	0.2	200000	300000
Canada Goose – Atlantic Population	Not Available	Not Available	------	------	------	------
Gull-billed Tern	2418 breeders	Not Available	------	------	------	------
Piping Plover	Not Available	Not Available	------	------	------	------
Prairie Warbler	62000	93000 (1.5)	Shrub-scrub/ Successional	0.4	155000	232500
Red Knot	20,000	Not Available	------	------	------	------
Red-throated Loon	100,000[b]	Monitor	------	------	------	------
Roseate Tern	6400 breeders	6200-7600[b]	------	------	------	------
Ruddy Turnstone	Not Available	Increase	------	------	------	------
Saltmarsh Sharp-tailed Sparrow	250000	500000 (2.0)	------	------	------	------
Sanderling	Not Available	Increase	------	------	------	------
Whimbrel	Not Available	Not Available	------	------	------	------
Wood Thrush	550000	825000 (1.5)	Deciduous Forest	0.12	4585000	6875000

Species	Current BCR Population	Population Objective	Habitat Type	Density[c] (# breed ind/acre)	BCR 30 Habitat Estimates[c]/ Sustain Current Pop (acres)	BCR 30 Habitat Estimates/ Meet Prelim. Population Objectives (acres)
High Priority Species						
American Golden Plover	Not Available	Not Available	------	------	------	------
Audubon's Shearwater	10,000-100,000 nonbreeders[b]	Monitor	------	------	------	------
Baltimore Oriole	140000	Not Available	Deciduous Forest	0.19	740000	------
Bay-breasted Warbler	Not Available	Not Available	------	------	------	------
Bicknell's Thrush	Not Available	Not Available	------	------	------	------
Black Scoter	Not Available	Not Available	------	------	------	------
Black-and-white Warbler	139696	153665 (1.1)	------	------	------	------
Black-bellied Plover	Not Available	Increase	------	------	------	------
Bridled Tern	1000 nonbreeders	Monitor	------	------	------	------
Broad-winged Hawk	15859	Maintain	------	------	------	------
Brown Thrasher	37000	55000 (1.5)	Shrub-scrub/ Early Succ	0.4	92500	137500
Buff-breasted Sandpiper	Not Available	Increase	------	------	------	------
Bufflehead	50894	Not Available	------	------	------	------
Canada Goose - North Atlantic	Not Available	Not Available	------	------	------	------
Canvasback	78168[a]	Increase	------	------	------	------
Chimney Swift	330996	496494 (1.5)	------	------	------	------
Clapper Rail	Not Available	Not Available	------	------	------	------
Common Eider	Not Available	Not Available	------	------	------	------
Dunlin	Not Available	Increase	------	------	------	------
Eastern Kingbird	104122	156183 (1.5)	------	------	------	------

Species	Current BCR Population	Population Objective	Habitat Type	Density[c] (# breed ind/acre)	BCR 30 Habitat Estimates[c]/ Sustain Current Pop (acres)	BCR 30 Habitat Estimates/ Meet Prelim. Population Objectives (acres)
Eastern Towhee	310000	465000 (1.5)	Shrub-scrub/ Early Succ	0.4	775000	1162500
Field Sparrow	84000	168000 (2.0)	Shrub-scrub/ Early Succ	1.06	79250	158500
Forster's Tern	16690 breeders	15300-18700 [b] breeders	------	------	------	------
Glossy Ibis	11006 breeders	Restore (increase)	------	------	------	------
Great Crested Flycatcher	114021	Maintain	------	------	------	------
Greater Shearwater	1000000-10000000	Monitor	------	------	------	------
Greater Yellowlegs	Not Available	Not Available	------	------	------	------
Henslow's Sparrow	30	60 (2.0)	Grassland	0.81	37	74
Horned Grebe	100000-1000000 nonbreeders	Monitor	------	------	------	------
Hudsonian Godwit	Not Available	Not Available	------	------	------	------
Kentucky Warbler	9500	14250 (1.5)	Decidous Forest	.048	200000	300000
Least Tern	16018 breeders	Not Available	------	------	------	------
Lesser Scaup	186938 [a]	Not Available	------	------	------	------
Long-tailed Duck	7044 [a]	Not Available	------	------	------	------
Louisiana Waterthrush	7000	7000	Deciduous Forest	1.6	4400	4400
Mallard	129867 [a]	Increase	------	------	------	------
Marbled Godwit	Not Available	Not Available	------	------	------	------
Marsh Wren	52021	52021 (1.0)	------	------	------	------
Northern Bobwhite	68000	136000 (2.0)	Shrub-scrub/ Early Succ	1.01	67325	134650

Species	Current BCR Population	Population Objective	Habitat Type	Density[c] (# breed ind/acre)	BCR 30 Habitat Estimates[c]/ Sustain Current Pop (acres)	BCR 30 Habitat Estimates/ Meet Prelim. Population Objectives (acres)
Northern Flicker	103639	155458 (1.5)	------	------	------	------
Northern Gannet	Not Available	Maintain	------	------	------	------
Prothonotary Warbler	21574	32361 (1.5)	------	------	------	------
Purple Sandpiper	Not Available	Not Available	------	------	------	------
Rusty Blackbird	Not Available	Not Available	------	------	------	------
Scarlet Tanager	80000	80000 (1.0)	Dediduous Forest	0.2	400000	400000
Scaup Spp.	186938[a]	Not Available	------	------	------	------
Semipalmated Sandpiper	Not Available	Not Available	------	------	------	------
Short-billed Dowitcher	Not Available	Not Available	------	------	------	------
Solitary Sandpiper	Not Available	Not Available	------	------	------	------
Surf Scoter	Not Available	Not Available	------	------	------	------
Tundra Swan – Eastern	27740[a]	Not Available	------	------	------	------
Whip-poor-will	42179	63268 (1.5)	------	------	------	------
White-rumped Sandpiper	Not Available	Not Available	------	------	------	------
White-winged Scoter	Not Available	Not Available	------	------	------	------
Willet	Not Available	Not Available	------	------	------	------
Willow Flycatcher	8948	13422 (1.5)	------	------	------	------
Wilson's Phalarope	Not Available	Not Available	------	------	------	------
Wilson's Plover	Not Available	Not Available	------	------	------	------
Worm-eating Warbler	27000	30000 (1.1)	Deciduous Forest	0.18	150000	165000
Yellow-throated Vireo	16000	16000 (1.0)	Deciduous Forest	0.05	320000	320000

Species	Current BCR Population	Population Objective	Habitat Type	Density[c] (# breed ind/acre)	BCR 30 Habitat Estimates[c]/ Sustain Current Pop (acres)	BCR 30 Habitat Estimates/ Meet Prelim. Population Objectives (acres)
Moderate Priority Species						
American Avocet	Not Available	Not Available	------	------	------	------
American Bittern	Not Available	Increase (Restore)	------	------	------	------
American Wigeon	8819[a]	Increase	------	------	------	------
Bachman's Sparrow	Not Available	Increase	------	------	------	------
Bald Eagle	400	403 (1.0)	------	------	------	------
Black Skimmer	10058 breeders	Not Available	------	------	------	------
Blackburnian Warbler	2329	2329 (1.0)	------	------	------	------
Black-crowned Night Heron	10338	16700-20400[b] breeders	------	------	------	------
Brown-headed Nuthatch	Not Available	Increase	------	------	------	------
Canada Warbler	1912	2868 (1.5)	------	------	------	------
Cerulean Warbler	700	1400 (2)	Deciduous Forest	0.4	1750	3500
Coastal Plain Swamp Sparrow*	Not Available	Not Available	------	------	------	------
Common Goldeneye	23319[a]	Not Available	------	------	------	------
Common Snipe	Not Available	Not Available	------	------	------	------
Common Tern	83834 breeders	Restore (increase)	------	------	------	------
Cory's Shearwater	Not Available	Not Available	------	------	------	------
Gadwall	7011[a]	Not Available	------	------	------	------
Golden-winged Warbler	300	600 (2.0)	Shrub-Scrub/ Early Succ.	0.2	1500	3000
Grasshopper Sparrow	37000	74000 (2.0)	Grassland	0.14	264285	528570

Species	Current BCR Population	Population Objective	Habitat Type	Density[c] (# breed ind/acre)	BCR 30 Habitat Estimates[c]/ Sustain Current Pop (acres)	BCR 30 Habitat Estimates/ Meet Prelim. Population Objectives (acres)
Gray Catbird	799157	799157 (1.0)	------	------	------	------
Green-winged Teal	Not Available	Not Available	------	------	------	------
Harlequin Duck	52 [a]	Not Available	------	------	------	------
Hooded Merganser	Not Available	Not Available	------	------	------	------
Ipswich Savannah Sparrow*	Not Available	Not Available	------	------	------	------
Killdeer	Not Available	Not Available	------	------	------	------
King Rail	Not Available	Restore (increase)	------	------	------	------
Least Bittern	Not Available	Not Available	------	------	------	------
Least Sandpiper	Not Available	Not Available	------	------	------	------
Lesser Yellowlegs	Not Available	Not Available	------	------	------	------
Little Blue Heron	3546 breeders	3200-4000[b] breeders	------	------	------	------
Loggerhead Shrike	Not Available	Not Available	------	------	------	------
Manx Shearwater	1-10[b]b/1000-10000[b]nb	Not Available	------	------	------	------
Nelson's Sharp-tailed Sparrow	Not Available	Not Available	------	------	------	------
Northern Pintail	10270[a]	Increase	------	------	------	------
Razorbill	Not Available	Restore (increase)	------	------	------	------
Red-necked Phalarope	Not Available	Not Available	------	------	------	------
Red Phalarope	Not Available	Not Available	------	------	------	------
Red-breasted Merganser	Not Available	Not Available	------	------	------	------
Red-cockaded Woodpecker	Not Available	Recovery Plan	------	------	------	------
Red-headed Woodpecker	1900	3800 (2.0)	Deciduous Forest	0.08	23750	47500

Species	Current BCR Population	Population Objective	Habitat Type	Density[c] (# breed ind/acre)	BCR 30 Habitat Estimates[c]/ Sustain Current Pop (acres)	BCR 30 Habitat Estimates/ Meet Prelim. Population Objectives (acres)
Red-necked Phalarope	Not Available	Not Available	------	------	------	------
Royal Tern	6343 breeders	15100-18500[b] breeders	------	------	------	------
Ruddy Duck	52066[a]	Increase	------	------	------	------
Seaside Sparrow	21578	23734 (1.1)	------	------	------	------
Sedge Wren	Not Available	Not Available	------	------	------	------
Semipalmated Plover	Not Available	Not Available	------	------	------	------
Short-eared Owl	Not Available	Not Available	------	------	------	------
Snowy Egret	15402 breeders	18300-22300[b] breeders	------	------	------	------
Sora	Not Available	Not Available	------	------	------	------
Spotted Sandpiper	Not Available	Not Available	------	------	------	------
Swainson's Warbler	71	71 (1.0)	------	------	------	------
Tricolored Heron	4208 breeders	3800-4600[b] breeders	------	------	------	------
Upland Sandpiper	100[c]	Not Available	Grassland	.03	3333	------
Western Sandpiper	Not Available	Not Available	------	------	------	------
Wood Duck – Eastern	120[a]	Not Available	------	------	------	------
Yellow-crowned Night Heron	1620 breeders	1400-1800[b] breeders	------	------	------	------

[a] Average of 90's Mid-Winter Inventories in BCR 30 States (individuals), [b]For BCRs 14 and 30 combined.
[c]From Rosenberg and Rohrbaugh. 2000.

BCR 30 Habitat Assessment

A number of efforts have occurred to identify available parcels of specific habitat types and to quantify priority habitats within parcels for portions of BCR 30. For example, the Center

for Conservation Biology at the College of William and Mary conducted a regional habitat assessment of habitat patches managed by Partners in Flight partners (public ownership) and determined the status of existing habitats relative to conservation goals. The results of their assessment are in Table 19 with additional information in Appendix C. However, no effort has been conducted to determine the availability of habitat types throughout the BCR, on both private and public lands. There is a recognized need to identify which lands/habitat patches to target for acquisition, restoration, and management to achieve species population goals. Efforts are underway to come up with a framework (conservation design – see Chapter 6) within the Atlantic Flyway. The results of these efforts will be applied to implementation of bird conservation priorities in BCR 30.

Table 18. College of William and Mary Center for Conservation Biology BCR 30 Habitat Assessment Summary for Managed Lands (CCB BCR 30 Habitat Assessment.)

HABITAT	SUBHABITAT	Hectares	Acres
Beach		5345	13209
Dune/Coastal Scrub		2979	7360
Early Successional	Grassland/Agricultural	38779	98825
	Shrub/Scrub Dominated	18399	45465
	Transitional	6252	15449
Early Successional/Pitch Pine Barren		21178	50458
	Dune/Coastal Scrub	914	1765
	Pitch Pine Barren	6375	15499
Forested Wetland	Hardwood Dominated	91897	227082
	Pine Dominated	41091	101538
Fresh/Brackish Emergent Marsh		40769	100743
Grassland/Agriculture		10395	24582
Maritime Marshes		9118	20276
Mature Deciduous Forest		83630	200395
Mixed Upland Forest	Evenly Mixed	551	1362
	Hardwood Dominated	106712	263691
	Pine Dominated	52514	129765
Pine Plantation		24098	59546
	Clearcut	14	35
	Mature	463	1145
	Pole Timber	105	260
	Sapling/Pole	23	57
Pine Savanna/Maritime Forest		3658	9040
Salt Marsh		55965	138292

Table 18. College of William and Mary Center for Conservation Biology BCR 30 Habitat Assessment Summary for Managed Lands (CCB BCR 30 Habitat Assessment.)

HABITAT	SUBHABITAT	Hectares	Acres
	High Marsh	51881	128200
	Low Marsh	12083	29858
Total Area of PIF Land		**685191**	**1680895**
Percent of BCR Land		**7.9%**	
Area of BCR 30		**8656749**	**21391207**

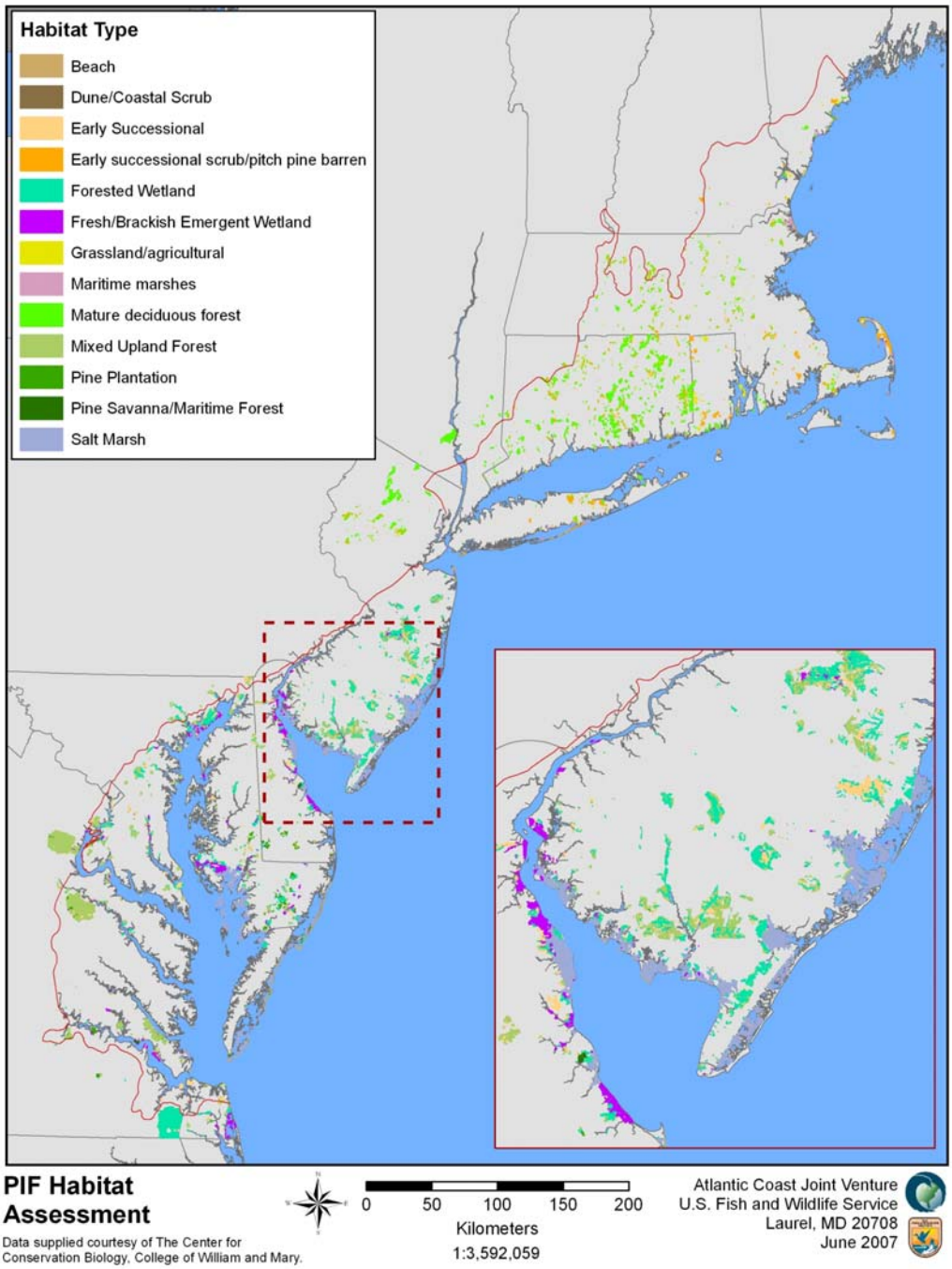
Habitat Loss, Degradation and Fragmentation

As noted in an earlier section, the most pressing threat for birds in BCR 30 is loss, degradation and fragmentation of existing habitats important during all of their life cycles. Populations of most priority species are limited by factors related to the quantity, distribution, connectivity and quality of habitats (including patch size) available to them during the breeding and nonbreeding seasons and during migration. When wetlands, forests, or fields are converted for use as human housing, industry, intensive agriculture, or forestry, they often lose most of their value as bird habitat (i.e., they become unavailable to the vast majority of bird species). Further, the activities, noise, pets, vehicles, buildings, roads, power lines, and other characteristics of anthropogenic land uses often disrupt and decrease the quality of any potential habitats remaining, including lands nearby or adjacent to human developments. The isolation and lack of connectivity of remaining habitat patches (fragmentation) lowers their value to many species.

Many priority species in BCR 30 may be limited by factors outside the BCR's boundaries. However, overall populations of priority species and certainly their abundance in BCR 30 will be affected negatively if there is not enough habitat available to them in this region, or if its quality is insufficient. Though many birds naturally occur in high concentrations, especially during migration,

higher rates of mortality due to starvation, predation or disease. Because it is difficult to determine definitively how much habitat is needed to sustain (or restore) populations of

Figure 3. Center for Conservation Biology BCR 30 Habitat Assessment



priority species, it is desirable to both conserve habitat that birds are currently using and increase the quality of available habitat whenever possible or cost-effective, through management actions.

Considering that the vast majority of habitat available to migratory birds in BCR 30 is on private land, the former task is a daunting one and the latter task is likely to affect only a small proportion of the landscape. Therefore, one of the key tasks to sustain and restore priority bird populations within the BCR will be to work with and develop incentives for private landowners to manage their lands in ways that are beneficial to bird populations.

In addition to outright habitat loss, many species are negatively affected by changes in landscape composition that decrease average patch size, increase edges between habitat types, and increase the distance between patches. These landscape changes are collectively referred to as fragmentation. When landscapes become fragmented beyond a certain point, effects on bird communities can be serious and negative, including lower habitat occupancy rates, lower reproductive success, higher nest predation and parasitism rates, and lower adult and juvenile survival (Doherty and Grubb 2001). Because BCR 30 is heavily populated, many of the different priority habitats occur within a patchy mosaic of different land uses, so fragmentation is the norm in much of this region. For example, remnant forest patches in BCR 30 often are in small, isolated tracts, within fragmented agricultural and/or developed landscapes. At the same time, many priority species are thought to be area sensitive and do not occupy patches of habitat unless they are of sufficient size, which may be one or more orders of magnitude larger than their territory size. Research from across a bird's range often shows this to be true to varying extents in different parts of the range, depending in part on landscape composition. Research from Cornell University's Birds in Forested Landscapes research program shows that occupancy of a forest patch by Scarlet Tanager or various thrush species is a function of both the size of the forest patch and the amount of forest cover in the surrounding landscape. In forested landscapes (e.g., >70% of area forested) forest birds will often occupy forests regardless of patch size, whereas in fragmented landscapes (>70% deforested) the same species is likely to be found only in patches of 100 or even 1000 ha. Therefore, conservation of different bird species should generally be focused on those landscapes containing a high proportion of a particular habitat.

Focus Areas

One of the tools being used to foster implementation in Bird Conservation Regions is the concept of focus areas which are geographically explicit areas supporting general habitat characteristics preferred by priority birds. Focus areas are not the only areas within a BCR that provide basic habitat needs for priority species but are geographic areas that have been identified by the bird conservation community as areas of high conservation potential because of their biological attributes at the landscape scale. The New England/Mid-Atlantic bird focus areas were

defined by staff of partner agencies and organizations during the BCR 30 all-bird workshop held in December 2004, as well as during other workshops and efforts focused on bird conservation within the region. Criteria developed for designating waterfowl focus areas have been adopted for use in defining other bird focus areas within BCR 30. These are:

1. Areas are regionally important to one or more life history stages or seasonal-use periods.
2. Focus areas are developed within the context of landscape-level conservation and biodiversity.
3. Focus areas are made up of discrete and distinguishable habitats or habitat complexes demonstrating clear ornithological importance. The boundaries are defined using ecological factors such as wetlands and wetland buffers.
4. Focus areas are large enough to supply all the necessary requirements for survival during the season for which it is important, except where small, disjunct areas are critical to survival and a biological connection is made, such as areas used by migrating shorebirds.

The focus areas depicted in this plan should be considered an initial draft set for the BCR and will need to be periodically revised as new tools become available to aid in site selection and enhanced through a review process. The process used to generate focus areas has important limitations that should be understood by anyone using the maps or list in this plan. The list of focus areas is biased in terms of taxonomic groups, habitats, jurisdictions, and existing knowledge. Not all bird experts in the region attended BCR 30 workshops where lines were drawn on maps, and some geographic areas and species groups were better represented than others. In the spirit of consensus, we tended to be inclusive with focus areas suggested. No attempt was made to verify the importance of each focus area identified or to rank them or quantify their relative contributions to different bird species or groups. It is important to consider that due to differences in their ecology, some avian taxa lend themselves to the concept of focus areas better than others. Species that tend to occur in large congregations and/or in relatively open habitats that are easily observed (e.g., shorebirds at beaches or waterfowl in bays) are likely covered more completely by current focus areas than are species that are secretive, widely dispersed, typically occur in small numbers, or use habitats that are difficult to observe (e.g., secretive marsh birds). Over the long-term, model-based approaches should be used for widely distributed species to determine the most suitable habitats across the landscape to focus conservation efforts on (see conservation design discussion in Chapter 6). In this draft, maps of focus areas for each bird group have been created and illustrate where overlap occurs in areas considered to be important for the different taxonomic groups and where conservation efforts can benefit multiple groups of birds. Focus

areas targeted for one taxonomic group are not necessarily less important than focus areas supporting multiple group of birds, because they might be extremely important for some of the highest priority species in that single bird group. Statistics for individual focus areas (e.g., acres/hectares, acres protected, etc.) can be found in Appendix A.

Sanderling; Highest Priority Species

Figure 4a: Waterfowl Focus Areas

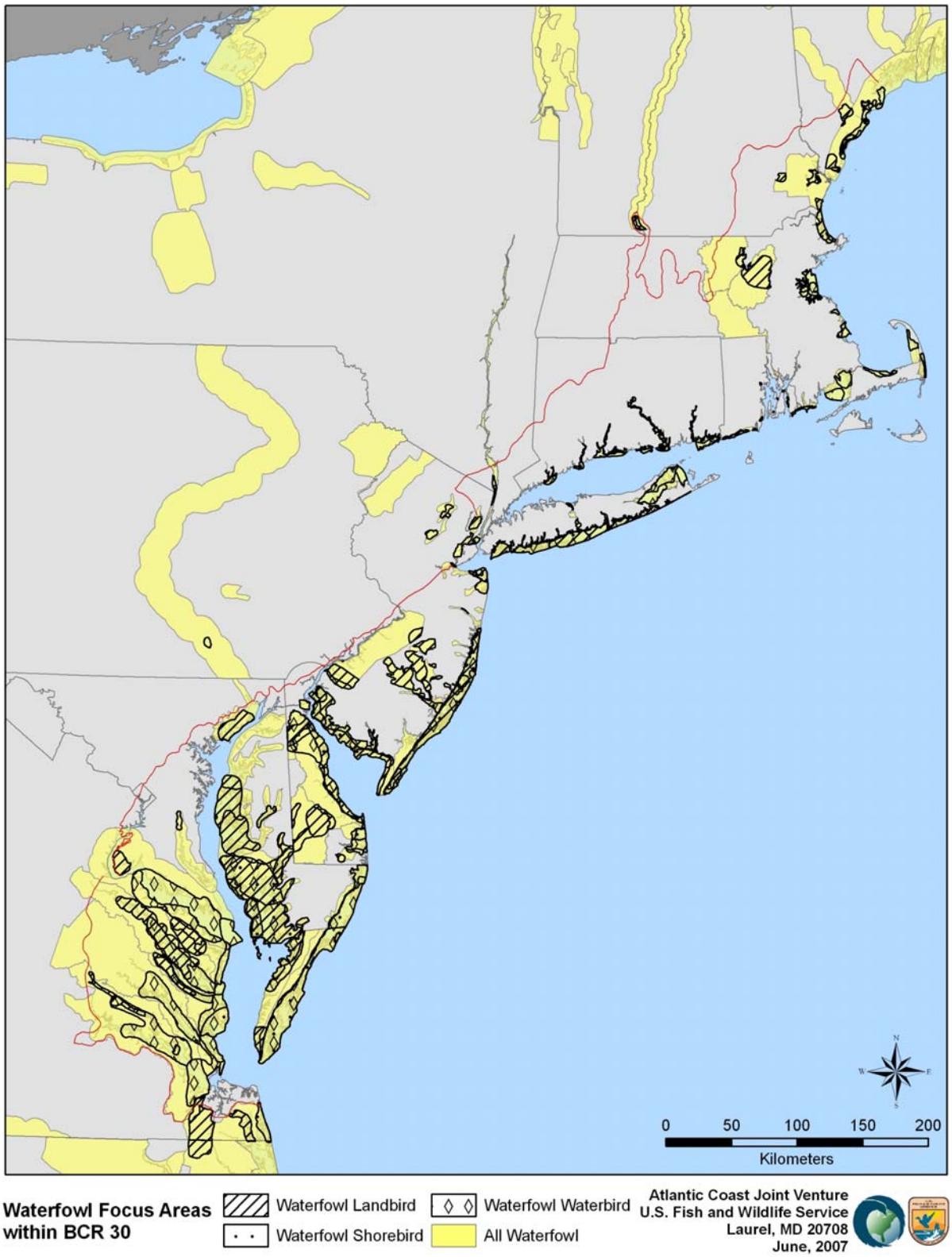


Figure 4b: Waterfowl Focus Areas (North)

Figure 4c: Waterfowl Focus Areas (central)

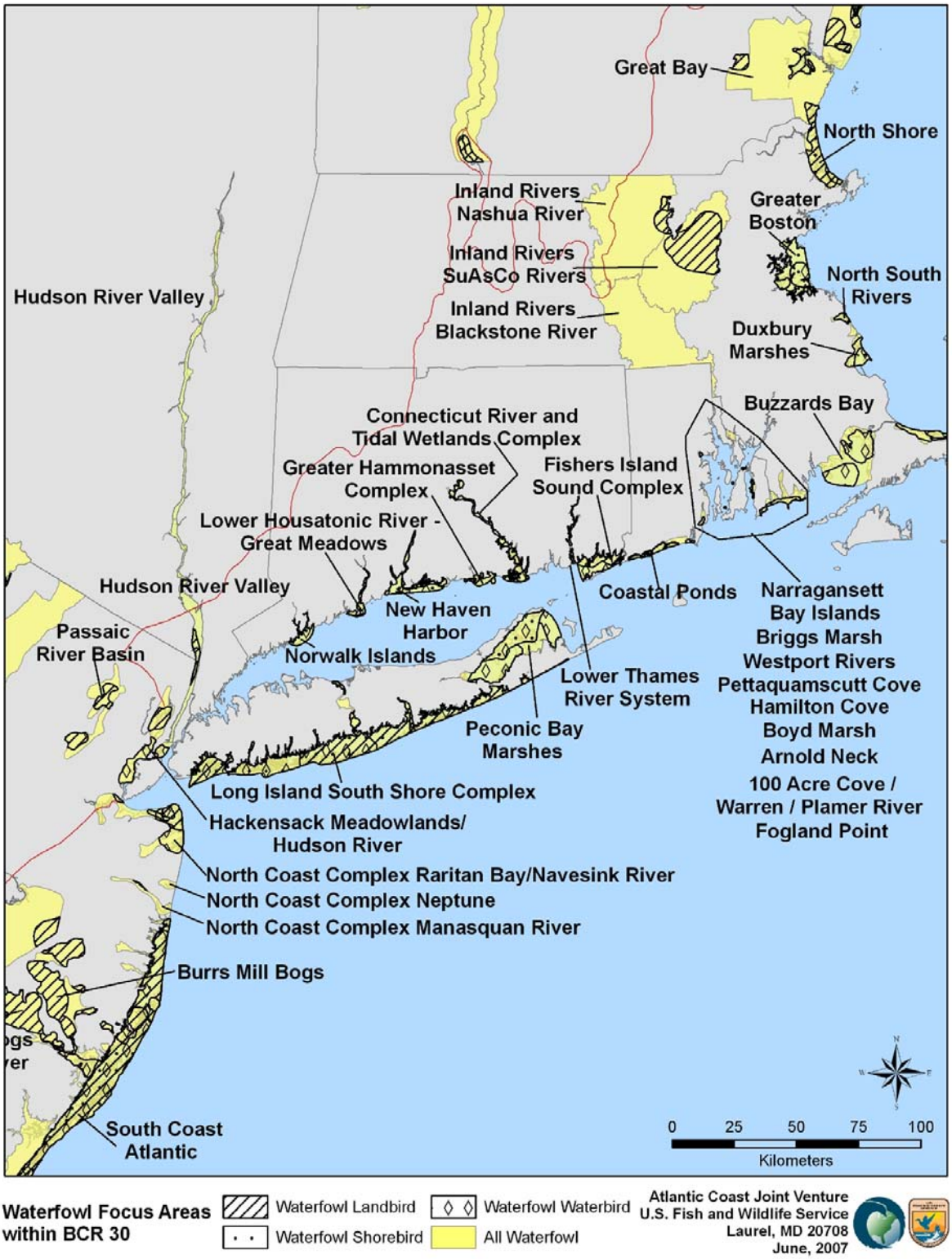


Figure 4d: Waterfowl Focus Areas (south)

Figure 5a: Waterbird Focus Areas (all)

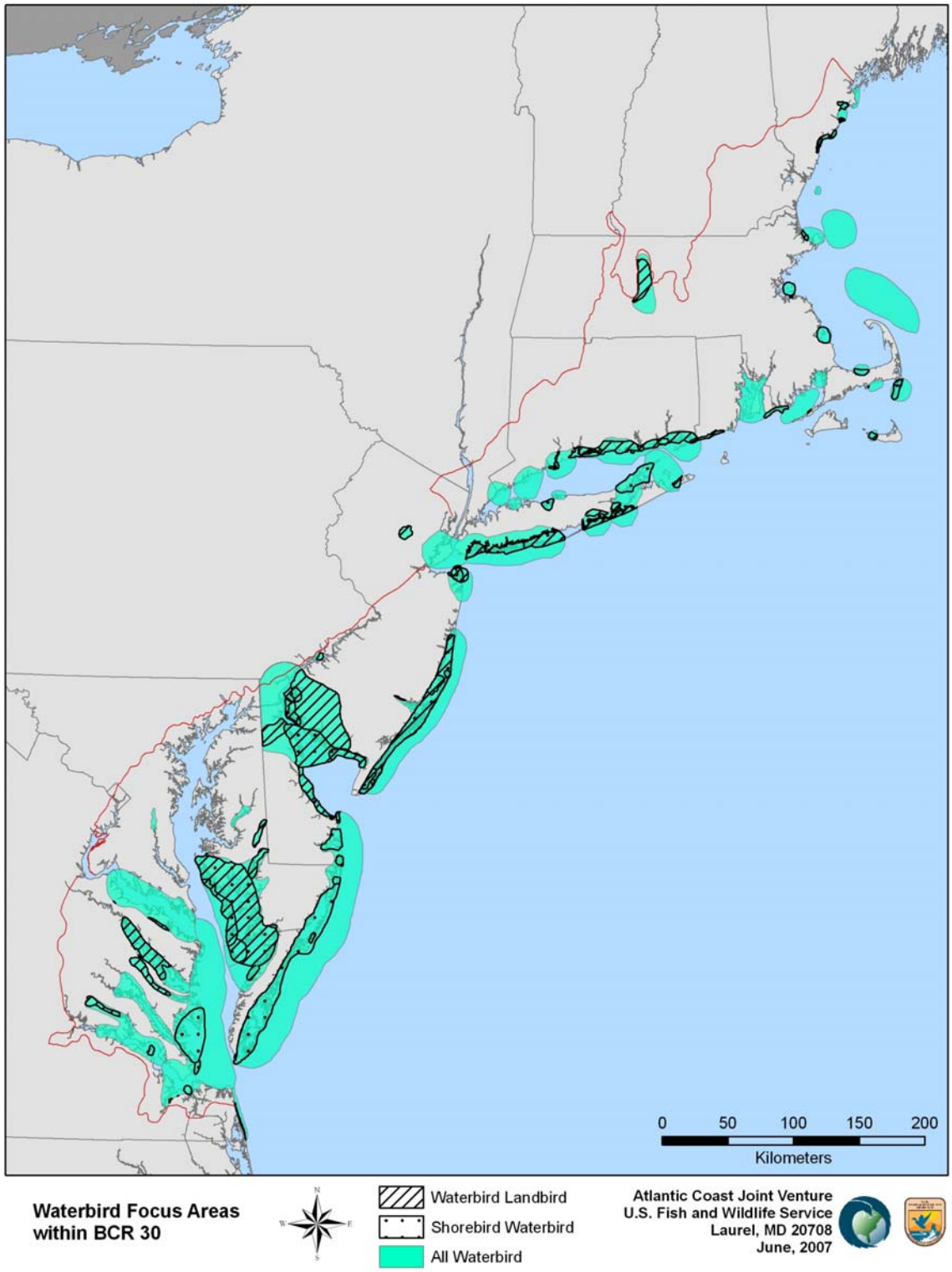


Figure 5b: Waterbird Focus Areas (north)

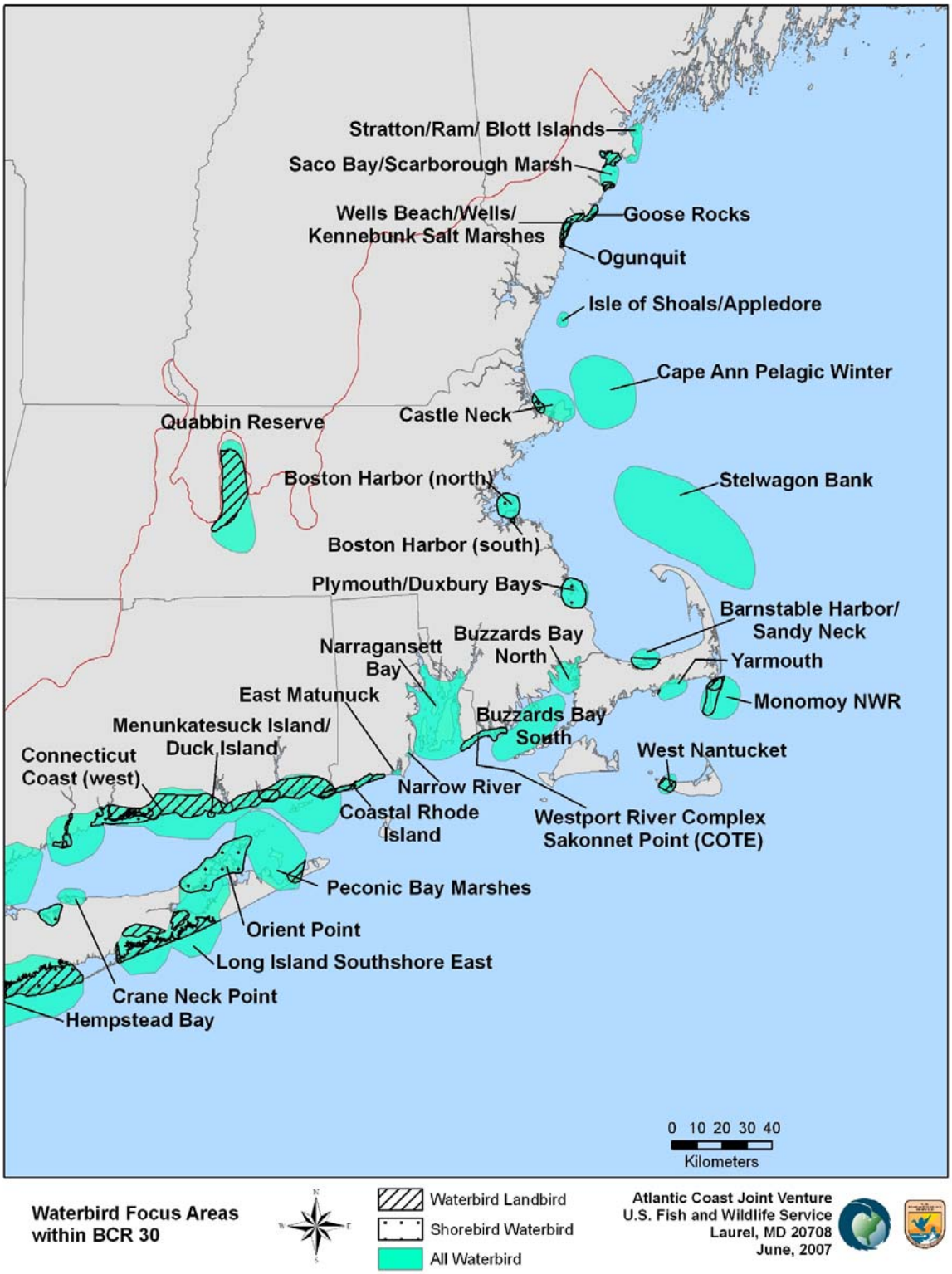


Figure 5c: Waterbird Focus Areas (central)

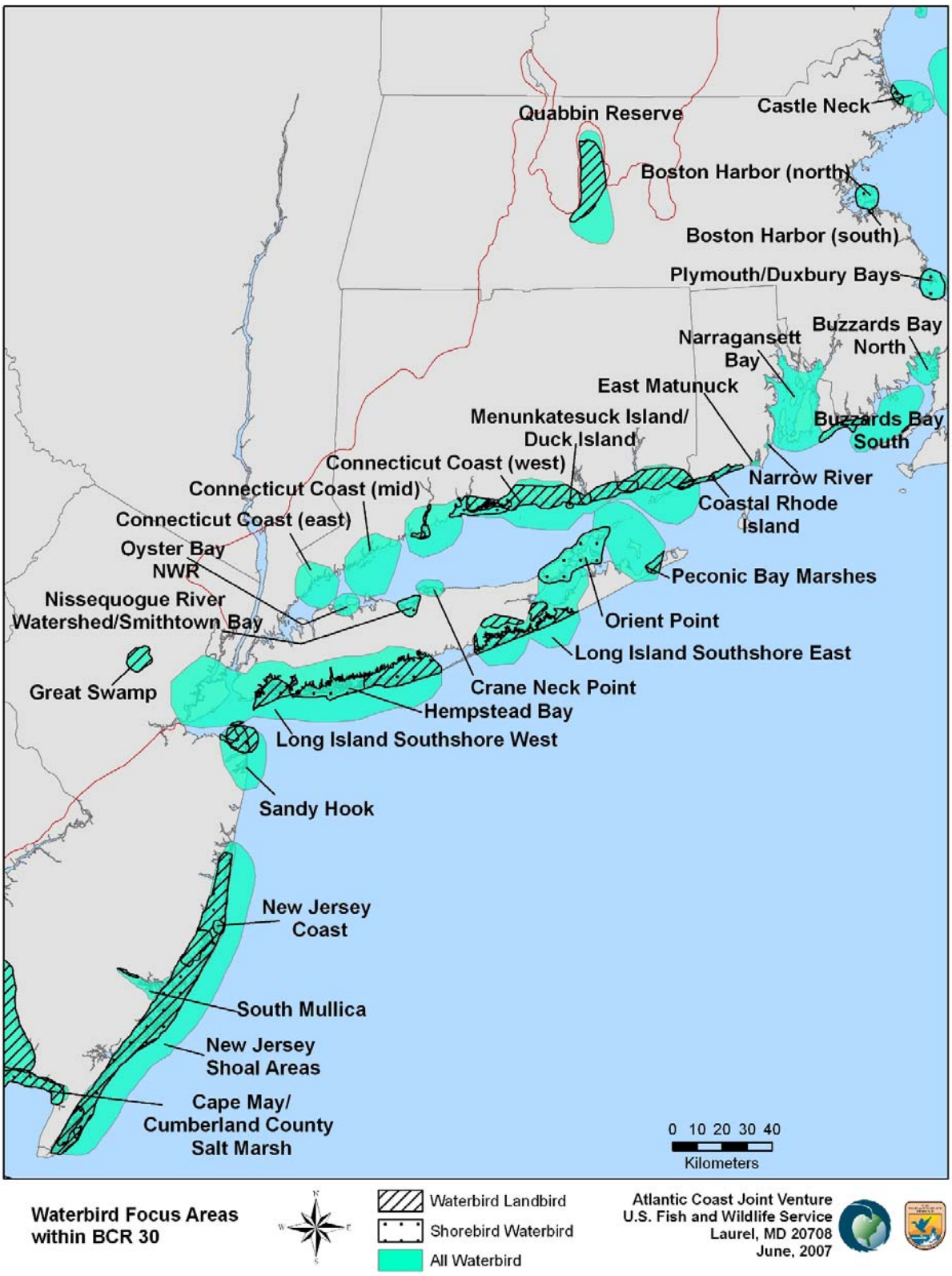


Figure 5d: Waterbird Focus Areas (south)

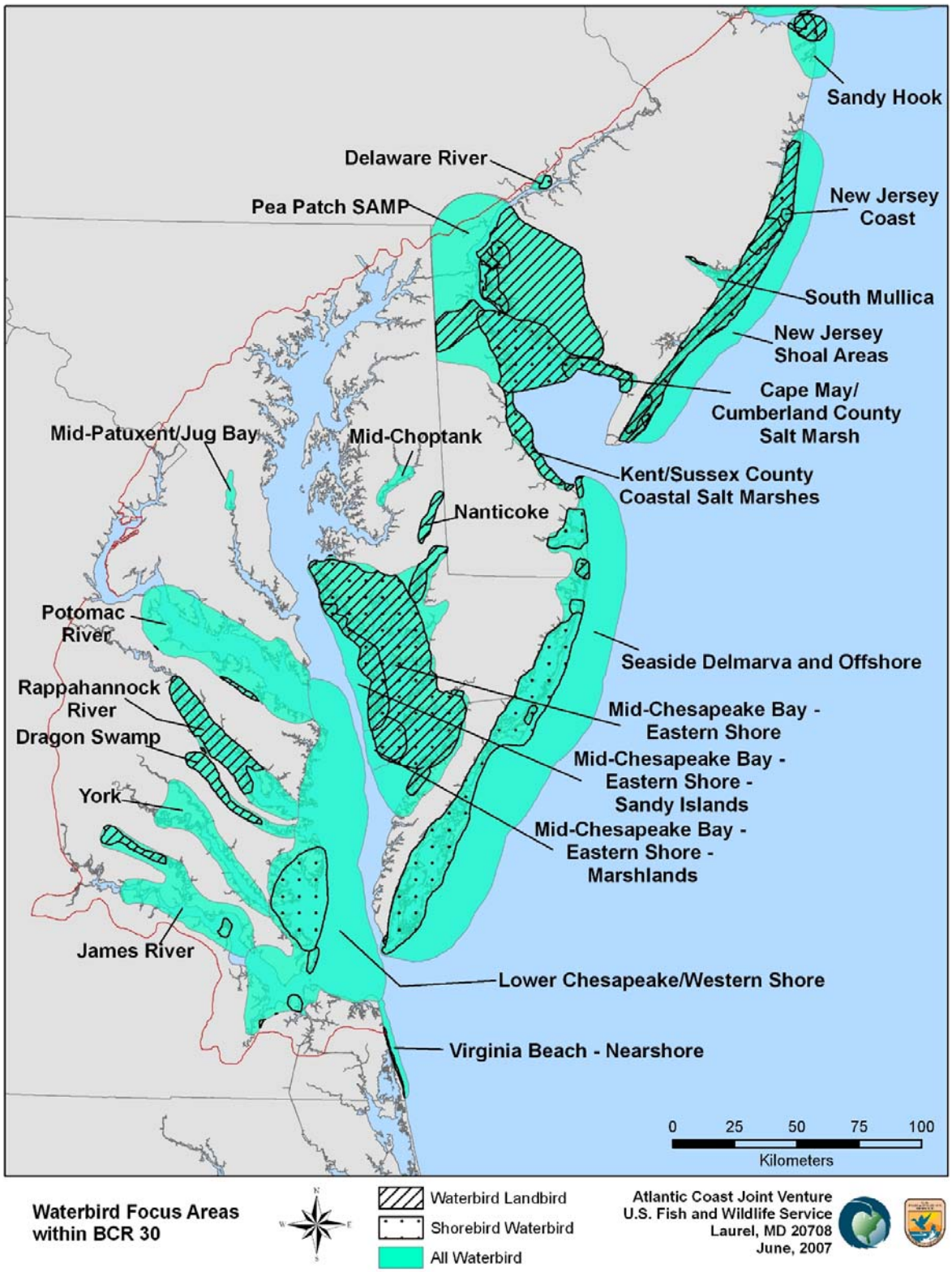


Figure 6a: Shorebird Focus Areas (all)

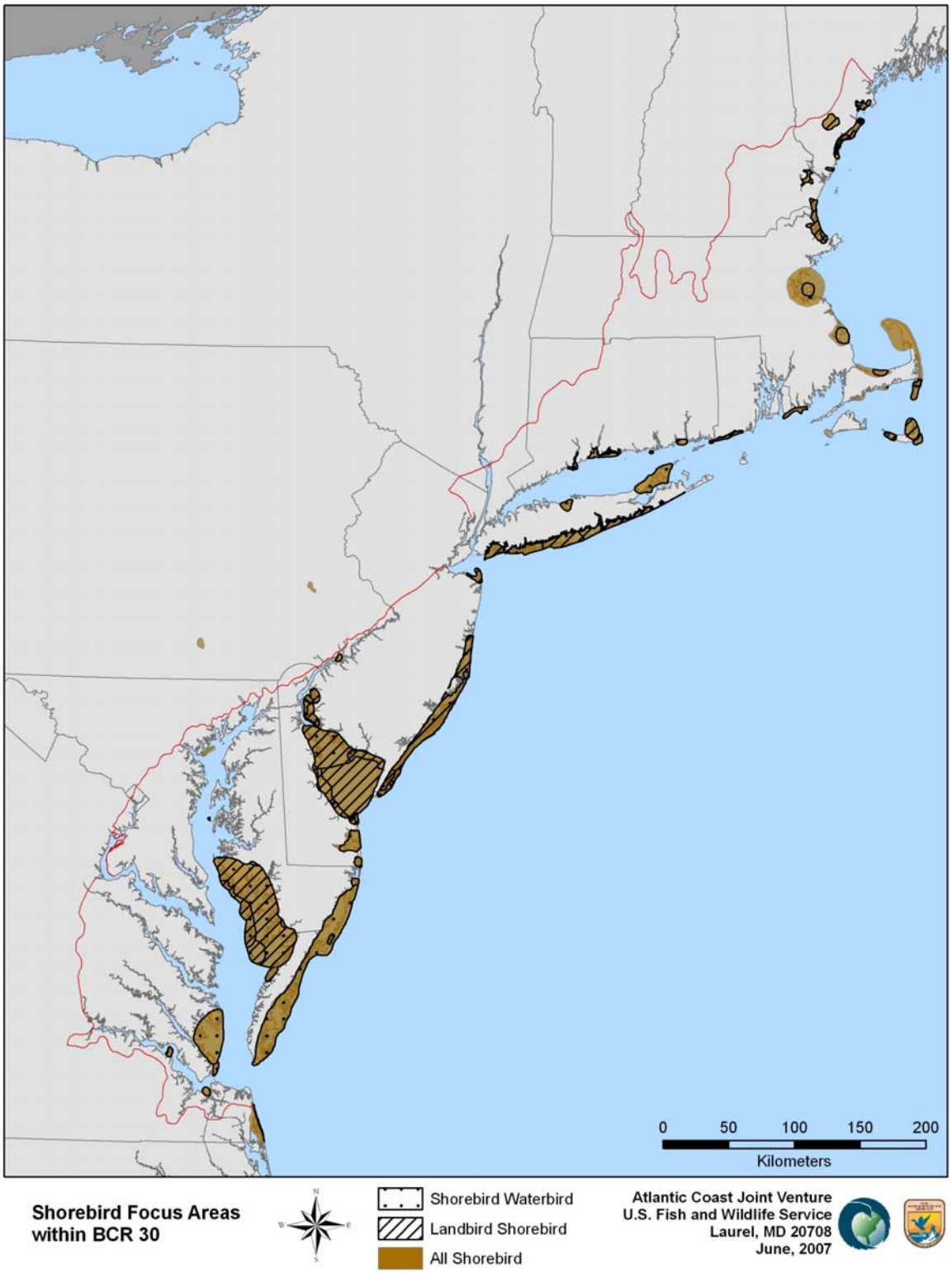


Figure 6b: Shorebird Focus Areas (north)

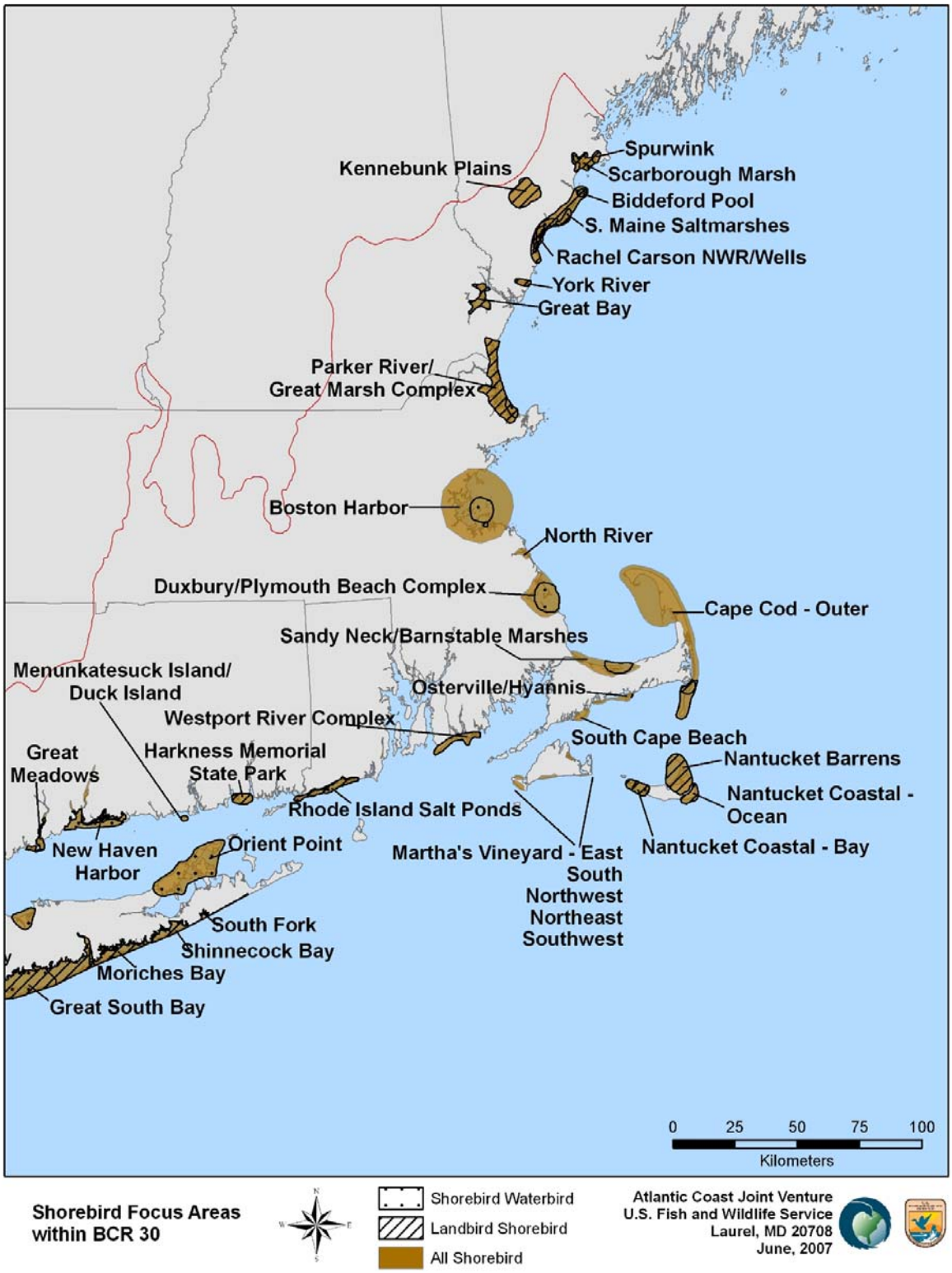


Figure 6c: Shorebird Focus Areas (central)

Figure 6d: Shorebird Focus Areas (south)

Figure 7a: Landbird Focus Areas (all)

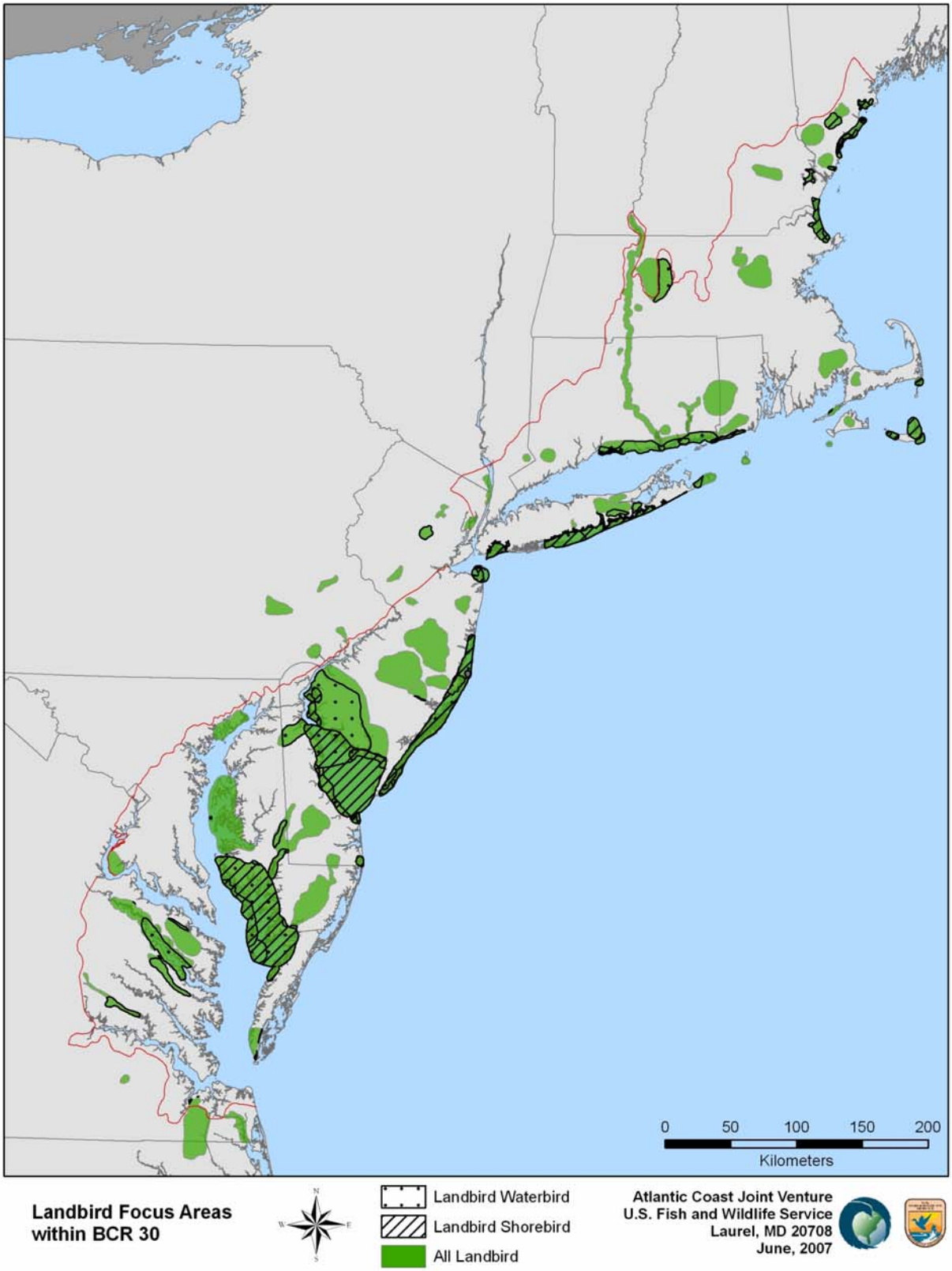


Figure 7b: Landbird Focus Areas (north)

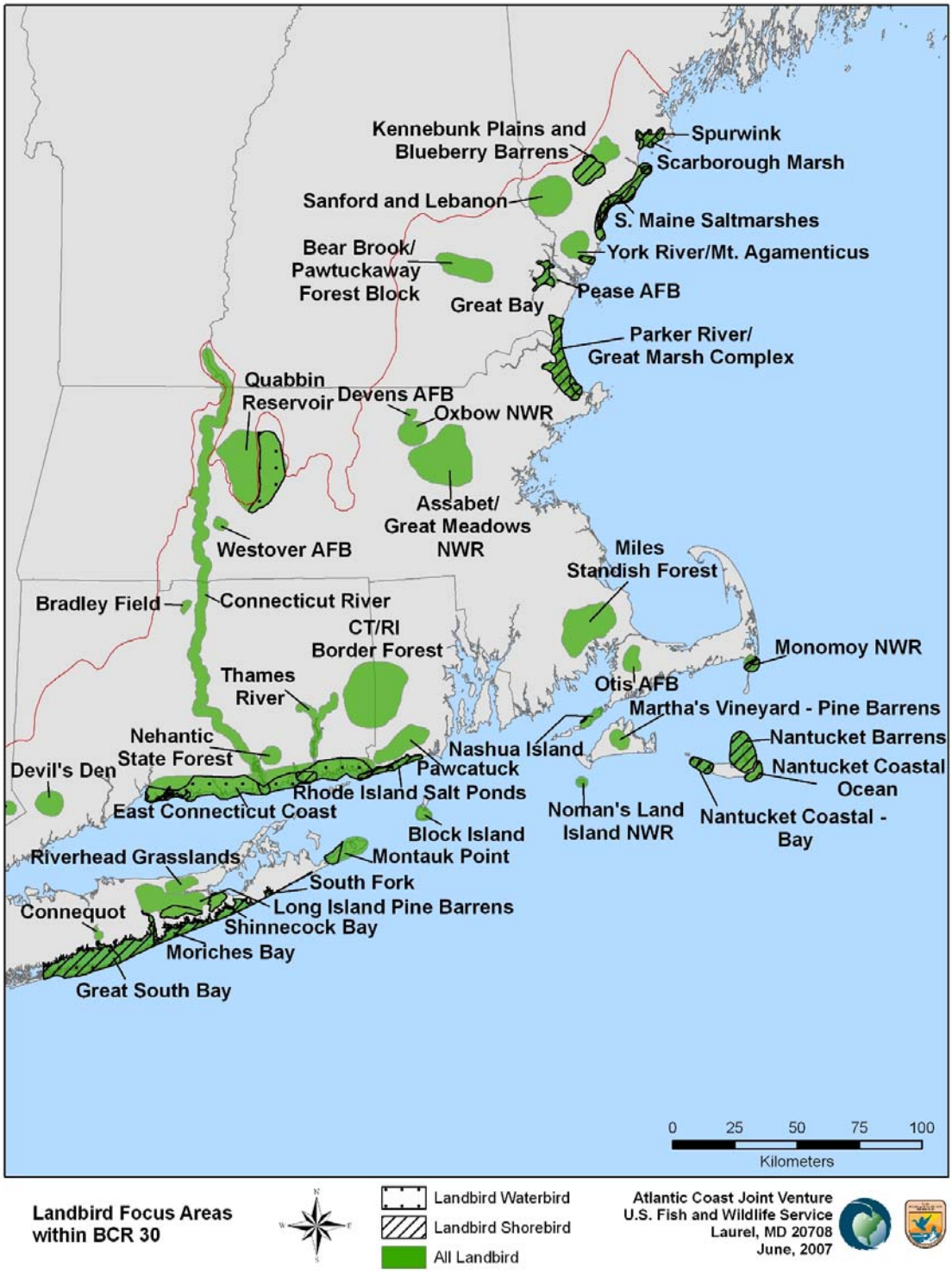


Figure 7c: Landbird Focus Areas (central)

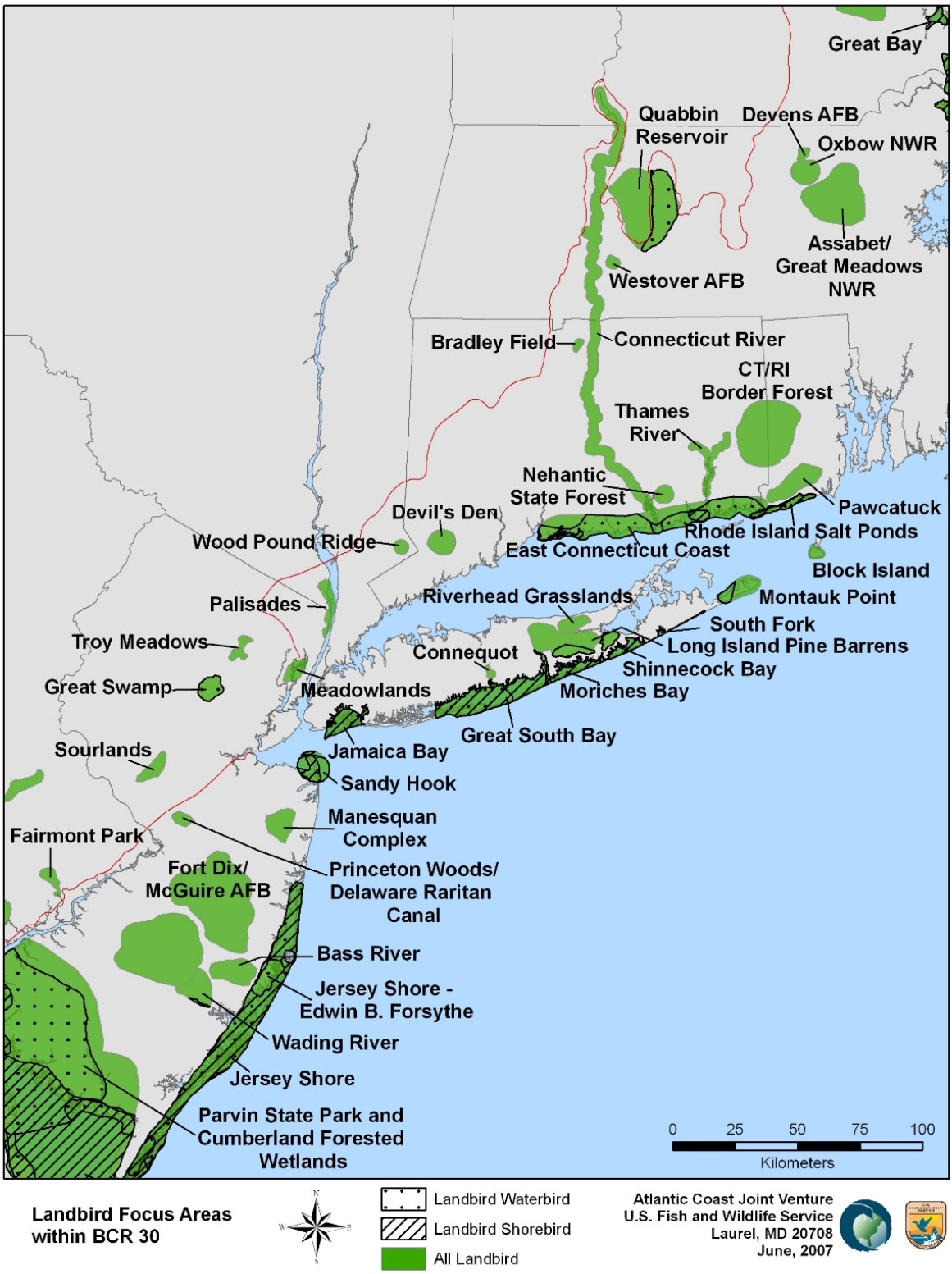


Figure 7d: Landbird Focus Areas (south)

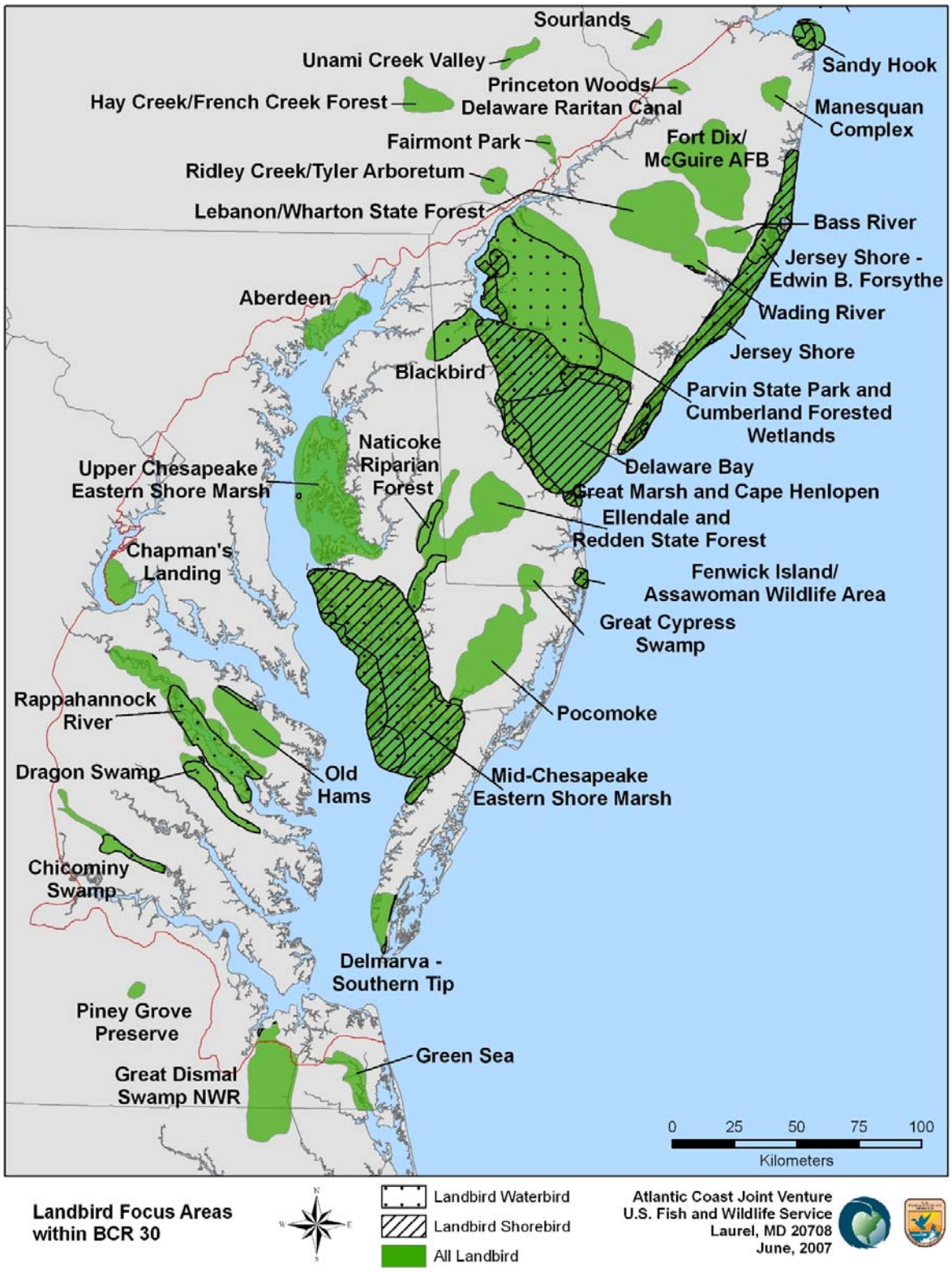


Figure 8a: Focus Area Overlaps for All Species

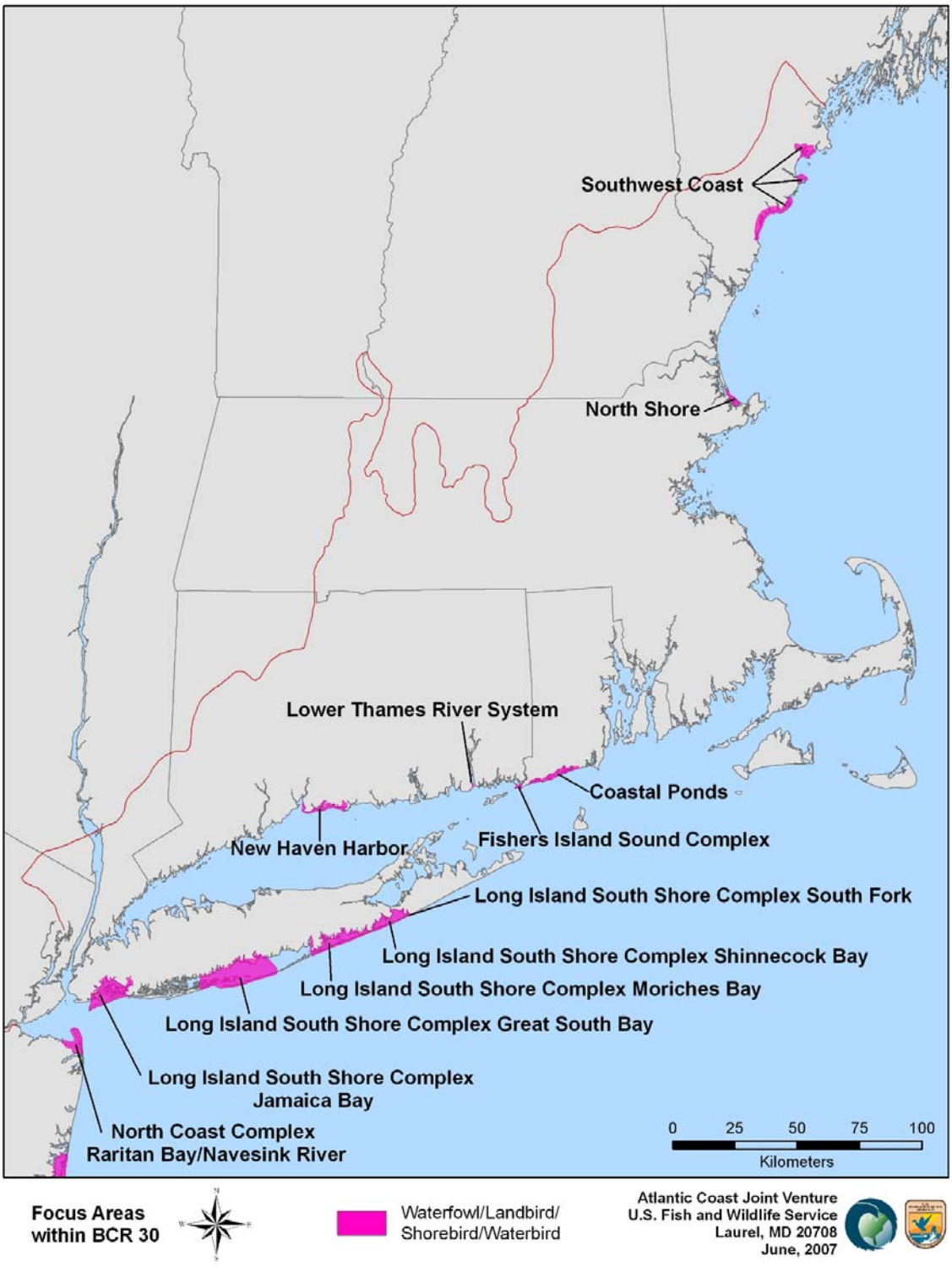
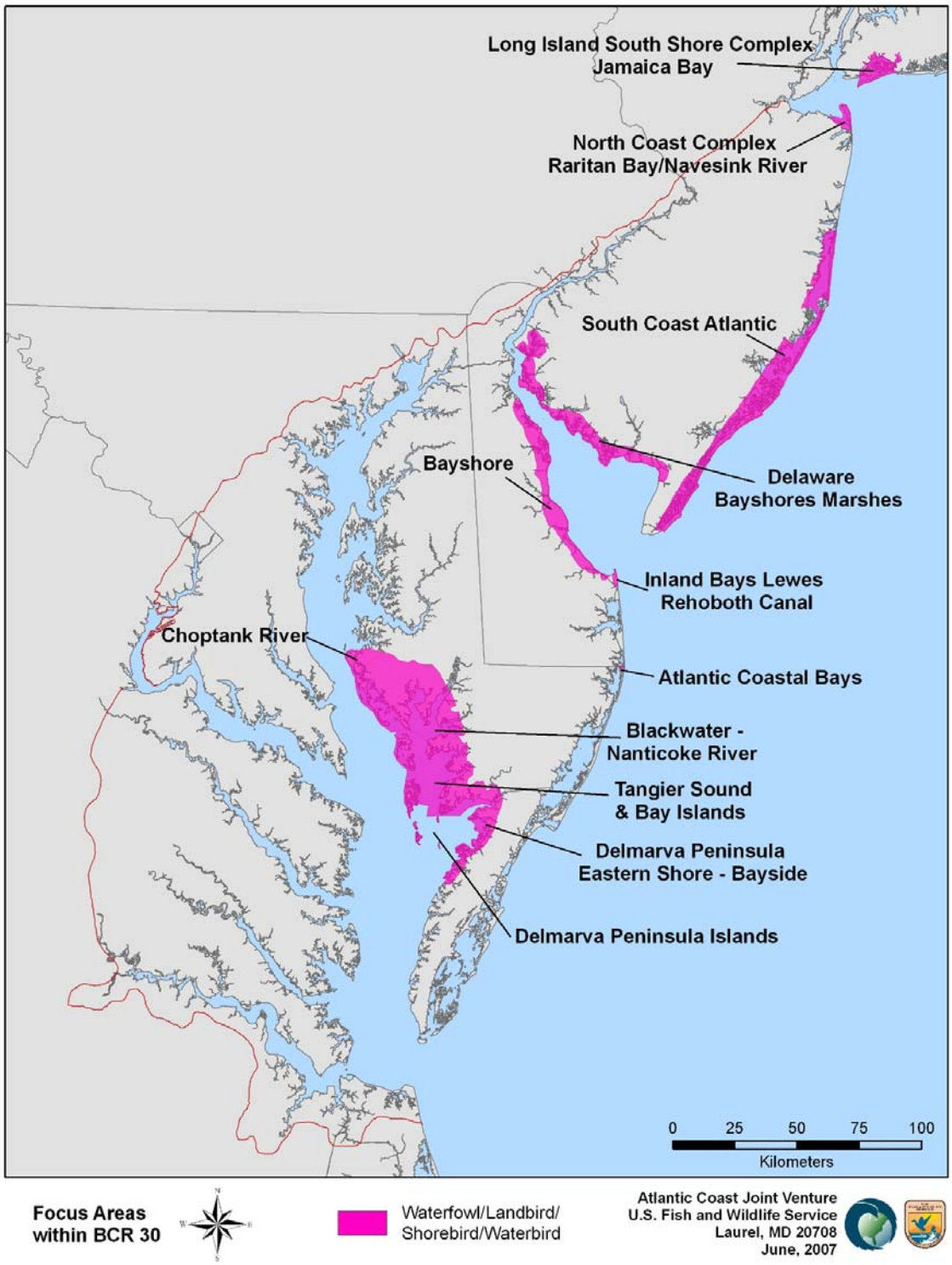


Figure 8b: Focus Area Overlaps for All Species



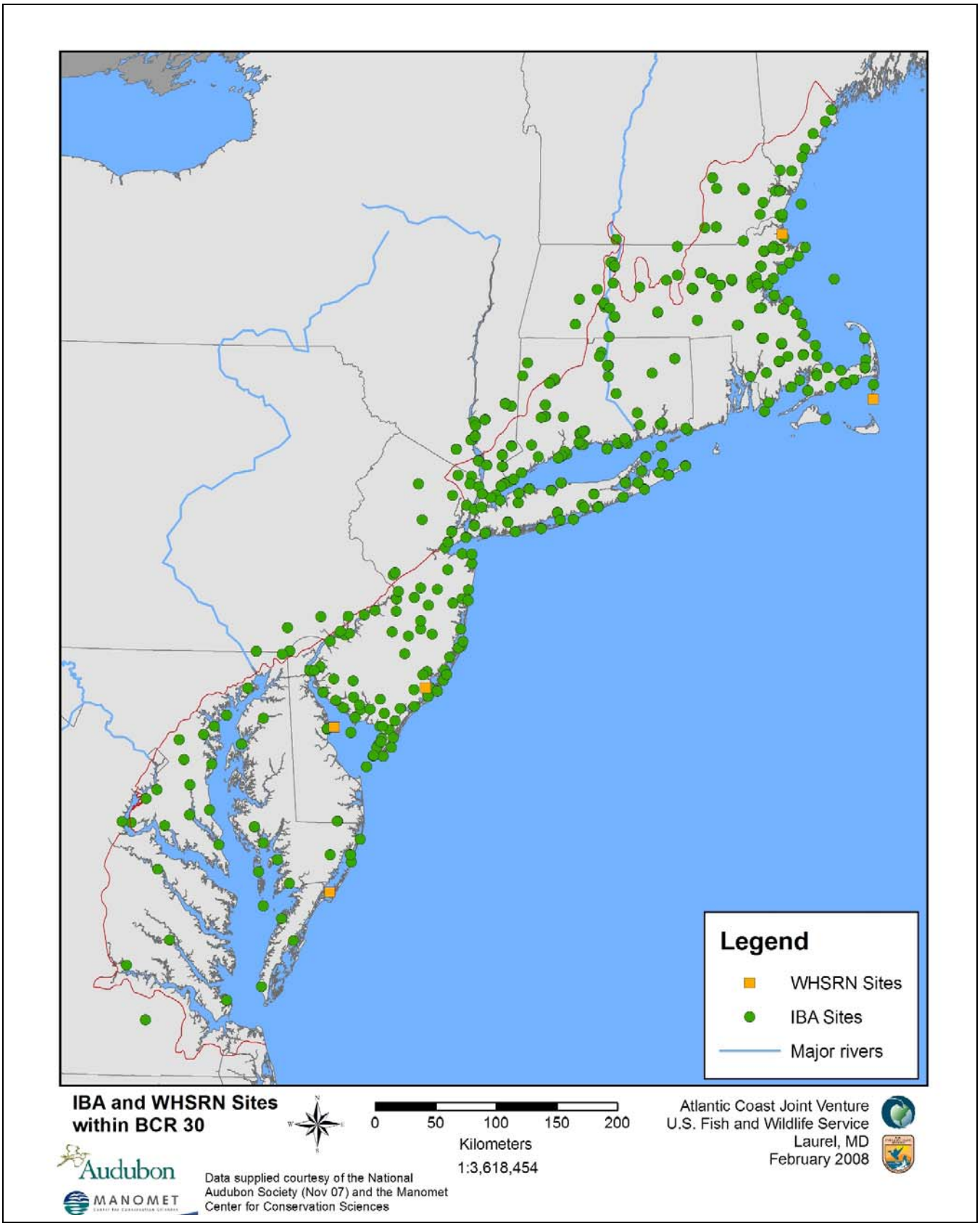
Important Bird Areas

Around the world, partners of Birdlife International have participated in an effort to identify and protect a network of sites, or Important Bird Areas (IBA), critical for the conservation of the world's birds. In the United States this effort is being led by the National Audubon Society, and carried out through its state offices and various partners. IBA programs differ across jurisdictions in terms of the criteria, analyses, and data used to identify sites. Methodologies have evolved over time, and in at least some cases IBA identification is based on objective evaluations that include GIS-based landscape analysis, and attempts to deal with wide-ranging species by identifying landscapes and habitats most likely to be valuable to particular species (e.g., see 2005 IBA book published by Audubon New York). Official IBAs in the US were identified independently from BCR focus areas and should be viewed as a separate but complementary efforts to conserve birds in the BCR. Many of the BCR 30 focus areas are recognized as IBAs; larger focus areas may even encompass multiple IBAs, as both IBAs and BCR 30 focus areas vary in scale. Until and unless BCR 30 partners decide to refine the current focus area list (e.g., by objectively evaluating bird and habitat distribution data and producing new maps), IBAs should be considered just as important to bird conservation efforts as the focus areas identified in this plan.

Western Hemisphere Shorebird Reserve Network

The Western Hemisphere Shorebird Reserve Network was launched in 1985 in response to serious population declines in shorebirds. The Western Hemisphere Shorebird Reserve Network (WHSRN) is a conservation strategy to protect key habitats throughout the Americas in order to sustain healthy populations of shorebirds. The mission of WHSRN is to conserve shorebird species and their habitats across the Americas through a network of key sites. During the last 20 years, over 21 million acres of shorebird habitat has been brought under the auspices of WHSRN. Similar to IBAs some of the WHSRN sites fall within focus areas and should be viewed as complimentary efforts to conserve important bird habitats in the BCR.

Figure 9: BCR 30 IBA & WHSRN Sites



CHAPTER 6: BCR 30 CONSERVATION DESIGN

Conservation Design is part of an iterative and adaptive approach of planning, implementing, and evaluating that allows for more effective implementation of habitat conservation because it allows partners to assess and learn from previous efforts and to measure progress towards goals. Conservation design generally refers to the steps in that process in which partners assess how much habitat is needed and where habitat conservation efforts should be focused in order to best meet the needs of priority species. These steps rely on a determination of habitat objectives based on restoring and sustaining populations. For migratory birds, general bird conservation goals have been established at the continental level (e.g., the North American Waterfowl Management Plan general goal of restoring waterfowl populations to the levels of the 1970s). In addition, continental population estimates and population objectives have been articulated in the conservation plans that have come out of each of the major bird initiatives (North American Waterfowl Management Plan 2004 Update, Partners in Flight North American Landbird Conservation Plan, U.S. Shorebird Conservation Plan, Waterbirds for the Americas, North American Waterbird Conservation Plan). For breeding landbirds, population objectives have been translated directly to habitat objectives by Partners in Flight based on abundance indices derived from Breeding Bird Survey (BBS) data and research into average densities across a species range. These continental estimates and population/habitat objectives have been "stepped down" to the BCR and state level, based on analyses of BBS data. This "top down" approach relies on many assumptions and may not be appropriate for setting population and habitat objectives within a specific BCR. An alternative approach is to develop population and habitat objectives in a "bottom-up" fashion by assessing habitat capacity and species distributions at the BCR-scale and combining BCR objectives to arrive at continental goals. Ideally, larger and smaller-scale objectives should be set through an interactive and iterative process where regional and continental assessments are each informed and influenced by the other.

Along with an assessment of how much habitat is available and how much is needed, a critical step in conservation design is the development of resources that guide decisions partners make about where to target what specific habitat conservation and management actions to most effectively restore and sustain bird populations. Focus areas for BCR 30 that were determined by partners using the best available information on distribution of species and habitats and expert opinion provide a coarse assessment of where partners should focus conservation for some species (Focus Areas). In order to better evaluate species-habitat relationships and more precisely target conservation actions to priority sites, model-based approaches will also be needed. These

approaches include relatively simple habitat maps and models of presence/absence and relative abundance/habitat suitability as well as more complex models that predict absolute abundance, probability of occurrence and present and/or future capacity. Single species-habitat models should be designed so that they can be combined to assess how to most efficiently conserve lands for multiple species with similar habitat requirements and evaluate trade-offs of implementing various management regimes for priority species with conflicting habitat needs. The process of determining how to most efficiently meet multiple species goals across the landscape is referred to as an optimal landscape design process. Throughout their development, model assumptions should be clearly stated and tested through research and monitoring programs should be developed and used to validate models and assess effectiveness of conservation planning and implementation.

A "Five Element Process" for conservation design was developed by Partners in Flight and summarized in a technical document (Will et al. 2005). As stated in that document, "the Five Elements represent components of a process by which biologically-based, spatially explicit, landscape-oriented habitat objectives can be developed for supporting and sustaining bird populations at levels recommended through the objectives set by PIF (or any of the bird conservation initiatives). The Five Elements comprise a conceptual approach through which conservation partners work together to assess current habitat conditions and ownership patterns, evaluate current species distributions and bird-habitat relationships, and determine where on the landscape sufficient habitat of different types can be delivered for supporting bird population objectives." Though the Five Element Process states that stepping down continental objectives is a prerequisite to the process, the authors argue that the order of steps is not necessarily important and may often be simultaneous. The Five Elements include the following: 1) landscape characterization and assessment; 2) bird population response modeling; 3) conservation opportunities assessment 4) optimal landscape design; and 5) monitoring and evaluation.

Conservation design in BCR 30 should follow a coordinated, collaborative approach that learns from other regions, builds upon existing efforts and applies the most appropriate tools and processes for the BCR. In summary, conservation design should attempt to answer these questions: How much habitat is presently available (and how much is already in the conservation estate)? How much more is needed to meet conservation goals (and are the goals realistic)? Where within the BCR should the conservation community implement what priority habitat conservation actions to most effectively achieve bird conservation objectives? How should lands

be managed to be most efficiently achieve the goals for multiple bird species (and other elements of biodiversity)?

A number of conservation design-related efforts are underway in different parts of the country as well as within BCR 30. For example, the Atlantic Coast Joint Venture has compiled a number of basic GIS habitat data layers for BCR 30 and the rest of the Atlantic Flyway and a Regional Gap Analysis effort that has developed detailed habitat mapping is nearing completion in the southeast and is underway in the northeast. States throughout the flyway have included elements of conservation design in their State Wildlife Action Plans. States in the Northeast are developing consistent habitat classification and mapping that crosswalks the classifications in the State Wildlife Action Plans to a common system. The Chesapeake Bay Program is developing to geographically target conservation actions in the watershed. The Center for Conservation Biology, College of William and Mary, completed a Habitat Assessment of priority habitats for "conservation lands" in BCR 30 that included more than 25,000 patches and 650,000 ha of land within 1,300 independently managed parcels and developed a critical parameters matrix to project the status and distribution of numerous priority bird species. Partner should consider expanding that habitat assessment approach to all lands in the BCR as part of an overall conservation design strategy. A summary of the results of that BCR 30 Habitat Assessment are included in Chapter 5, as well as Appendix C.

Tasks to accomplish conservation design in BCR 30

1. Create a habitat mapping and modeling working group for the BCR to develop specific questions and strategies for conservation/landscape design and select a subset of priority species (focal species) that best represent priority species and habitats. This group should examine habitat mapping and modeling efforts from the eastern United States to assess the best overall strategy for developing a "best-fit" conservation design for BCR 30.

2. Work with the northeast states, USGS, USFWS and other partners to complete the compiling and mapping of basic information on the distribution of existing species, habitat and managed lands in the BCR including the most recent NLCD land cover data as well as the more detailed Ecological Systems land cover when available. Organize information by BCR and state. Utilize relationship with regional NBII node and NBII bird conservation node to make the information available to partners through a Web site.

3. Work with USGS NBII regional bird conservation node and IAFWA to develop a database of bird conservation information from the State Wildlife Action Plans.

4. Develop grant proposals or use collaborative approaches to develop spatial models of avian relative abundance or habitat suitability for selected priority species across the BCR. For breeding birds these models could utilize NLCD and BBS data and would be supplemented when possible by other datasets such as Forest Inventory Analysis data and Ecological Systems land cover and other attributes being developed by the Regional Gap Analysis Program when available. For an assessment of migratory stopover habitats, the results of ongoing and proposed radar analyses should be used to determine stopover hotspots and migration patterns.

5. Develop probabilistic models to predict the capacity of regions to support bird populations at present and in the future. Compare this capacity with the population and habitat objectives determined by stepping down continental goals. Work with USGS, states and others to develop models (possibly as part of a Science Support or Multistate grant).
6. Develop a strategy to conduct additional surveys that will both allow for validation of models and for the development of long-term database for future modeling efforts. Work with U.S. Fish and Wildlife Service, states and others to develop and implement additional surveys for under surveyed species, priority species, and priority geographic areas. Collaborate with partners involved in Northeast coordinated bird monitoring effort.
7. Develop decision support tools using habitat data layers and bird-habitat models to determine where conservation should be targeted to optimally achieve population objectives for migratory birds. Make these tools useful and available at the BCR and state scales.

CHAPTER 7: BCR 30 AND STATE WILDLIFE ACTION PLAN CROSSWALK

Under Development

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APPENDIX A. SPECIES FOCUS AREA STATISTICS (SORTED BY BIRD GROUP)

State	Focus Areas	Bird group	Acres	Hectares	Area Protected (Acres)	Area Protected (Ha)	% Protected
NJ	Princeton Woods/Delaware Raritan Canal	Landbird	8,717	3,527	17	7	0.19
NJ	Sourlands	Landbird	16,758	6,782	730	295	4.36
NJ	Fort Dix/McGuire AFB	Landbird	209,947	84,962	119,768	48,469	57.05
NJ	Lebanon/Wharton State Forest	Landbird	189,907	76,853	83,035	33,603	43.72
NJ	Bass River	Landbird	36,903	14,934	23,430	9,482	63.49
NJ	Jersey Shore	Landbird/ Shorebird	230,000	93,078	49,185	19,905	21.38
NJ	Wading River	Landbird	32,334	13,085	20,278	8,206	62.72
NJ	Jersey Shore - Edwin B. Forsythe	Landbird/ Shorebird	24,917	10,084	12,824	5,190	51.47
NJ/DE	Delaware Bay	Landbird/ Shorebird	611,666	247,532	95,587	38,683	15.63
NJ	Parvin State Park and Cumberland Forested Wetlands	Landbird	582,538	235,745	81,347	32,920	13.96
DE	Blackbird	Landbird	61,016	24,692	14,442	5,845	23.67
DE	Great Marsh and Cape Henlopen	Landbird/ Shorebird	10,418	4,216	4,096	1,657	39.31
DE	Fenwick Island/Assawoman Wildlife Area	Landbird/ Shorebird	8,982	3,635	2,706	1,095	30.12
DE	Ellendale and Redden State Forest	Landbird	89,775	36,330	17,936	7,258	19.98
MD/VA	Mid-Chesapeake Eastern Shore Marsh	Landbird/ Shorebird	669,336	270,871	110,171	44,585	16.46
MD	Pocomoke	Landbird	162,631	65,814	34,902	14,124	21.46
DE/MD	Great Cypress Swamp	Landbird	22,010	8,907	12,898	5,219	58.60
VA	Delmarva - Southern Tip	Landbird	35,200	14,245	1,389	562	3.94
VA	Green Sea	Landbird	42,414	17,164	7,520	3,043	17.73
VA/NC	Great Dismal Swamp NWR	Landbird	176,493	71,424	124,596	50,422	70.60
VA	Chicominy Swamp	Landbird	39,912	16,152	4,134	1,673	10.36
MD	Aberdeen	Landbird	72,478	29,331	41,600	16,835	57.40
PA	Ridley Creek/Tyler Arboretum	Landbird	21,643	8,759	1,878	760	8.68
PA	Hay Creek/French Creek Forest	Landbird	46,863	18,965	9,987	4,042	21.31
PA	Unami Creek Valley	Landbird	18,643	7,545	605	245	3.24
ME	Spurwink	Landbird/ Shorebird	2,843	1,150	361	146	12.71
ME	S. Maine Saltmarshes	Landbird/ Shorebird	39,428	15,956	3,797	1,537	9.63
ME	York River/Mt. Agamenticus	Landbird	28,026	11,342	835	338	2.98

State	Focus Areas	Bird group	Acres	Hectares	Area Protected (Acres)	Area Protected (Ha)	% Protected
MA	Monomoy NWR	Landbird	7,810	3,161	408	165	5.23
MA	Noman's Land Island NWR	Landbird	4,259	1,724	503	204	11.82
MD	Upper Chesapeake Eastern Shore Marsh	Landbird	301,175	121,881	4,594	1,859	1.53
MD	Chapman's Landing	Landbird	40,542	16,407	2,275	921	5.61
VA	Rappahannock River	Landbird	227,833	92,201	8,387	3,394	3.68
VA	Old Hams	Landbird	101,183	40,947	261	106	0.26
MA	Oxbow NWR	Landbird	23,039	9,323	4,909	1,987	21.31
NJ	Sandy Hook	Landbird	30,422	12,311	2,046	828	6.73
CT	Nehantic State Forest	Landbird	11,677	4,726	3,497	1,415	29.94
CT	Thames River	Landbird	30,205	12,224	1,471	595	4.87
CT	East Connecticut Coast	Landbird	174,539	70,633	9,926	4,017	5.69
CT	Devil's Den	Landbird	22,508	9,109	2,083	843	9.25
RI	Block Island	Landbird	7,585	3,070	290	117	3.82
MD/DE	Naticoke Riparian Forest	Landbird	120,413	48,729	19,105	7,731	15.87
MA	Assabet/ Great Meadows NWR	Landbird	109,429	44,284	22,719	9,194	20.76
ME	Sanford and Lenanon	Landbird	55,520	22,468	515	208	0.93
MA	Parker River/Great Marsh Complex	Landbird/ Shorebird	47,173	19,090	10,049	4,067	21.30
MA	Nashua Island	Landbird	8,811	3,566	0	0	0.00
VA	Piney Grove Preserve	Landbird	8,307	3,362	0	0	0.00
VA	Dragon Swamp	Landbird	50,823	20,567	0	0	0.00
PA	Fairmont Park	Landbird	11,491	4,650	0	0	0.00
NY	Wood Pound Ridge	Landbird	6,797	2,750	0	0	0.00
NY	Moriches Bay	Landbird/ Shorebird	17,666	7,149	4,660	1,886	26.38
ME	Kennebunk Plains	Landbird/ Shorebird	24,811	10,041	2,140	866	8.63
NJ	Jersey Shore	Landbird/ Shorebird	212,741	86,093	43,524	17,613	20.46
ME	S. Maine Saltmarshes	Landbird/ Shorebird	34,130	13,812	2,310	935	6.77
MA	Martha's Vineyard - South	Shorebird	2,015	816	447	181	22.18
MA	Martha's Vineyard - East	Shorebird	593	240	43	18	7.29
MA	Martha's Vineyard - Northeast	Shorebird	1,507	610	11	4	0.70
NY	Orient Point	Shorebird/ Waterbird	71,741	29,033	257	104	0.36
ME	Rachel Carson NWR/Wells	Shorebird	3,059	1,238	1,364	552	44.58
MA	North River	Shorebird	4,005	1,621	777	314	19.40
MA	Duxbury/Plymouth Beach Complex	Shorebird	43,991	17,802	1,126	456	2.56
MA	Sandy Neck/Barnstable Marshes	Shorebird	29,462	11,923	3,958	1,602	13.43

State	Focus Areas	Bird group	Acres	Hectares	Area Protected (Acres)	Area Protected (Ha)	% Protected
MA	Cape Cod - Outer	Shorebird	135,729	54,928	25,250	10,218	18.60
MA	Osterville/Hyannis	Shorebird	6,002	2,429	216	87	3.60
NY	Nissequogue River Watershed/Smithtown Bay	Shorebird/ Waterbird	12,895	5,218	232	94	1.80
NY	Hempstead Bay	Shorebird/ Waterbird	36,158	14,633	1,745	706	4.83
CT	New Haven Harbor	Shorebird	26,566	10,751	1,608	651	6.05
CT	Great Meadows	Shorebird	7,018	2,840	1,426	577	20.32
NJ	Raritan Bay/Sandy Hook	Shorebird	15,883	6,428	2,124	859	13.37
NJ	John Heinz NWR/Tinicum	Shorebird	6,142	2,485	409	166	6.66
NJ	Hereford Inlet	Shorebird	2,342	948	147	59	6.27
NJ	Delaware Bay - Atlantic	Shorebird	15,339	6,207	5,696	2,305	37.13
DE	Delaware Seashore	Shorebird	48,515	19,633	4,395	1,779	9.06
MD/VA	Delmarva Seaside	Shorebird	418,172	169,228	60,045	24,299	14.36
MD/VA	Delmarva Seaside Chincoteague Impoundments	Shorebird	4,902	1,984	3,403	1,377	69.42
VA	Lower Chesapeake Western Shore	Shorebird	164,158	66,432	3,473	1,406	2.12
VA	Hog Island Impoundment	Shorebird	6,527	2,641	2,330	943	35.69
VA	Craney Island	Shorebird	7,635	3,090	3,388	1,371	44.38
VA	Backbay NWR Outer Beach/Impoundments	Shorebird	40,355	16,331	13,890	5,621	34.42
MD	Hartmiller Island	Shorebird	8,988	3,637	3,046	1,233	33.89
DE	Upper Delaware Bay	Shorebird	32,660	13,217	9,191	3,719	28.14
NJ	Mannington Meadow	Shorebird	14,424	5,837	372	151	2.58
NJ	Supawna Meadows NWR	Shorebird	6,925	2,803	3,099	1,254	44.75
MA	Martha's Vineyard Southwest	Shorebird	2,363	956	12	5	0.49
MA	Martha's Vineyard Northwest	Shorebird	1,259	510	8	3	0.63
MA	Boston Harbor	Shorebird	164,246	66,468	7,156	2,896	4.36
VA	Grandview Beach	Shorebird	7,922	3,206	463	187	5.84
MA	South Cape Beach	Shorebird	4,785	1,936	821	332	17.15
CT	Harkness Memorial State Park	Shorebird	7,605	3,078	257	104	3.38
ME	Biddeford Pool	Shorebird	2,239	906	124	50	5.52
MD	4th Street Flats/Skimmer Island	Shorebird	6,860	2,776	0	0	0.00
PA	Conejohela Flats	Shorebird	7,593	3,073	0	0	0.00
PA	Green Lane Reservoir	Shorebird	6,050	2,448	0	0	0.00
MD	Poplar Island	Shorebird	663	268	0	0	0.00
CT	Menunkatesuck Island/ Duck Island	Shorebird/ Waterbird	1,224	495	0	0	0.00
ME	York River	Shorebird/ Landbird	3,490	1,412	0	0	0.00
MA/RI	Westport River Complex Sakonnet Point (COTE)	Shorebird/ Waterbird	13,064	5,287	612	248	4.68

State	Focus Areas	Bird group	Acres	Hectares	Area Protected (Acres)	Area Protected (Ha)	% Protected
NJ	New Jersey Coast	Waterbird	275,829	111,624	64,728	26,195	23.47
NJ	South Mullica	Waterbird	17,666	7,149	8,427	3,410	47.70
NJ	New Jersey Shoal Areas	Waterbird	310,396	125,613	235	95	0.08
NJ	Cape May/Cumberland County Salt Marsh	Waterbird	42,121	17,046	23,751	9,611	56.39
NJ/DE	Pea Patch SAMP	Waterbird	974,160	394,228	136,804	55,362	14.04
PA	Delaware River	Waterbird	9,213	3,728	1,313	531	14.25
DE	Kent/Sussex County Coastal Salt Marshes	Waterbird	55,920	22,630	24,826	10,047	44.40
MD	Mid-Choptank	Waterbird	21,324	8,630	658	266	3.09
MD	Nanticoke	Waterbird	18,763	7,593	6,999	2,832	37.30
MD	Mid-Patuxent/Jug Bay	Waterbird	12,030	4,868	5,070	2,052	42.15
MD/VA	Mid-Chesapeake Bay - Eastern Shore - Sandy Islands	Waterbird	144,402	58,438	12,132	4,910	8.40
MD/VA	Mid-Chesapeake Bay - Eastern Shore - Marshlands	Waterbird	61,678	24,960	58	24	0.09
MD/VA	Mid-Chesapeake Bay - Eastern Shore	Waterbird	722,985	292,582	111,026	44,931	15.36
VA	Lower Chesapeake/Western Shore	Waterbird	1,042,981	422,079	24,874	10,066	2.38
VA	Potomac River	Waterbird	435,092	176,076	8,200	3,318	1.88
VA	Rappahannock River	Waterbird	188,649	76,344	3,805	1,540	2.02
VA	Dragon Swamp	Waterbird	68,351	27,661	5	2	0.01
VA	York	Waterbird	157,864	63,885	19,251	7,791	12.19
VA	James River	Waterbird	257,299	104,125	30,464	12,328	11.84
VA	Virginia Beach - Nearshore	Waterbird	27,040	10,943	813	329	3.01
DE/MD	Seaside Delmarva and Offshore	Waterbird	1,440,776	583,061	74,203	30,029	5.15
RI	East Matunuck	Waterbird	1,584	641	252	102	15.89
RI	Narragansett Bay - Narrow River	Waterbird	1,570	636	743	301	47.29
MA	Monomoy NWR	Waterbird	53,117	21,496	1,359	550	2.56
MA	Buzzards Bay North	Waterbird	28,898	11,695	618	250	2.14
MA	Boston Harbor (south)	Waterbird/ Shorebird	617	250	12	5	2.01
MA	Boston Harbor (north)	Waterbird/ Shorebird	18,568	7,514	842	341	4.54
ME	Saco Bay/Scarborough Marsh	Waterbird	22,336	9,039	2,484	1,005	11.12
RI	Coastal Rhode Island	Waterbird	14,389	5,823	1,394	564	9.69
NY	Long Island Southshore West	Waterbird	577,705	233,789	35,678	14,438	6.18
NY	Long Island Southshore East	Waterbird	214,770	86,914	10,660	4,314	4.96

State	Focus Areas	Bird group	Acres	Hectares	Area Protected (Acres)	Area Protected (Ha)	% Protected
NY	Peconic Bay Marshes	Waterbird	146,218	59,172	3,613	1,462	2.47
CT	Connecticut Coast (east)	Waterbird	422,585	171,014	13,415	5,429	3.17
CT	Connecticut Coast (mid)	Waterbird	106,696	43,178	1,371	555	1.28
CT	Connecticut Coast (west)	Waterbird	62,730	25,386	751	304	1.20
ME	Stratton/Ram/ Blott Islands	Waterbird	13,987	5,660	243	98	1.73
ME	Goose Rocks	Waterbird	4,436	1,795	209	85	4.72
MA	Plymouth/Duxbury Bays	Waterbird	26,120	10,570	313	126	1.20
MA	Barnstable Harbor/Sandy Neck	Waterbird	18,070	7,313	893	361	4.94
MA	Buzzards Bay South	Waterbird	96,927	39,225	52	21	0.05
MA	Yarmouth	Waterbird	18,051	7,305	312	126	1.73
MA	West Nantucket	Waterbird	10,978	4,443	281	114	2.56
MA	Quabbin Reserve	Waterbird	125,519	50,796	26,799	10,845	21.35
NY	Oyster Bay NWR	Waterbird	18,514	7,492	4,679	1,894	25.27
NJ	Sandy Hook	Waterbird	91,613	37,075	2,803	1,134	3.06
MA	Castle Neck	Waterbird	40,636	16,445	2,496	1,010	6.14
RI	Narragansett Bay	Waterbird	145,137	58,735	4,836	1,957	3.33
ME	Wells Beach/Wells/Kennebunk Salt Marshes	Waterbird	9,842	3,983	2,372	960	24.10
MA	Cape Ann Pelagic Winter	Waterbird	151,404	61,271	0	0	0.00
MA	Stelwagon Bank	Waterbird	378,173	153,041	0	0	0.00
ME	Isle of Shoals/Appledore	Waterbird	5,727	2,317	0	0	0.00
ME	Ogunquit	Waterbird	469	190	0	0	0.00
NY	Crane Neck Point	Waterbird	15,156	6,133	0	0	0.00
CT	Connecticut River and Tidal Wetlands Complex	Waterfowl	28,234	11,426	4,188	1,695	14.83
CT	Lower Thames River System	Waterfowl	5,242	2,121	71	29	1.36
CT	New Haven Harbor	Waterfowl	26,566	10,751	1,608	651	6.05
CT	Fishers Island Sound Complex	Waterfowl	25,751	10,421	1,331	538	5.17
CT	Lower Housatonic River - Great Meadows	Waterfowl	7,018	2,840	1,426	577	20.32
CT	Greater Hammonasset Complex	Waterfowl	7,863	3,182	1,112	450	14.15
CT	Norwalk Islands	Waterfowl	9,335	3,778	261	105	2.79
MA	North Shore	Waterfowl	36,935	14,947	8,575	3,470	23.22
MA	Inland Rivers Nashua River	Waterfowl	285,262	115,441	42,296	17,117	14.83
MA	Inland Rivers SuAsCo Rivers	Waterfowl	255,765	103,504	41,283	16,707	16.14
MA	Greater Boston	Waterfowl	45,554	18,435	971	393	2.13
MA	Greater Boston Area	Waterfowl	2,059	833	954	386	46.36
MA	Inland Rivers Blackstone River	Waterfowl	214,679	86,877	13,546	5,482	6.31
MA	Greater Boston Quincy Bay	Waterfowl	4,622	1,871	163	66	3.52

State	Focus Areas	Bird group	Acres	Hectares	Area Protected (Acres)	Area Protected (Ha)	% Protected
MA	North South Rivers	Waterfowl	6,714	2,717	1,318	533	19.63
MA	Duxbury Marshes	Waterfowl	15,568	6,300	1,250	506	8.03
MA	Inner Cape Cod	Waterfowl	29,731	12,032	3,766	1,524	12.67
MA	Outer Cape Cod	Waterfowl	16,801	6,799	2,233	904	13.29
MA	Barnstable Marshes	Waterfowl	20,512	8,301	4,041	1,635	19.70
MA	Buzzards Bay	Waterfowl	89,854	36,363	1,980	801	2.20
MA	Westport Rivers	Waterfowl	15,371	6,221	1,025	415	6.67
NH	Great Bay	Waterfowl	265,991	107,643	23,633	9,564	8.88
NJ	North Coast Complex Hackensack Meadowlands/Hudson *	Waterfowl	50,709	20,521	1,469	594	2.90
NJ	North Coast Complex Raritan Bay/Navesink River	Waterfowl	72,430	29,311	4,632	1,875	6.40
NJ	North Coast Complex Manasquan River	Waterfowl	13,105	5,303	2,141	866	16.34
NJ	North Coast Complex Neptune	Waterfowl	4,891	1,979	187	76	3.82
NJ	South Coast Atlantic	Waterfowl	358,417	145,046	106,070	42,925	29.59
NJ	Pineland BogsBurrs Mill Bogs	Waterfowl	115,419	46,708	44,054	17,828	38.17
NJ	Pineland BogsMullica River	Waterfowl	80,460	32,561	52,799	21,367	65.62
NY	Peconic Bay Marshes	Waterfowl	108,412	43,873	1,012	409	0.93
NY	Long Island South Shore Complex South Fork	Waterfowl	2,274	920	38	15	1.68
NY	Long Island South Shore Complex Great South Bay	Waterfowl	98,996	40,062	25,818	10,448	26.08
NY	Long Island South Shore Complex Shinnecock Bay	Waterfowl	12,051	4,877	3	1	0.03
NY	Long Island South Shore Complex Moriches Bay	Waterfowl	17,666	7,149	4,660	1,886	26.38
NY	Long Island South Shore Complex Hempstead Bay	Waterfowl	37,883	15,331	2,253	912	5.95
NY	Long Island South Shore Complex Jamaica Bay	Waterfowl	26,577	10,755	18,831	7,621	70.85
RI	100 Acre Cove / Warren / Plamer River	Waterfowl	2,615	1,058	289	117	11.04
RI	Arnold Neck	Waterfowl	709	287	4	1	0.50
RI	Boyd Marsh	Waterfowl	318	129	8	3	2.41
RI	Fogland Point	Waterfowl	2,428	982	704	285	29.00
RI	Briggs Marsh	Waterfowl	2,475	1,001	145	58	5.84
RI	Pettaquamscutt Cove	Waterfowl	2,399	971	801	324	33.39
RI	Coastal PondsNinigret/Trustom/Potter Ponds	Waterfowl	9,852	3,987	1,552	628	15.75
RI	Coastal PondsGalilee Bird Sanctuary	Waterfowl	387	157	227	92	58.76
RI	Coastal PondsPoint Judith Ponds	Waterfowl	89	36	1	0	1.10

State	Focus Areas	Bird group	Acres	Hectares	Area Protected (Acres)	Area Protected (Ha)	% Protected
RI	Coastal PondsQuonochontaug Pond	Waterfowl	2,048	829	124	50	6.07
RI	Coastal PondsWinnapaug Pond	Waterfowl	1,668	675	240	97	14.39
ME	Saco River	Waterfowl	235,301	95,223	24,494	9,912	10.41
NJ	Delaware River Freshwater Wetlands	Waterfowl	380,043	153,798	9,683	3,918	2.55
NY	Hudson River Valley BCR 28/30 Section	Waterfowl	47,691	19,300	1,592	644	3.34
DE	Nanticoke	Waterfowl	314,959	127,459	39,149	15,843	12.43
DE	Inland Bays Rehoboth Bay	Waterfowl	46,020	18,623	2,367	958	5.14
DE	Inland Bays Indian River Bay	Waterfowl	55,210	22,343	7,600	3,076	13.77
MD	Blackwater - Nanticoke River	Waterfowl	401,182	162,352	77,927	31,536	19.42
MD	Choptank River	Waterfowl	297,860	120,540	8,435	3,413	2.83
MD	Atlantic Coastal Bays	Waterfowl	153,563	62,145	13,863	5,610	9.03
MD	Tangier Sound & Bay Islands	Waterfowl	247,970	100,350	39,253	15,885	15.83
MD	Patuxent River	Waterfowl	167,460	67,769	18,531	7,499	11.07
MD	Lower Potomac River - Maryland	Waterfowl	729,599	295,258	24,991	10,113	3.43
VA	Rappahannock River	Waterfowl	739,578	299,296	58,005	23,474	7.84
VA	York/Poquoson River	Waterfowl	1,169,974	473,472	64,745	26,201	5.53
VA	Delmarva Peninsula Eastern Shore - Seaside	Waterfowl	369,821	149,661	50,940	20,615	13.77
VA	Delmarva Peninsula Eastern Shore - Bayside	Waterfowl	246,633	99,809	8,602	3,481	3.49
VA	Western Bayshore	Waterfowl	398,210	161,150	902	365	0.23
VA	Delmarva Peninsula Island - Tangier	Waterfowl	1,861	753	27	11	1.47
VA	Delmarva Peninsula Island - Watts	Waterfowl	116	47	71	29	60.87
VA	Southeast Virginia	Waterfowl	343,177	138,879	109,695	44,392	31.96
VA	Lower James River	Waterfowl	1,100,304	445,277	55,559	22,484	5.05
VA	Lower Potomac River - Virginia	Waterfowl	416,554	168,573	38,787	15,697	9.31
MD	Eastern Bay	Waterfowl	141,477	57,254	5,852	2,368	4.14
MD	Susquehanna River	Waterfowl	148,438	60,071	46,736	18,913	31.49
MD	Chester River & Kent County Bayshore	Waterfowl	275,349	111,430	8,055	3,260	2.93
DE	Blackbird	Waterfowl	89,259	36,122	16,030	6,487	17.96
DE	Bayshore	Waterfowl	407,859	165,054	81,730	33,075	20.04
NJ	Delaware Bayshores Marshes	Waterfowl	241,793	97,850	67,736	27,412	28.01
ME	Southwest Coast	Waterfowl	880,536	356,340	20,165	8,161	2.29
NH	Connecticut River - NH	Waterfowl	502,786	203,470	29,284	11,851	5.82

State	Focus Areas	Bird group	Acres	Hectares	Area Protected (Acres)	Area Protected (Ha)	% Protected
VT	Connecticut River - VT	Waterfowl	373,592	151,187	17,293	6,998	4.63
DE	Inland Bays Lewes Rehoboth Canal	Waterfowl	10,769	4,358	4,527	1,832	42.04
RI	Narragansett Bay Islands Dyer Island	Waterfowl	182	73	0	0	0.00
RI	Hamilton Cove	Waterfowl	504	204	0	0	0.00
RI	Narragansett Bay Islands Rose Island	Waterfowl	161	65	0	0	0.00
VA	Delmarva Peninsula Island - South Point	Waterfowl	2,945	1,192	0	0	0.00
VA	Delmarva Peninsula Island - Great Fox	Waterfowl	331	134	0	0	0.00
VA	Delmarva Peninsula Island - Goose	Waterfowl	716	290	0	0	0.00

APPENDIX B. COLLEGE OF WILLIAM AND MARY CENTER FOR CONSERVATION BIOLOGY BCR 30 PARTNERS IN FLIGHT LANDS HABITAT ASSESSMENT (CCB BCR 30 HABITAT ASSESSMENT) SUMMARY

STATE	HABITAT	SUBHABITAT	HECTARES	ACRES
CT	Early successional scrub/pitch pine barren		7263.43	17948.25
	Grassland/agricultural		3032.671	7493.879
	Maritime marshes		1595.52	3942.609
	Mature deciduous forest		48944.33	120943.6
Total area for CT			**60835.95**	**150328.4**
DC	Early Successional	Grassland/agricultural	164.061	405.401
	Early Successional	Shrub/Scrub Dominated	5.033	12.436
	Early Successional	Transitional	11.147	27.542
Total area for DC			**180.241**	**445.379**
DE	Beach		117.774	291.024
	Dune/Coastal Scrub		32.88	81.248
	Early Successional	Grassland/agricultural	5678.735	14032.41
	Early Successional	Shrub/Scrub Dominated	1709.769	4224.926
	Early Successional	Transitional	1270.017	3138.25
	Forested Wetland	Hardwood Dominated	2257.455	5578.278
	Forested Wetland	Pine Dominated	**1840.303**	**4547.462**
	Fresh/Brackish Emergent Wetland		10664.79	26353.15
	Mixed Upland Forest	Hardwood Dominated	2874.585	7103.226
	Mixed Upland Forest	Pine Dominated	1372.292	3390.997
	Pine Plantation		3776.221	9331.205
	Pine Plantation	Pole timber	65.462	161.759
	Pine Savanna/Maritime Forest		982.72	2428.348
	Salt Marsh	High Marsh	10889.84	26909.28
	Salt Marsh	Low Marsh	980.363	2422.52
Total area for DE			**44513.2**	**109994.1**
MA	Early successional scrub/pitch pine barren		6938.271	15271.7
	Early successional scrub/pitch pine barren	Dune/coastal scrub	914.426	1765.079
	Early successional scrub/pitch pine barren	Pitch pine barren	3507.842	8413.959
	Grassland/agricultural		2222.897	4386.754
	Maritime marshes		4141.97	7979.77
	Mature deciduous forest		9736.029	17798.61
Total area for MA			**27461.44**	**55615.87**
MD	Beach		1330.946	3288.823
	Dune/Coastal Scrub		1100.176	2718.581
	Early Successional	Grassland/agricultural	16330.85	40354.2
	Early Successional	Shrub/Scrub Dominated	2280.376	5634.905
	Early Successional	Transitional	3619.697	8944.422
	Forested Wetland	Hardwood dominated	24747.74	61152.74
	Forested Wetland	Pine Dominated	11758.87	29056.7

	Fresh/Brackish Emergent Wetland		16957.84	41903.55
	Mixed Upland Forest	Evenly Mixed	7.616	18.819
	Mixed Upland Forest	Hardwood Dominated	24336.3	60136.07
	Mixed Upland Forest	Pine Dominated	12914.49	31912.27
	Pine Plantation		7316.458	18079.28
	Pine Plantation	Clearcut	10.278	25.398
	Pine Plantation	Mature	51.723	127.811
	Pine Plantation	Pole Timber	15.494	38.286
	Pine Savanna/Maritime Forest		368.848	911.438
	Salt Marsh	High Marsh	32170.69	79495.19
	Salt Marsh	Low Marsh	4068.172	10052.63
Total area for MD			**159386.6**	**393851.1**
ME	Early successional scrub/pitch pine barren		809.62	2000.609
	Early successional scrub/pitch pine barren	Pitch pine barren	4.759	11.759
	Grassland/agricultural		475.22	1174.287
	Maritime marshes		1311.685	3241.241
	Mature deciduous forest		1036.175	2560.418
Total area for ME			**3637.459**	**8988.314**
NH	Early successional scrub/pitch pine barren		420.859	1039.962
	Early successional scrub/pitch pine barren	Pitch pine barren	119.063	294.212
	Grassland/agricultural		379.912	938.78
	Maritime marshes		219.21	541.685
	Mature deciduous forest		297.319	734.688
Total area for NH			**1436.363**	**3549.327**
NJ	Beach		340.386	841.114
	Dune/Coastal Scrub		461.522	1140.441
	Early Successional	Grassland/agricultural	5660.988	13988.52
	Early Successional	Shrub/Scrub Dominated	11927.52	29473.42
	Early successional scrub/pitch pine barren		950.456	2348.635
	Forested Wetland	Hardwood Dominated	22015.26	54400.66
	Forested Wetland	Pine Dominated	15436.02	38143.11
	Fresh/Brackish Emergent Wetland		3983.473	9843.345
	Grassland/agricultural		1089.5	2692.211
	Maritime marshes		92.821	229.366
	Mature deciduous forest		12490.33	30864.17
	Mixed Upland Forest	Hardwood Dominated	21167.82	52306.59
	Mixed Upland Forest	Pine Dominated	9261.852	22886.39
	Pine Plantation		340.324	840.949
	Salt Marsh		49516.88	122358.4
Total area for NJ			**154735.2**	**382357.3**
NY	Early successional scrub/pitch pine barren		1372.286	3390.984
	Early successional scrub/pitch	Pitch pine barren	2743.255	6778.695

	pine barren			
	Grassland/agricultural		352.311	870.571
	Maritime marshes		1255.915	3103.412
Total area for NY			**8499.23**	**21001.98**
RI	Early successional scrub/pitch pine barren		3422.893	8458.105
	Grassland/agricultural		2842.974	7025.14
	Maritime marshes		500.986	1237.952
	Mature deciduous forest		2626.812	6491.38
Total area for RI			**9393.665**	**23212.58**
VA	Beach		3556.363	8787.934
	Dune/Coastal Scrub		1384.066	3420.092
	Early Successional	Grassland/agricultural	10944.55	27044.47
	Early Successional	Shrub/Scrub Dominated	2476.416	6119.325
	Early Successional	Transitional	1351.205	3338.881
	Forested Wetland	Hardwood Dominated	42876.71	105950.2
	Forested Wetland	Pine Dominated	**12055.88**	**29790.63**
	Fresh/Brackish Emergent Wetland		9163.312	22642.95
	Mixed Upland Forest	Evenly Mixed	543.461	1342.916
	Mixed Upland Forest	Hardwood Dominated	58333.61	144144.9
	Mixed Upland Forest	Pine Dominated	28965.48	71574.98
	Pine Plantation		12664.6	31294.81
	Pine Plantation	Clearcut	3.845	9.502
	Pine Plantation	Mature	411.76	1017.462
	Pine Plantation	Pole Timber	24.335	60.135
	Pine Plantation	Sapling/Pole	22.976	56.775
	Pine Savanna/Maritime Forest		2306.646	5699.832
	Salt Marsh		6448.003	15933.29
	Salt Marsh	High Marsh	8820.251	21795.23
	Salt Marsh	Low Marsh	7034.548	17382.67
Total area for VA			**209388**	**517407**
Grand Total for BCR 30			**685191**	**1680**

APPENDIX C. POTENTIAL PROJECTS FOR BIRD CONSERVATION IN BCR 30.

The following projects have been pulled out of the results of the BCR 30 All-bird Workshop held December 2004. It is not an inclusive list.

Potential Projects – Beach, Sand, Mud Flat

<table>
<tr><td colspan="2">Program/Project Name: Enhancement of colonial waterbird and shorebird productivity through selective predator control</td><td>Submitted by:
M. Lowney and S. Williams</td></tr>
<tr><td colspan="3">Implementation Priority: High</td></tr>
<tr><td colspan="3">Rationale: While many unconsolidated beaches, rocky islands, and barrier islands have been protected and human disturbance managed, the nesting target species continue to decline. These declines are due to introduction or colonization of these habitats by predators. Many predators are not native to BCR30 such as the Norway rat, red fox, opossum, and coyote. Over abundant predators include raccoons, laughing gulls, herring gulls, great black-backed gulls, American crows and fish crows. Black-crowned night herons and great horned owls may need to be selectively controlled at a limited number of locations. Some highest and high priority species (state and/or federally listed species or species of special concern) within BCR30 have declined upwards of 80% since 1966. The breeding range of some high priority species has been reduced as a result of avian or mammalian depredation.</td></tr>
<tr><td colspan="2">Objectives:
• Increase fledging rates and population sizes of priority species in BCR30.
• Develop decision model on when to implement avian or mammalian predator management.
• Prevent abandonment of breeding habitats on protected lands.</td><td>Deliverables:
• Annual removal of mammalian and avian predators.
• Monitoring of fledging rates and breeding population sizes to document efficacy of predator management.
• Documentation of predation events to quantify damage.</td></tr>
<tr><td colspan="2">Location: Saltmarsh habitats from ME to VA</td><td>Target Species: Piping plovers, Wilson’s plovers, roseate terns, gull-billed terns, royal terns, sandwich terns, least terns, black skimmers, American oystercatchers, guillemots (?)</td></tr>
<tr><td colspan="2">Timeline:

Activity: Management and monitoring</td><td>Lead Organization: USFWS, USDA-Wildlife Services, state fish and wildlife agencies, TNC</td></tr>
<tr><td colspan="3">Partner Organizations: USFWS, USDA-Wildlife Services, state fish and wildlife agencies, TNC, National Audubon, NASA (VA), ACOE (VA), US Navy (VA), colleges and universities, some birding NGO’s, Delta Waterfowl.</td></tr>
<tr><td colspan="3">Costs: 1 million/year</td></tr>
<tr><td colspan="3">Current Support:</td></tr>
<tr><td colspan="3">Unfunded:</td></tr>
<tr><td colspan="3">Potential Sources: SWG, TNC, ACOE</td></tr>
</table>

<table>
<tr><td colspan="2">Program/Project Name: Human Disturbance Management</td><td>Submitted by:
Boettcher, Adams, Pover, and Haglan</td></tr>
<tr><td colspan="3">Implementation Priority: High</td></tr>
<tr><td colspan="3">Rationale: North and mid-Atlantic beaches and islands support the majority of federally and state listed Atlantic coast breeding populations of piping plovers and roseate terns along with a number of highest and high priority species. These habitats are experiencing rapid increases in development and recreational use. This disturbance can result in the abandonment of breeding and nonbreeding habitats by high priority species. Efforts to reduce human disturbance is has been shown to increase breeding productivity and use of beach and island habitats throughout the annual cycle.</td></tr>
<tr><td colspan="2">Objectives:
• Collaborate with partners to minimize human disturbance on high priority sites.
• Identify and map high priority breeding and nonbreeding sites.
• Develop, implement and enforce policies and regulations designed to reduce/eliminate impacts caused by human disturbance.
• Increase public awareness on the importance and need to protect avian resources through outreach efforts.</td><td>Deliverables:
• Site management plans and regulations to reduce/ eliminate human disturbance impacts.
• Outreach programs and materials to educate users/stakeholders.
• Produce GIS maps and databases of high priority sites for use by and managers and law enforcement.
• Post, protect, and patrol high priority breeding and nonbreeding sites during appropriate seasons.</td></tr>
<tr><td colspan="2">Location: Beaches and islands and their saltmarsh habitats from Maine to Virginia.</td><td>Target Species: Piping plovers, Wilson’s plovers, American oystercatchers, roseate terns, black skimmers, gull-billed terns and other colonial seabirds.</td></tr>
<tr><td colspan="2">Timeline: Ongoing and continuous</td><td rowspan="2">Lead Organization: State wildlife agencies and USFWS.</td></tr>
<tr><td colspan="2">Activity: Policy development, management, education and law enforcement.</td></tr>
<tr><td colspan="3">Partner Organizations: National Park Service, local municipalities, NGOs and other landowners.</td></tr>
<tr><td colspan="3">Costs: 500k/year</td></tr>
<tr><td colspan="3">Current Support: 150k/year</td></tr>
<tr><td colspan="3">Unfunded: 350k/year</td></tr>
<tr><td colspan="3">Potential Sources: SWG, USACOE, USFWS and other federal agencies, state agencies, local municipalities.</td></tr>
</table>

Potential Projects – Estuaries and Bays

<table>
<tr><td colspan="2">Program/Project Name: SAV (Zostera) Restoration in VA's Coastal Bays</td><td>Submitted by:
B.Truitt</td></tr>
<tr><td colspan="3">Implementation Priority: High</td></tr>
<tr><td colspan="3">Rationale: SAV's disappeared from VA's coastal bays during the early 1930's. VIMS has recently perfected a method of SAV restoration through seed harvesting, curing, and planting. Greater than 75 acres have been restored (as of 2002). In 2003 large volumes of seed were harvested by machine and deployed via bags and 25 acres planted in 5-5 acre plots. If this method works, SAV restoration can be ramped up throughout all the coastal bays.</td></tr>
<tr><td colspan="2">Objectives:
• Restore SAV meadows through seed transplants to produce an array of ecosystem services.
• Inventory and monitor recovery.</td><td>Deliverables:
• Report highlighting acres planted and restored and inventory and monitoring of restored meadows.</td></tr>
<tr><td colspan="2">Location: Coastal bays from Wallops Island – south. (Applicable to Chesapeake Bay and other coastal bays in other states)</td><td>Target Species: Priority waterfowl and sea ducks</td></tr>
<tr><td colspan="2">Timeline:
3 years</td><td rowspan="2">Lead Organization: VIMS – Dr. Robert Orth</td></tr>
<tr><td colspan="2">Activity: Restoration</td></tr>
<tr><td colspan="3">Partner Organizations: TNC, VMRC, VA Coastal Resource Management Program,</td></tr>
<tr><td colspan="3">Costs: Approximately 100K/year to start-up.</td></tr>
<tr><td colspan="3">Current Support:</td></tr>
<tr><td colspan="3">Unfunded:</td></tr>
<tr><td colspan="3">Potential Sources: ACOE, NOAA (Coastal Resource Management)</td></tr>
</table>

<table>
<tr><td colspan="2">Program/Project Name: What needs to be done to better prepare for oil spills?</td><td>Submitted by:</td></tr>
<tr><td colspan="3">Implementation Priority:</td></tr>
<tr><td colspan="3">Rationale:</td></tr>
<tr><td colspan="2">Objectives: Improve NRDA process for ephemeral data collection (acute events)
• teaching practitioners
• manual
• workshops (3 east coast regional)
• other communications</td><td>Deliverables:
•</td></tr>
<tr><td colspan="2">Location: Planning 2007; workshops 2008</td><td>Target Species:</td></tr>
<tr><td colspan="2">Timeline:</td><td rowspan="2">Lead Organization:</td></tr>
<tr><td colspan="2">Activity:</td></tr>
<tr><td colspan="3">Partner Organizations:</td></tr>
<tr><td colspan="3">Costs: $75,000</td></tr>
<tr><td colspan="3">Current Support:</td></tr>
<tr><td colspan="3">Unfunded:</td></tr>
<tr><td colspan="3">Potential Sources: USFWS; DOI</td></tr>
</table>

Program/Project Name: What needs to be done to better prepare for oil spills?	**Submitted by:**
Implementation Priority:	
Rationale:	
Improve Beach Monitoring (chronic) • technical workshop on design, data interpretation • state coordinators • BSC, west coast (CA, WA)	**Deliverables:** •
Location: Fall 2007 at Patuxent?	**Target Species:**
Timeline:	**Lead Organization:**
Activity:	
Partner Organizations:	
Costs: $20,000	
Current Support:	
Unfunded:	
Potential Sources: USFWS-Region 5; National Parks; NE Bird Monitoring Project	

Program/Project Name: What needs to be done to better prepare for oil spills?	**Submitted by:**
Implementation Priority:	
Rationale:	
Identify Restoration Opportunities • Catalog of appropriate restoration projects/sites • By states, species	**Deliverables:** •
Location:	**Target Species:**
Timeline:	**Lead Organization:**
Activity:	
Partner Organizations:	
Costs: $ may be pro bono	
Current Support:	
Unfunded:	
Potential Sources:	

Program/Project Name: What needs to be done to better prepare for oil spills?	**Submitted by:**
Implementation Priority:	
Rationale:	
Obtain distribution, abundance, productivity data • Baseline information needed to maximize NRDA and other settlements	**Deliverables:** •
Location:	**Target Species:**

Timeline:	**Lead Organization:**
Activity:	
Partner Organizations:	
Costs:	
Current Support:	
Unfunded:	
Potential Sources:	

BCR 30 Conservation Project	**Submitted by:** Doug Forsell Steering Committee
Program/Project Name: Assessment of Bird Use of Shallow Water Marine Shoal Areas in BCR30	
Location: U.S. Atlantic waters to 20 meter depth contour	**Lead Organization:** USFWS and USGS
Partner Organizations: USFWS, USGS, NOAA. coastal states, Mass Audubon, Manomet Bird Observatory	
Timeline: 2006 - 2008 **Activity:**	**Target Species:** Seaducks loons, and seabirds
Objectives: Most of the data on offshore distribution and abundance of waterbirds is from the late 1970's and early 80's. This project will determine where seasonal or geographic gaps in bird distribution data exists (expected to be over 50 % of the area) and will conduct aerial or shipboard surveys of coastal shallow water areas, which are usually not surveyed by large ships. Data will be compiled into an easy to use GIS based data management system to facilitate production of map and tabular products.	**Benefits/Issues:** Without data on the distribution and abundance of birds, we are unable to influence activities in coastal waters such as: identifying areas where high bycatch of birds might occur, assessing impacts of nearshore development projects, conducting damage assessments from spills, and planning for and responding to spills. Currently, coastal shoals to 12 miles offshore are being proposed for mining of sand for beach replacement projects and the placement of wind turbines for energy production. With the limited data available, biologists can not determine what the value of shoal areas are to migratory birds nor are we able to suggest alternative areas for development where impacts to birds might be mitigated. Many of the species in these waters are thought to have declining populations including, scoters, long-tailed ducks, and loons.
Costs: 50 k Statistical analysis and evaluation of existing data and GIS system. 50 k To acquire selected data sets could be acquisition or put into data into a digital format 150 k per year for surveys of data gaps in BCR30 for at least three years. Surveys would center on wintering use of shoals, but some data will be collected in other seasons.	
Current Support: $18 k USGS, USFWS in fy05	
Unfunded: 200k per year or lower amounts over a longer period.	
Potential Sources: MMS, FWS, NMFS, NOAA	

Implementation Priority:
Medium - Data needed now, but existing data should be compiled before full project is implemented.

Program/Project Name: What needs to be done to better assess aquaculture impacts?	**Submitted by:**
Implementation Priority:	
Rationale:	
• Conduct immediate analysis of current threats to shorebirds from ongoing aquaculture projects	**Deliverables:** •
Location:	**Target Species:**
Timeline:	**Lead Organization:**
Activity:	
Partner Organizations:	
Costs: $20,000	
Current Support:	
Unfunded:	
Potential Sources: USFWS, DOI	

Program/Project Name: What needs to be done to better assess aquaculture impacts?	**Submitted by:**
Implementation Priority:	
Rationale:	
• Ensure appropriate staff person from each state is involved with aquaculture regulatory process	**Deliverables:** •
Location:	**Target Species:**
Timeline:	**Lead Organization:**
Activity:	
Partner Organizations:	
Costs:	
Current Support:	
Unfunded:	
Potential Sources: SWG	

Program/Project Name: What needs to be done to better assess aquaculture impacts?	**Submitted by:**
Implementation Priority:	
Rationale:	
• Develop Best management Practices for aquaculture to minimize impacts to migratory birds	**Deliverables:** •
Location:	**Target Species:**
Timeline:	**Lead Organization:**

Activity:	
Partner Organizations:	
Costs: $100,000	
Current Support:	
Unfunded:	
Potential Sources: Industry?	

Potential Projects – Estuarine Emergent Marsh

Program/Project Name: Identification and Protection of Saltmarshes for High priority Species	**Submitted by:** L.Gore
Implementation Priority: High	
Rationale: Systematically identify the range of threatened and vulnerable coastal marshes on the Atlantic Coast to promote the protection of high priority species.	
Objectives: • Identify marsh and buffer habitats. • Assess the threats, vulnerability and protection status of marsh and buffers. • Assess those marshes that support high priority species. • Determine and apply best protection strategies (e.g., acquisition, easements, zoning, planning and outreach)	**Deliverables:** • Prioritized list of marshes and buffers that support high priority species. • Prioritized list of protection strategies. • Outreach/education products.
Location: Saltmarshes extending from RI – VA.	**Target Species:** American black duck, Atlantic brant**,** saltmarsh sharp-tailed sparrow**,** seaside sparrow, black rail, clapper rail, short-billed dowitcher,
Timeline: **Activity:** Management and outreach	**Lead Organization:** Multi-state working groups.
Partner Organizations: IBA programs, TNC	
Costs: Unk.	
Current Support:	
Unfunded:	

Program/Project Name: Coastal Marsh Restoration	**Submitted by:** T. Villanueva
Implementation Priority:	
Rationale: Tremendous acreage of coastal marsh vegetation and associated substrate are lost to variety of causes such as erosion, excessive herbivory by over abundant species (i.e., resident Canada geese, snow geese, and invasive nutria), land subsidence, sudden marsh die-off, and sea level rise. The loss of saltmarsh can have negative impacts on numerous species of waterfowl, waterbirds, shorebirds, and landbirds. Moreover, impacted marshes can lead to the erosion of adjacent marsh areas.	

Objectives: • Identify areas of significant saltmarsh loss. • Restore coastal marsh vegetation and associated substrate to provide habitat for high priority marsh birds, landbirds, waterfowl, shorebirds, and waterbirds throughout the annual cycle. Methods used will include placement of compatible dredge material to elevate substrate and replace lost shoreline.	**Deliverables:** • GIS mapping, project design and acres of marsh restored that will provide breeding and nonbreeding habitat for high priority marsh birds, landbirds, waterfowl, shorebirds, and waterbirds.
Location: Impacted saltmarshes throughout BCR30.	**Target Species:** American black duck, saltmarsh sharp-tailed sparrow**,** seaside sparrow, black rail, clapper rail, migratory Canada goose, ruddy turnstone, dunlin, marsh wren, coastal swamp sparrow and other saltmarsh species.
Timeline: Ongoing and continuous with periodic maintenance.	**Lead Organization:** USFWS, US ACOE
Activity: Restoration	
Partner Organizations: Ducks Unlimited, state fish and wildlife agencies.	
Costs: Millions	
Current Support: Shipping channel dredging projects or projects involving the removal (mining?) of excess deposited materials from other areas.	
Unfunded:	
Potential Sources: NAWCA, SWG, ACOE, state coastal engineering agencies.	

Program/Project Name: Saltmarsh Restoration	
Implementation Priority: High	
Rationale: Restore hydrological conditions of saltmarshes that support highest and high breeding and nonbreeding priority species. Specifically: 1. Restore high marsh habitats lost to impoundments, tidal restrictions, invasive species, and filling for the benefit of black rails and other high priority saltmarsh species. 2. Restore semi permanent and permanent open water habitat and tidal flats lost to ditching and tidal restriction for the benefit of shorebirds, waterbirds, and waterfowl.	
Objectives: • Restore semi-permanent and permanent open water habitats and flats within altered marshes for the benefit of black ducks and shorebirds. • Restore tidal flow to high quality high marsh habitat. • Invasive species management.	**Deliverables:** • Increase breeding habitats for high priority species. • Increase habitat for breeding, migrating, and wintering waterfowl and waterbirds (acres).
Location: Saltmarshes extending from RI – VA.	**Target Species:** American black duck, saltmarsh sharp-tailed sparrow**,** seaside sparrow, black rail, clapper rail, short-billed dowitcher, and other saltmarsh species.
Timeline:	**Lead Organization:** Multi-state

Activity: Restoration	working groups.
Partner Organizations: State fish and wildlife agencies, USFWS, Ducks Unlimited	
Costs: Unk.	
Current Support:	
Unfunded:	
Potential Sources:	

Potential Projects – Freshwater Emergent Marsh

Program/Project Name: Protection of Largest Wetland Habitat Tracts	**Submitted by:**
Implementation Priority: Highest	
Rationale: If left unprotected, these sites could disappear or become degraded, resulting in destruction and/or reduction of available quality habitat.	
Objectives: • Reduce loss of wetland habitats • Maintain quality of staging, breeding and wintering areas for priority species.	**Deliverables:** • Protected habitat
Location: BCR 30 The emphasis should be on the western shores of the Delaware Bay and the lower Chesapeake Bay.	**Target Species:** American black duck, Greater Yellowlegs, Yellow Rail, AP Canada Geese, American Woodcock, Snowy Egret, Little Blue Heron, Solitary Sandpiper, N Atlantic Canada Goose, Prothonotary Warbler, Mallard, American Bittern, Marsh Wren
Timeline: Next 3 years	**Lead Organization:** States/Feds
Activity: Land Easements/Acquisition	
Partner Organizations: State fish and wildlife agencies, USFWS, Foundations, NGOs, Corporations	
Costs: Unk.	
Current Support: NAWCA, NGOs, State Agencies, USFWS, USDA NRCS, Foundations, Corporations	
Unfunded:	
Potential Sources: NAWCA, Coastal Grants, NGOs, State Agencies, USFWS, USDA, Foundations, Corporations	

Program/Project Name: Restore Degraded and Prior-converted Wetlands	**Submitted by:**
Implementation Priority: High	
Rationale: Large and small areas have been ditched, filled and/or impacted by adjacent land uses to the detriment of the wetland habitat and the animals using it. This also affects downstream water quality.	
Objectives: • Seek to impact broad landscapes and/or watersheds in key focus areas, targeting private lands. • Encourage support (funding) and implementation of state, federal and private land programs (e.g. Partners for Wildlife, Farmbill (WRP), etc.)	**Deliverables:** • Restored prior-converted/degraded wetlands • Technical assistance on private lands • Outreach
Location: Delaware Bay EA where 3 species groups focus areas overlap (landbird, waterbird, waterfowl)	**Target Species:** Priority waterbird species.
Timeline: Now	
Activity: • Wetland enhancement	

Activity: • Wetland enhancement	
Partner Organizations: State agencies, NRCS, USFWS, NGOs	
Costs: Estimate $100/acre	
Current Support: State agencies, Feds, NGOs, NRCS	
Unfunded:	
Potential Sources: State agencies, NRCS, USFWS, NGOs	
Current Support: State agencies, Feds, NGOs, NRCS	
Unfunded:	
Potential Sources: State agencies, NRCS, USFWS, NGOs	

Potential Projects (Taken from the Northwestern Atlantic Birds at Sea Conservation Cooperative website: www.acjv.org

Program/Project Name: Analyze seabird bycatch in Northeast and Mid-Atlantic fisheries	**Submitted by:** Northwestern Atlantic Birds at Sea Conservation Cooperative
Implementation Priority:	
Rationale:	
Objectives: • To estimate seabird bycatch	**Deliverables:** • Analyze existing observer data

Location:	**Target Species:**
Timeline: Ongoing - 2008	**Lead Organization:** Debi Palka and Melissa Warden (NMFS)
Activity: Data Analysis	
Partner Organizations:	
Costs:	
Current Support:	
Unfunded:	
Potential Sources:	

Program/Project Name: Analyze seabird bycatch in Northeast and Mid-Atlantic fisheries	**Submitted by:** Northwestern Atlantic Birds at Sea Conservation Cooperative
Implementation Priority:	
Rationale:	
Objectives: • To identify factors impacting bycatch and identify potential mitigation measures and potential benefit of implementation of such measures	**Deliverables:** • Conduct spatial and temporal analysis
Location:	**Target Species:**
Timeline: Ongoing - 2008	**Lead Organization:** Debi Palka and Melissa Warden (NMFS)
Activity: Data Analysis	
Partner Organizations:	
Costs:	
Current Support:	
Unfunded:	
Potential Sources:	

Program/Project Name: Analyze information on the age and gender of birds caught	**Submitted by:** Northwestern Atlantic Birds at Sea Conservation Cooperative
Implementation Priority:	
Rationale:	
Objectives: • To analyze information on the age, gender, diet, and other characteristics of individual birds and species	**Deliverables:** • Establish protocols for identifying, aging, and sexing seabirds caught in fisheries • Collect and analyze samples
Location:	**Target Species:**
Timeline: TBD	**Lead Organization:** Gina Shield (NMFS)
Activity: Data Analysis	

Partner Organizations: TBD, seabird biologist, SEANET
Costs:
Current Support:
Unfunded:
Potential Sources:

Program/Project Name: Certify observers for seabird identification	**Submitted by:** Northwestern Atlantic Birds at Sea Conservation Cooperative
Implementation Priority:	
Rationale:	
Objectives: • To improve the ability for seabird records to stand up to legal scrutiny	**Deliverables:** • Coordinate with existing observer training programs to develop a seabird training curriculum for observers (to include identification of seabird carcasses and live birds at-sea)
Location:	**Target Species:**
Timeline: Pilot - 2007	**Lead Organization:** David Lee
Activity: Improving Information Collected By Observers	
Partner Organizations: NMFS (Gina Shield), FWS, Manomet (?), Doug Forsell	
Costs: Travel ($3K) and Materials	
Current Support:	
Unfunded:	
Potential Sources:	

Program/Project Name: Carcass collection	**Submitted by:** Northwestern Atlantic Birds at Sea Conservation Cooperative
Implementation Priority:	
Rationale:	
Objectives: • To assist in species identification and the collection of age and gender information of species caught in fisheries	**Deliverables:** • Establish a mechanism for collecting seabird carcasses collected in the fisheries • Apply for scientific collection permits • Collect and sample carcasses
Location:	**Target Species:**
Timeline:	**Lead Organization:** Joan Browder (NMFS), David Lee, David Stedman

Activity: Improving Information Collected By Observers	(FL Museum)
Partner Organizations: Gina Shield (NMFS)	
Costs:	
Current Support:	
Unfunded:	
Potential Sources:	

Program/Project Name:	**Submitted by:** Northwestern Atlantic Birds at Sea Conservation Cooperative
Implementation Priority:	
Rationale:	
Objectives: •	**Deliverables:** •
Location:	**Target Species:**
Timeline: 2007-2008	**Lead Organization:**
Activity: Improving Information Collected By Observers	
Partner Organizations:	
Costs: TBD	
Current Support:	
Unfunded:	
Potential Sources:	

Program/Project Name: Request that observers record seabird occurrences	**Submitted by:** Northwestern Atlantic Birds at Sea Conservation Cooperative
Implementation Priority:	
Rationale:	
Objectives: • To train observers to voluntarily report seabird occurrences to stimulate their interests and to provide locations for birds at sea	**Deliverables:** • Develop a sightings form • Coordinate with existing observer training programs to record and identify seabirds sighted at-sea • Develop a process to analyze the data • Develop a database to store information
Location:	**Target Species:**
Timeline: Pilot - 2007	**Lead Organization:** Joan Browder (NMFS)

Activity: Improving Information Collected By Observers	
Partner Organizations: NMFS observer programs and FWS, Doug Forsell	
Costs: $50,000	
Current Support:	
Unfunded:	
Potential Sources:	

Program/Project Name: Create a bibliography, literature review of seabird bycatch information	**Submitted by:** Northwestern Atlantic Birds at Sea Conservation Cooperative
Implementation Priority:	
Rationale:	
Objectives: • To provide a list of references for others working on seabird bycatch and to provide to managers and potential funding sources	**Deliverables:** • Build on existing work on a bibliography • Provide web access to information and photos, etc. • Consider publication
Location:	**Target Species:**
Timeline: 2007 and ongoing	**Lead Organization:** Joan Browder (NMFS)
Activity: Collecting Key Information	
Partner Organizations: Doug Forsell (FWS), Mary Lou Soczek	
Costs: N/A	
Current Support:	
Unfunded:	
Potential Sources:	

Program/Project Name: Population Assessments for North Atlantic seabirds	**Submitted by:** Northwestern Atlantic Birds at Sea Conservation Cooperative
Implementation Priority:	
Rationale:	
Objectives: • To better understand fisheries impacts on seabirds in the North Atlantic	**Deliverables:** • Add sea ducks and other fisheries not presently included

Location:	**Target Species:**
Timeline: 2007	**Lead Organization:** David Lee
Activity: Collecting Key Information	
Partner Organizations: UNID sea duck person (Doug Forsell?), Chris Dwyer	
Costs: $5,000	
Current Support:	
Unfunded:	
Potential Sources:	

Program/Project Name: Priority Species List	**Submitted by:** Northwestern Atlantic Birds at Sea Conservation Cooperative
Implementation Priority:	
Rationale:	
Objectives: • To identify priority species for use in NMFS National Bycatch Report	**Deliverables:** • Review existing lists of priority bird and add information on conservation status and population trends
Location:	**Target Species:**
Timeline: Spring 2007	**Lead Organization:** Kim Rivera (NMFS)
Activity: Collecting Key Information	
Partner Organizations: David Lee, Chris Haney, Doug Forsell, Dick Viet, Kathy Parsons	
Costs: $5,000	
Current Support:	
Unfunded:	
Potential Sources:	

Program/Project Name: Finalize FWS Waterbird Bycatch Policy's Implementation Plan	**Submitted by:** Northwestern Atlantic Birds at Sea Conservation Cooperative
Implementation Priority:	
Rationale:	
Objectives: • To provide FWS with a policy guidelines regarding the reduction of seabird bycatch	**Deliverables:** • Finalize draft Waterbird Bycatch Policy
Location:	**Target Species:**

Timeline: 2007	**Lead Organization:** Mila Plavsic (FWS)
Activity: Collecting Key Information	
Partner Organizations: FWS Waterbird Bycatch Working Group	
Costs: $5,000	
Current Support:	
Unfunded:	
Potential Sources:	

Program/Project Name: Interact with Councils, fish commissions, Atlantic Coastal Cooperative Statistics Program, state fisheries agencies	**Submitted by:** Northwestern Atlantic Birds at Sea Conservation Cooperative
Implementation Priority:	
Rationale:	
Objectives: • To increase awareness of fisheries managers on reports of seabird bycatch and to increase collaborations in mitigation	**Deliverables:** • Establish key contacts • Attend meetings – possibly hire a ½ FTE at FWS • Request input and review into seabird documents • Provide comments and input into fisheries documents
Location:	**Target Species:**
Timeline: 2007	**Lead Organization:** Atlantic Coast Cooperative
Activity: Coordination Between Fishery and Bird Managers	
Partner Organizations: NMFS, Mila Plavsic (?) FWS	
Costs: $10,000 (+$50,000)	
Current Support:	
Unfunded:	
Potential Sources:	

Program/Project Name: Include information on seabirds in NMFS Stock Assessment and Fishery Evaluation (SAFE) Reports/Council documents	**Submitted by:** Northwestern Atlantic Birds at Sea Conservation Cooperative
Implementation Priority:	
Rationale:	

Objectives: • To provide NMFS and the Councils with a record of the presence of seabirds within regional fisheries areas	**Deliverables:** • Seabird Chapter in the South Atlantic Ecosystem FMP
Location:	**Target Species:**
Timeline: Spring 2007	**Lead Organization:** Joan Browder and someone from NE (NMFS
Activity: Coordination Between Fishery and Bird Managers	
Partner Organizations: John Stanton and Wilson Laney (FWS)	
Costs: N/A	
Current Support:	
Unfunded:	
Potential Sources:	

Program/Project Name: NMFS/FWS MOU	**Submitted by:** Northwestern Atlantic Birds at Sea Conservation Cooperative
Implementation Priority:	
Rationale:	
Objectives: • To implement Executive Order 13186: Federal Responsibilities to Protect Migratory Birds	**Deliverables:** • NMFS to finalize draft MOU and work with FWS on implementation
Location:	**Target Species:**
Timeline: 2007	**Lead Organization:** Kim Rivera and Nicole Le Boeuf (NMFS)
Activity: Coordination Between Fishery and Bird Managers	
Partner Organizations: Mila Plavsic (FWS)	
Costs: N/A	
Current Support:	
Unfunded:	
Potential Sources:	

Program/Project Name: Engage the Waterbird Conservation Council in its "Year of the Seabird"	**Submitted by:** Northwestern Atlantic Birds at Sea Conservation Cooperative
Implementation Priority:	
Rationale:	

Objectives: • To provide Council with information regarding seabird bycatch along the Atlantic coast for the Council's distribution and elevation to managers	**Deliverables:** • Communicate with the WCC regarding Atlantic workshop results
Location:	**Target Species:**
Timeline: 2007	**Lead Organization:** Nicole Le Boeuf (NMFS), Jennifer Arnold
Activity: Coordination Between Fishery and Bird Managers	
Partner Organizations: Kathy Parsons, Jennifer Wheeler (FWS)	
Costs: N/A	
Current Support:	
Unfunded:	
Potential Sources:	

Program/Project Name: Draft a threat assessment for Atlantic coast seabirds	**Submitted by:** Northwestern Atlantic Birds at Sea Conservation Cooperative
Implementation Priority:	
Rationale:	
Objectives: • To develop a fishery bycatch assessment of where the group believes seabirds' greatest needs are in the context of other threats and with an eye to cumulative effects	**Deliverables:** • Consider other factors, such as contaminants and sea level rise
Location:	**Target Species:**
Timeline: TBD	**Lead Organization:** David Lee
Activity: Coordination Between Fishery and Bird Managers	
Partner Organizations: Atlantic Coast Cooperative	
Costs: N/A	
Current Support:	
Unfunded:	
Potential Sources:	

Program/Project Name: Education, Outreach, and Cooperation with Stakeholders	**Submitted by:** Northwestern Atlantic Birds at Sea Conservation Cooperative
Implementation Priority:	

Rationale:	
Objectives: • To increase the awareness of seabird bycatch among fishers	**Deliverables:** •
Location:	**Target Species:**
Timeline: TBD	**Lead Organization:** TBD
Activity: Coordination Between Fishery and Bird Managers	
Partner Organizations: NMFS, FWS, Sea Grant, local institutions	
Costs: TBD	
Current Support:	
Unfunded:	
Potential Sources:	

Program/Project Name: Reduce derelict fishing gear and seabird entanglements	**Submitted by:** Northwestern Atlantic Birds at Sea Conservation Cooperative
Implementation Priority:	
Rationale:	
Objectives: • To provide information and incentives to fishers to help collect/redeem derelict gear and to prevent further seabird bycatch	**Deliverables:** • Initiate collection of derelict fishing gear • Develop outreach programs to reduce derelict fishing gear
Location:	**Target Species:**
Timeline: TBD	**Lead Organization:** TBD
Activity: Coordination Between Fishery and Bird Managers	
Partner Organizations: NMFS, State fisheries agencies, NOS, Sea Grant	
Costs: TBD	
Current Support:	
Unfunded:	
Potential Sources:	

Program/Project Name: Develop fishing gear and practices guidelines	**Submitted by:** Northwestern Atlantic Birds at Sea Conservation Cooperative
Implementation Priority:	

Rationale:	
Objectives: • To reduce seabird bycatch in focused seasons, areas, gear types	**Deliverables:** • Reconvene or Establish ongoing Working Group of the Cooperative • Consider findings from analyses and the bibliography
Location:	**Target Species:**
Timeline: TBD	**Lead Organization:** TBD
Activity: Coordination Between Fishery and Bird Managers	
Partner Organizations: NMFS, state fisheries managers	
Costs: Low	
Current Support:	
Unfunded:	
Potential Sources:	

Program/Project Name: Engage in the WWF Smart Gear Competition	**Submitted by:** Northwestern Atlantic Birds at Sea Conservation Cooperative
Implementation Priority:	
Rationale:	
Objectives: • To provide information to fishers regarding this competition and to promote the development of seabird bycatch mitigation measures	**Deliverables:** • Raise awareness among fishers regarding the competition
Location:	**Target Species:**
Timeline: TBD	**Lead Organization:** TBD
Activity: Coordination Between Fishery and Bird Managers	
Partner Organizations: World Wildlife Fund, state fisheries agencies, Councils, NMFS	
Costs: TBD	
Current Support:	
Unfunded:	
Potential Sources:	

Potential Projects – Forested Upland Communities

Program/Project Name: Using Landowner Incentive Programs to Improve Forest Management on Public and Private Lands For Priority Bird Species	**Submitted by:**
Implementation Priority: High	

<table>
<tr><td colspan="2">Rationale: Many forest-dependent bird species are declining from lack of forest management.</td></tr>
<tr><td>Objectives:
Promote uneven-aged management (i.e., stands with high vertical structural diversity)
Promote thinning to open canopies and promote understory development
Outreach to public and agencies that relates forest ecology and management to wildlife habitat quality (i.e., forest management is not bad for birds…). For example, regional workshop(s) to promote forest management for bird conservation.
Engage USDA Forest Service and NRCS staff as partners in outreach and conservation
Direct SWG and LIP funding to forest management on public and private lands, especially in coordinated, spatially explicit way (e.g., within focus areas or high quality landscapes)</td><td>Deliverables:
Increase in heterogeneity of forest structure on public and private lands.
Produce regional guidelines for forest management & priority birds, showing benefits of forest management to all-bird conservation (e.g., game and non-game species)</td></tr>
<tr><td>Location: BCR 30</td><td>Target Species: Priority upland forest bird species</td></tr>
<tr><td>Timeline: Now</td><td rowspan="2">Lead Organization: FWS, USDA-NRCS</td></tr>
<tr><td>Activity:
Management
Education/Outreach</td></tr>
<tr><td colspan="2">Partner Organizations: Audubon, TNC, private landowners, Land Trust</td></tr>
<tr><td colspan="2">Costs: To be determined</td></tr>
<tr><td colspan="2">Current Support:</td></tr>
<tr><td colspan="2">Unfunded:</td></tr>
<tr><td colspan="2">Potential Sources: SWG, LIP</td></tr>
</table>

<table>
<tr><td colspan="2">Program/Project Name: Reducing deer over-abundance to sustain priority bird populations.</td><td>Submitted by:</td></tr>
<tr><td colspan="3">Implementation Priority: High</td></tr>
<tr><td colspan="3">Rationale: Many forest-dependent bird species are declining as a result of deer overabundance and the impacts deer are having on forested ecosystems.</td></tr>
<tr><td colspan="2">Objectives:
• Develop outreach to public via agencies and NGOs that links deer over-abundance with decreased ecosystem integrity.
• Promote community-based deer management, this may include urban hunts and targeted hunts in high quality habitats.
• Work with hunting interests to promote local and statewide management of deer populations at lower levels to allow for more natural forest structure.
• Include deer management (e.g., lower populations) issues & projects in CWCS process (e.g., hunter access projects).</td><td>Deliverables:
• Educational materials that will help improve understanding by the public of the problems caused by deer overabundance.
• A report describing lower deer populations to bird/ecosystem conservation.</td></tr>
<tr><td colspan="2">Location:
BCR 30</td><td>Target Species: Priority upland forest bird species</td></tr>
<tr><td colspan="2">Timeline: Now</td><td rowspan="2">Lead Organization: FWS, State Wildlife Agencies</td></tr>
<tr><td colspan="2">Activity:
• Education/Outreach
• Management</td></tr>
<tr><td colspan="3">Partner Organizations: NWF, Audubon, ABC</td></tr>
<tr><td colspan="3">Costs: To be determined</td></tr>
<tr><td colspan="3">Current Support:</td></tr>
<tr><td colspan="3">Unfunded:</td></tr>
<tr><td colspan="3">Potential Sources: SWG, Duck Stamp?</td></tr>
</table>

APPENDIX D. SPECIES OF GREATEST CONSERVATION NEED (SGCN) IDENTIFIED IN STATE WILDLIFE ACTION PLANS FOR STATES WITHIN BCR 30.

Common Name	BCR 30	ME	NH	MA	RI	CT	NY	NJ	PA	DE	MD	DC	VA
American Avocet	Moderate												
American Bittern*	Moderate	2	X	E/X	E/X	E/X	SC/X	E/X	E/HC	2	I/X	X	II
American Black Duck	Highest	2	X	X	X	X	X	X	MC	1	X	X	II
American Golden-plover	High						X	X		2			
American Oystercatcher	Highest	1		X	X	SC/X	X	SC/X		E/1	X		II
American Wigeon	Moderate												
American Woodcock	Highest	2	X	X	X	X	X	X	MC	1	X	X	IV
Atlantic Brant	Highest						X	X		2	X		III
Audubon's Shearwater	High							X		1			
Bachman's Sparrow	Moderate										X		T/ I
Bald Eagle	Moderate	T/2	E/X	E/X	X	E/X	T/X	E/X	T/HC	E/1	T/X	X	T/ II
Baltimore Oriole	High	2			X	X		X		2			
Bay-breasted Warbler	High	2	X			X	X						
Bicknell's Thrush**	High	1	X				SC/X			1	X		IV
Black Rail	Highest					E/X	E/X	T/X		E/1	I/X		I
Black Scoter	High					X	X	X		2			

Common Name	BCR 30	ME	NH	MA	RI	CT	NY	NJ	PA	DE	MD	DC	VA
Black Skimmer	Moderate				X	X	SC/X	E/X		E/1	E/X		II
Black-and-White Warbler	High	2			X	X		X		2	X		IV
Black-bellied Plover	High				X		X			2	X		IV
Blackburnian Warbler	Moderate	2			X	X		X	MC		T/X		
Black-crowned Night-heron	Moderate	T2		X	X	X	X	T/X	E/PV	E/1	X	X	III
Blue-winged Warbler	Highest	1		X	X	X	X	X	RS	1	I/X		
Bridled Tern	High							X		2			
Broad-winged Hawk	High			X	X	X		SC/X	MC	1	X	X	
Brown Thrasher	High	2		X	X	SC/X	X	SC/X	MC	2	X	X	IV
Brown-headed Nuthatch	Moderate									2	X		IV
Buff-breasted Sandpiper	High						X			2			
Bufflehead	High							X		2			
Canada Goose Atl Pop	Highest												
Canada Goose North Atl Pop	High												
Canada Warbler*	Moderate	2	X	X	X	X	X	SC/X	MC	2	X		IV
Canvasback	High					X		X		2	X		
Cerulean Warbler*	Moderate		X		X	X	SC/X	SC/X	HC-RS	E/1	X	X	II
Chimney Swift	High	2			X	X		X	MC	2		X	IV

Common Name	BCR 30	ME	NH	MA	RI	CT	NY	NJ	PA	DE	MD	DC	VA
Clapper Rail	High				X	X		X					IV
Coastal Plain Swamp Sparrow	Moderate										I/X		?
Common Eider	High	2		X			X	X		1			
Common Goldeneye	Moderate												
Common Snipe	Moderate												
Common Tern*	Moderate	2	E/X	SC/X	X	SC/X	T/X	SC/X	E/PV	E/1	X		III
Cory's Shearwater	Moderate						X						
Dunlin	High				X		X			2	X		IV
Eastern Kingbird	High	2			X	X		X		2			IV
Eastern/Rufous-sided Towhee	High	2	X	X	X	X		X		2	X	X	IV
Field Sparrow	High	2		X	X	X		X		2	X	X	IV
Forster's Tern	High						X	X		E/1	X		IV
Gadwall	Moderate				X								
Glossy Ibis	High	2			X	SC/X	X	SC/X		2	X		III
Golden-winged Warbler*	Moderate		X	E/X		E/X	SC/X	SC/X	HC-RS	2	X		I
Grasshopper Sparrow	Moderate	E/2	T/X	T/X	X	E/X	X	T/X	MC	2	X	X	IV
Gray Catbird	Moderate				X	X		X					IV
Great Crested Flycatcher	High	2			X	X		X		2			
Greater Scaup	High	2				X	X	X		2			IV
Greater Shearwater	High	2					X	X		2			

Common Name	BCR 30	ME	NH	MA	RI	CT	NY	NJ	PA	DE	MD	DC	VA
Greater Yellowlegs	High	2			X		X	X		2	X		
Green-winged Teal	Moderate				X				PV				
Gull-billed Tern	Highest						X	SC/X		2	E/X		T/ I
Harlequin Duck **	Moderate	T/2		X	X		X	X			X		
Henslow's Sparrow*	High			E/X			T/X	E/X	HC-RS	E/1	T/X		T/ I
Hooded Merganser	Moderate					X				2			
Horned Grebe	High					X	X	X		2	X		IV
Hudsonian Godwit	High						X	X		2			IV
Ipswich Savannah Sparrow	Moderate					SC/X							
Kentucky Warbler	High						X	SC/X	MC	2	X	X	IV
Killdeer	Moderate												
King Rail	Moderate			T/X	X	E/X	T/X	SC/X	E/PV	2	X		II
Least Bittern	Moderate	E/2	X	E/X	X	T/X	T/X	SC/X	E/PV	2	I/X	X	III
Least Sandpiper	Moderate				X								
Least Tern*	High	E/1	E/X	SC/X	X	T/X	T/X	E/X		E/1	T/X		II
Lesser Scaup	High					X	X	X		2			
Lesser Yellowlegs	Moderate				X								
Little Blue Heron	Moderate	2			X	SC/X	X	SC/X		2	X		II

Common Name	BCR 30	ME	NH	MA	RI	CT	NY	NJ	PA	DE	MD	DC	VA
Loggerhead Shrike**	Moderate	2					E/X	E/X	E/IC	E/1	E/X		T/I
Long-tailed Duck/Old Squaw	High			X		X	X	X		2			
Louisiana Waterthrush*	High	2		X	X	X	X	X	RS	2	X	X	IV
Mallard	High									2			
Manx Shearwater	Moderate							X					
Marbled Godwit	High						X	X		2			IV
Marsh Wren	High	2			X	X		X	HC	2	X	X	IV
Nelson's Sharp-tailed Sparrow	Moderate	2	X					X					III
Northern Bobwhite	High			X	X	X	X	X	IC	2	X	X	IV
Northern Flicker	High	2			X	X		X		2			
Northern Gannet	High							X			X		
Northern Pintail	Moderate						X	X					
Piping Plover	Highest	E/1	E/X	T/X	X	T/X	E/X	X	IC	E/1	E/X		T/I
Prairie Warbler	Highest	2		X	X	X	X	X	MC	1	X		IV
Prothonotary Warbler	High				X		X	X	HC	2	X	X	IV
Purple Sandpiper	High	2	X		X		X	X		2	X		IV
Razorbill	Moderate	E/2					X	X					
Red Knot*	Highest	2		X	X		X	T/X		1	X		IV

Common Name	BCR 30	ME	NH	MA	RI	CT	NY	NJ	PA	DE	MD	DC	VA
Red Phalarope	Moderate												
Red-breasted Merganser	Moderate												
Red-cockaded Woodpecker	Moderate										X		E/ I
Red-headed Woodpecker	Moderate					E/X	SC/X	T/X	MC	E/1	X		
Red-necked Phalarope	Moderate	2					X			2			
Red-throated Loon	Highest					X	X	X		2	X		
Roseate Tern	Highest	E/1	E/X	E/X	X	E/X	E/X	E/X		1	X		E/ IV
Royal Tern	Moderate							X			E/X		II
Ruddy Duck	Moderate	2					X		MC		X		
Ruddy Turnstone	Highest	2		X	X	X	X	X		1	X		
Rusty Blackbird	High	2	X				X						IV
Saltmarsh Sharp-tailed Sparrow*	Highest	1	X	X	X	SC/X	X	X		1	X		II
Sanderling	Highest	2		X	X	X	X	SC/ X		1	X		
Scarlet Tanager	High	2			X	X	X	X	RS	2	X	X	IV
Seaside Sparrow	Moderate		X	X	X	SC/X	SC/X	X		1	X		IV
Sedge Wren*	Moderate	E/1	E/X	E/X		E/X	T/X	E/X	E/IC	E/1	E/X		III
Semipalmated Plover	Moderate				X								

Common Name	BCR 30	ME	NH	MA	RI	CT	NY	NJ	PA	DE	MD	DC	VA
Semipalmated Sandpiper	High	2	X		X	X	X	X		2	X		
Short-billed Dowitcher	High			X	X		X			2	X		IV
Short-eared Owl*	Moderate	T/1		E/X	X	T/X	E/X	E/X	E/IC	E/1	E/X		
Snowy Egret	Moderate	2		X	X	T/X	X	SC/X		2	X		
Solitary Sandpiper	High				X				MC	2	X		
Sora	Moderate			X	X	X		SC/X	MC	2		X	
Spotted Sandpiper	Moderate				X	X		SC/X		1			
Surf Scoter	High					X	X	X		2			
Swainson's Warbler	Moderate							X		E/1	E/X		II
Tricolored Heron	Moderate	2					X	SC/X		2	X		III
Tundra Swan	High								MC-RS*	2			
Upland Sandpiper*	Moderate	T/1	E/X	E/X	E/X	E/X	T/X	E/X	T/IC	E/1	E/X		T/I
Whimbrel	Highest	2		X	X		X	SC/X		1	X		IV
Whip-poor-will*	High	2	X	X	X	SC/X	SC/X	X	MC	2	X		IV
White-rumped Sandpiper	High				X					2			
White-winged Scoter	High					X	X	X		2			
Willet	High	2	X		X	X	X	X		2	X		
Willow Flycatcher	High	2		X	X	X	X	X	MC	2	X		IV

Common Name	BCR 30	ME	NH	MA	RI	CT	NY	NJ	PA	DE	MD	DC	VA
Wilson's Phalarope	High							X		2			
Wilson's Plover	High									2	E/X		E/I
Wood Duck	Moderate							X				X	
Wood Thrush	Highest	2	X	X	X	X	X	X	RS	1	X	X	IV
Worm Eating Warbler	High				X	X	X	SC/X	RS	2	X	X	IV
Yellow-crowned Night-heron	Moderate				X	SC/X	X	T/X	E/PV	E/1	X		II
Yellow-throated Vireo	High	2			X	X		X	MC	2	X	X	IV

APPENDIX E. POTENTIAL FUNDING SOURCES IN BCR 30

Grant	Granting Entity	Description	Funding	Match (grantee/ grantor)	Applicant Eligibility	Web Site
Conservation Reserve Enhancement Program (CREP)	DCR/Farm Service Agency	The CREP aims to improve water quality and wildlife habitat by offering rental payments to farmers who voluntarily restore riparian buffers, filter strips and wetlands through the installation of approved conservation practices. Another CREP goal is to establish 8,000 acres of perpetual conservation or open space easement statewide. State cost-share payments are administered through local Soil and Water Conservation District (SWCD) offices. May include permanent easements.	not specified	3:1 from State; 1:1 from FSA (of expenses for implementing best management practices (BMP), such as fencing or alternative watering systems).	private landowners	http://www.dcr.virginia.gov/sw/crep.htm
Conservation Reserve Program (CRP)	Farm Service Agency	Voluntary program for agricultural producers to help them safeguard environmentally sensitive land. Producers enrolled in CRP plant long-term, resource-conserving covers to improve the quality of water, control soil erosion, and enhance wildlife habitat.	Farmers receive an annual rental payment for the term of the multi-year contract. Cost sharing is provided to establish the vegetative cover practices.	10-15 year rental programs with 1:1 cost-share in establishing approved conservation practices.	private landowners	http://www.nrcs.usda.gov/programs/crp/
Acres for America	National Fish and Wildlife Foundation	Acres for America is a partnership between Wal-Mart Stores, Inc. and NFWF to provide funding for projects that conserve important habitat for fish, wildlife, and plants through acquisition of interest in real property. The goal of the Acres for America program is to offset the footprint of Wal-Mart's domestic facilities on at least an acre by acre basis through these acquisitions. Preference will be given to acquisitions that are part of published conservation plans (North American Waterfowl Management Plan, Partners in Flight, etc.), draft State Conservation Strategies, or ESA Recovery Plans.	Approximately $3.1 million will be available annually for 10 years for conservation investments.	All grant awards require a minimum 1:1 match of cash or contributed goods and services. Federal funds may be considered as match. Higher ratios of matching funds will at times aid in making applications more competitive.	not specified	http://www.nfwf.org/programs/walmart/rfp.cfm
Chesapeake Bay Small Watershed Grants Program	National Fish and Wildlife Foundation	Operates through the Chesapeake Bay Program to provide grants to organizations working on a local level to protect and improve watersheds in the Chesapeake	up to $50,000 annually	n/a	not specified	http://www.nfwf.org/programs/chesapeake/index.cfm

APPENDIX E. POTENTIAL FUNDING SOURCES IN BCR 30

Grant	Granting Entity	Description	Funding	Match (grantee/ grantor)	Applicant Eligibility	Web Site
		Bay basin, while building citizen-based resource stewardship. The purpose of the grants program is to address the water quality and living resource needs of the Chesapeake Bay ecosystem. The Small Watershed Grants Program has been designed to encourage the development and sharing of innovative ideas among the many organizations wishing to be involved in watershed protection activities.				
Community Legacy Grants	National Fish and Wildlife Foundation	The grants program will continue the Community Legacy Grants initiative begun in 2002. This initiative is intended to encourage the establishment of partnerships that will create a conservation legacy in communities throughout the Chesapeake Bay watershed. As envisioned under the Chesapeake 2000 Agreement, this legacy includes abundant, diverse populations of fish, wildlife and plants, fed by healthy streams and rivers, sustaining strong local and regional economies, and our unique quality of life. Through the Community Legacy Grants initiative, a maximum of five grants of up to $100,000 will be awarded to truly innovative projects that either restore vital fish and wildlife habitats, develop locally-supported watershed management plans, or promote environmentally-sensitive development.	max of 5 grants of up to $100,000	not specified	not specified	http://www.nfwf.org/programs/chesapeake/
General Matching Grants Program	National Fish and Wildlife Foundation	Matching grants are awarded to projects that: address priority actions promoting fish and wildlife conservation and the habitats on which they depend; work proactively to involve other conservation and community interests; leverage available funding; and evaluate project outcomes. Does not include basic research.	Grants typically range from $25,000-$250,000, based upon need.	minimum 2:1	federal, tribal, state, and local governments, educational institutions, and non-profit conservation organizations	http://www.nfwf.org/guidelines.cfm
Migratory Bird Conservancy	National Fish and	The Migratory Bird Conservancy (MBC) is the only habitat conservation fund created	Approximately $100,000 is	minimum 1:1 with cash or tangible in-kind	not specified, but past grantees have	http://www.conservebirds.org/

APPENDIX E. POTENTIAL FUNDING SOURCES IN BCR 30

Grant	Granting Entity	Description	Funding	Match (grantee/ grantor)	Applicant Eligibility	Web Site
	Wildlife Foundation	and supported by birding businesses and their customers, and contributes to the goals and objectives of Partners in Flight. NFWF makes awards primarily of federal funds in support of bird habitat conservation projects that directly address conservation of priority bird habitats in the Western Hemisphere. Acquisition, restoration, and improved management of habitats are program priorities. Education, research, and monitoring will be considered only as components of actual habitat conservation projects.	available each grant cycle. The average award to date has been about $40,000, with a range of $20,000 to $70,000. Competition is stiff. In 2003, about 10% of preproposals that were submitted were ultimately funded.	contributions	included USFWS and state natural resource agencies	
State Comprehensive Wildlife Conservation Support Program	National Fish and Wildlife Foundation and Doris Duke Charitable Foundation	Funding for projects that involve collaboration and strategic coordination for the development and implementation of regional (multi-state) and national conservation approaches based on State Comprehensive Wildlife Conservation Strategies (SCWCs). The State Comprehensive Wildlife Conservation Support Program is a three-year grant program that was developed to support: 1) Enhancement of the SCWCSs, through strategic regional and national coordination and implementation; 2) A national communication strategy via the development of a comprehensive National Report of SCWCSs; and 3) collaborative implementation of conservation actions as identified by the state strategies and national report, via coordinated and collaborative multi-state data management and synchronization, action plan development, execution of conservation activities, and monitoring of outcomes. Projects must involve the coordination of conservation objectives/actions among at least two states, and should address priorities identified by at least two SCWCSs.	Not to exceed $100,000. Projects may not to exceed 18 months in duration, with preference given to projects that do not exceed 12 months (note – project time span is initiated at execution of grant agreement).	not required, but recipients encouraged to voluntarily provide and identify in-kind matching support	Any state fish and wildlife agency (in partnership with at least one other state fish and wildlife agency), IAFWA, SAFWA, NAFWA, etc.	http://www.nfwf.org/programs/SCWCSP.cfm
Natural	National	support high quality projects that engage	grants range from	2:1 (includes cash and	state and local	http://www.nfwf.org/progra

APPENDIX E. POTENTIAL FUNDING SOURCES IN BCR 30

Grant	Granting Entity	Description	Funding	Match (grantee/ grantor)	Applicant Eligibility	Web Site
Resources Conservation Service: Conservation on Private Lands	Fish and Wildlife Foundation and NRCS	private landowners, primarily farmers and ranchers, in the conservation and enhancement of fish and wildlife and natural resources on their lands. A new focus added for this year's program is on grassland nesting birds, particularly sage grouse, and their associated habitats.	$10,000-$150,000	in-kind)	governments, education institutions, and nonprofit organizations	ms/nrcsnacd.cfm
Five-Star Restoration Grants	National Fish and Wildlife Foundation and others	The Five-Star Restoration Program provides modest financial assistance on a competitive basis to support community-based wetland, riparian, and coastal habitat restoration projects that build diverse partnerships and foster local natural resource stewardship through education, outreach and training activities. Projects must include a strong on-the-ground wetland, riparian, or coastal habitat restoration component and should also include training, education, outreach, monitoring, and community stewardship components. Projects involving only research, monitoring, or planning are not eligible for funding.	Awards are between $5,000 and $20,000; the average grant is $10,000	yes, but ratio not specified	Must involve diverse partnerships of ideally 5 organizations that contribute funding, land, technical assistance, workforce support, and/or other in-kind services. Partners may include: schools or youth organizations; local or tribal governments; universities and local cooperative extension districts; local businesses or corporations; conservation organizations or local citizens groups; state and federal resource management agencies; and foundations or other funders. State and federal partnerships are encouraged, but they are not eligible to serve as the grantee.	http://www.nfwf.org/programs/5star-rfp.cfm
Species Recovery Fund Grants	National Wildlife Federation		between $3,000 and $7,000	not specified	presumably non-profits	http://www.nwf.org/wildlife/grants/

APPENDIX E. POTENTIAL FUNDING SOURCES IN BCR 30

Grant	Granting Entity	Description	Funding	Match (grantee/ grantor)	Applicant Eligibility	Web Site
		Each spring, the National Wildlife Federation awards grants to local organizations using innovative, community-based means to directly improve on-the-ground conditions for imperiled species.				
National Park Service Challenge Cost Share	NPS	Increase participation by qualified partners in the preservation and improvement of National Park Service natural, cultural, and recreational resources; in all authorized Service programs and	$30,000 max award	1:1 (including non-federal in-kind match)	State and local agencies, non-profit organizations, communities, educational	http://www.nps.gov/ncrc/programs/ccsp/index.htm

APPENDIX E. POTENTIAL FUNDING SOURCES IN BCR 30

Grant	Granting Entity	Description	Funding	Match (grantee/ grantor)	Applicant Eligibility	Web Site
		activities; and on national trails. NPS and partners should work together on projects with mutually beneficial, shared outcomes.			institutions, corporations, and individuals.	
Environmental Quality Incentives Program (EQIP)	NRCS	Voluntary conservation program for farmers and ranchers that promotes agricultural production and environmental quality as compatible national goals. EQIP offers financial and technical help to assist eligible participants install or implement structural and management practices on eligible agricultural land. Includes promotion of *at-risk species* habitat conservation.	not specified	1-10 yr incentive payment and cost-share (75-90%) contracts	private landowners	http://www.nrcs.usda.gov/programs/eqip/
Farm and Ranch Lands Protection Program	NRCS	Voluntary program that helps farmers and ranchers keep their land in agriculture. State, Tribal, and local governments and non-governmental organizations with farm/ranch protection programs acquire *conservation easements* from landowners. Participating landowners agree not to convert their land to non-agricultural uses and to develop and implement a conservation plan for any highly erodible land.	not specified	1:1	private landowners, through State, Tribal, or local government or nongovernmental organizations	http://www.nrcs.usda.gov/programs/frpp/
Grassland Reserve Program	NRCS	voluntary program offering landowners the opportunity to protect, restore, and enhance grasslands, rangeland, pastureland, and shrubland on their property while maintaining the areas as grazing lands. The program emphasizes support for working grazing operations; enhancement of plant and animal biodiversity; and protection of grassland and land containing shrubs and forbs under threat of conversion to cropping, urban development, and other activities that threaten grassland resources.	$254 million in program funding for fiscal years 2002 through 2007, with 2-million-acre statutory enrollment cap.	variable cost-sharing for restoration, or 10-30 yr rental contract, or 30-yr or permanent easement	private landowners (with at least 40 contiguous acres)	http://www.nrcs.usda.gov/programs/GRP/
Healthy Forests Reserve Program	NRCS	Voluntary program to restore and enhance forest ecosystems to: 1) promote the recovery of threatened and endangered species, 2) improve biodiversity; and 3)	not specified	10-yr cost-share (1:1), 30-yr easement, 99-yr easement	private landowners	http://www.nrcs.usda.gov/programs/HFRP/ProgInfo/HFRPProgramInfo.html

APPENDIX E. POTENTIAL FUNDING SOURCES IN BCR 30

Grant	Granting Entity	Description	Funding	Match (grantee/ grantor)	Applicant Eligibility	Web Site
		enhance carbon sequestration.				
Wetlands Reserve Program (WRP) and Wetland Reserve Enhancement Program (WREP)	NRCS	WRP - Voluntary program offering landowners the opportunity to protect, restore, and enhance wetlands on their property. Enrolled lands are mostly high-risk agricultural lands located in flood prone areas and restored to wetlands. The type of wetlands being restored varies from floodplain forest, to prairie potholes, to coastal marshes. WREP - allows NRCS to form partnerships to improve or expand the delivery of WRP, including, but not limited to, *easement acquisition* and activities associated with wetland restoration, creation, or enhancement. WREP projects should address wetland creation and enhancement efforts on easements enrolled in prior years; partners should contribute significantly to WRP technical assistance costs; and provide assistance with managing easement projects.	WRP - funding for total of 2,275,000 acres (250,000 acres annually); WREP - $9.5 mil available in FY06	10-yr cost-share (1:1), 30-yr easement, permanent easement; WREP - partner contribution to tech assistance costs	private landowners	http://www.nrcs.usda.gov/programs/wrp/; http://www.nrcs.usda.gov/programs/wrp/pdfs/WREP_AnnounOfProgFund_FY06_1_26_06.pdf
Wildlife Habitat Incentives Program (WHIP)	NRCS	Voluntary program for people who want to develop and improve *wildlife habitat* primarily on private land. Includes upland, wetland, riparian, and aquatic habitat areas.	not specified	5-10 yr cost-share (1:3) agreements, greater cost-share for 15+ yr agreements	private landowners, Federal land when the primary benefit is on private or Tribal land; State and local government land on a limited basis; and Tribal land	http://www.nrcs.usda.gov/programs/whip/
Wildlife Grants Program	Sierra Club Foundation	The mission of The Sierra Club Foundation is to advance the preservation and protection of the natural environment by empowering the citizenry, especially democratically based grassroots organizations, with charitable resources to further the cause of environmental protection. Funds for the Wildlife Grants Program are supported by the following two funds at The Foundation: Avery Wildlife Fund - Grants for local projects to	In the 2004 grant cycle, awards ranged from $500 to $5,000.	n/a	presumably non-profits	http://www.sierraclub.org/foundation/programs/wildlife_grants.asp

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Grant	Granting Entity	Description	Funding	Match (grantee/ grantor)	Applicant Eligibility	Web Site
		preserve, protect, and educate about wildlife; and Schroeder Wildlife Fund: Grants to support wildlife efforts that represent "grassroots" endeavors. Special consideration given to projects that focus on birds.				
Forest Legacy Program (FLP)	USFS	Federal program in partnership with state forestry agencies designed to encourage the protection of privately owned forest lands through property acquisition and conservation easements. Funding based on Assessment of Need (AON) developed by the States. The AON is an implementation plan that demonstrates that the FLP will conserve important forest areas, evaluates characteristics, uses, and threats, describes specific forest legacy areas where the FLP will be focused, and lays outlines program goals and eligibility criteria that guide the selection of forest tracts for conservation.	In FY 2007, $2.1mil for New River Corridor Project	1:3 (grantee match may come from private, state or local sources)	state agencies, local governments, land trusts, local organizations, and interested landowners	http://www.dof.virginia.gov/mgt/index-flp.shtml; http://www.fs.fed.us/spf/coop/programs/loa/flp.shtml
Forestland Enhancement Program (FLEP)	USFS	Federal program in partnership with state forestry agencies for implementation of state-approved forestry practices, including forest stewardship plan implementation, hardwood mgmt, invasive species control, wildlife habitat mgmt (pine mgmt no included)	$135k in 2005	1:3	private, non-industrial landowners	http://www.dof.virginia.gov/mgt/cip-fact-flep.shtml; http://www.fs.fed.us/spf/coop/programs/loa/flep.shtml
Endangered Species Grants - Habitat Conservation Planning (HCP) Assistance Grants	USFWS	Provides financial assistance to States and Territories to support the development of HCPs that provide for the conservation of imperiled species while allowing economic activities to proceed. Can include animal, plant, and habitat surveys; research; planning; monitoring; habitat protection, restoration, management, and acquisition; and public education. National competition.	collectively, Endangered Species Grants FY 06 est $80 mil; range $1,000 to $14,362,500	75% for single State or Territory; 90% for 2 or more States or Territories implementing a joint project	restricted to those State fish and wildlife agencies with which the USFWS has a current cooperative agreement for the species involved.	http://www.fws.gov/endangered/grants/; http://www.fws.gov/grants/state.html
Endangered Species Grants - Habitat Conservation	USFWS	Provides financial assistance to States and Territories to acquire land associated with approved Habitat Conservation Plans (HCPs) to secure protection of	collectively, Endangered Species Grants FY 06 est $80 mil;	75% for single State or Territory; 90% for 2 or more States or Territories implementing	restricted to those State fish and wildlife agencies with which the USFWS has a	http://www.fws.gov/endangered/grants/; http://www.fws.gov/grants/state.html

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Grant	Granting Entity	Description	Funding	Match (grantee/ grantor)	Applicant Eligibility	Web Site
Planning (HCP) Land Acquisition		endangered and threatened species habitats and expand conservation benefits of HCPs. Can include animal, plant, and habitat surveys; research; planning; monitoring; habitat protection, restoration, management, and acquisition; and public education. National competition.	range $1,000 to $14,362,500	a joint project	current cooperative agreement for the species involved.	
Endangered Species Grants - Implementation of Conservation Project Grants	USFWS	Provides financial assistance to States and Territories to assist in the development of programs for the conservation of endangered and threatened species. Can include animal, plant, and habitat surveys; research; planning; monitoring; habitat protection, restoration, management, and acquisition; and public education. Formula.	collectively, Endangered Species Grants FY 06 est $80 mil; range $1,000 to $14,362,500	75% for single State or Territory; 90% for 2 or more States or Territories implementing a joint project	restricted to those State fish and wildlife agencies with which the USFWS has a current cooperative agreement for the species involved.	http://www.fws.gov/endangered/grants/; http://www.fws.gov/grants/state.html
Endangered Species Grants - Recovery Land Acquisition	USFWS	Provides financial assistance to States and Territories to acquire habitat for endangered and threatened species. Acquisition of habitat to secure long term protection is often an essential element of a comprehensive recovery effort for a listed species. Can include animal, plant, and habitat surveys; research; planning; monitoring; habitat protection, restoration, management, and acquisition; and public education. Regional competition.	collectively, Endangered Species Grants FY 06 est $80 mil; range $1,000 to $14,362,500	75% for single State or Territory; 90% for 2 or more States or Territories implementing a joint project	restricted to those State fish and wildlife agencies with which the USFWS has a current cooperative agreement for the species involved.	http://www.fws.gov/endangered/grants/; http://www.fws.gov/grants/state.html
Landowner Incentive Program (LIP)	USFWS	LIP (nontribal portion) is designed to assist States by providing grants to establish or supplement landowner incentive programs that protect, restore or manage habitats on private lands, to benefit Federally listed, proposed or candidate species or other species determined to be at-risk, and provide technical and financial assistance to private landowners for habitat protection and restoration.	FY 06 est $34,920,000 - average for Tier 2 grants is $1,170,000 ($165,000 to $1,750,000); average for Tier 1 grants is $180,000. No State may receive more than 5% of the total amount available to the States.	1:3	For the nontribal portion, only State agencies with primary responsibility for fish and wildlife may submit proposals. Other agencies, organizations or individuals may partner with or serve as a subgrantee of that fish and wildlife agency.	http://federalasst.fws.gov/lip/lip.html
Multistate	USFWS	To support sport fish and wildlife	FY 06 est	no match required	States, groups of	http://www.fws.gov/grants/

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Grant	Granting Entity	Description	Funding	Match (grantee/ grantor)	Applicant Eligibility	Web Site
Conservation Grants		restoration projects identified by the International Association of Fish and Wildlife Agencies (IAFWA). Sport Fish and Wildlife Restoration funds may be used for sport fisheries and wildlife research projects, boating access development, hunter safety, aquatic education, habitat improvements, and other projects consistent with the purposes of the enabling legislation. Projects must benefit at least 26 States, or a majority of the States in a region of the USFWS, or a regional association of State fish and game departments. Beginning in 2005, IAFWA identifies National Conservation Needs (NCN) annually and solicits grant proposals that address all, or a portion of, a NCN.	$6,000,000 - average $140,000 ($25,000 to $500,000)		States, USFWS (for National Survey of Fishing, Hunting, and Wildlife- Associated Recreation only), non-governmental organizations.	conserve.html; http://www.iafwa.org/multi state_grants.htm
National Wildlife Refuge System's Challenge Cost Share	USFWS	Encourage partnerships between USFWS and nonfederal entities through projects which conserve, protect, and enhance fish, wildlife, and plants. Funds may be used for approved Challenge Cost Share projects. Encourages the use of Challenge Cost Share agreements to complete projects on and off Service lands.	FY 05 est $12,000,000 - average $7,800 ($300 to $25,000).	1:1 (including non-federal in-kind match)	individiduals, public and quasi-public institutions/organizations, specialized group, small business, profit organization, native American, Federal, Interstate, Intrastate, State, Local, Sponsored organization, U.S. territory, or any organization with interests which support the mission of the Service.	http://www.federalgrantswire.com/challenge_cost_share.html
Neotropical Migratory Bird Conservation Fund	USFWS	Since FY02, funds projects in the US, Latin America, and the Caribbean that promote the conservation of neotropical migrant birds. The Act's purposes are to: perpetuate healthy populations of neotropical migratory birds, assist in the conservation of these birds by supporting conservation initiatives, and provide	The Act authorizes $5 million, and Congress appropriated $4 million in Fiscal Year 2005. At a minimum, 75 percent of this	3:1 (re-authorization in 2006 may reduce match burden on grantee - targeting 1:1 match)	Any U.S., Latin American, or Caribbean individual, corporation, government agency, trust, association, or other private entity can apply for funding.	http://www.fws.gov/birdhabitat/nmbca/eng_neo.htm

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Grant	Granting Entity	Description	Funding	Match (grantee/ grantor)	Applicant Eligibility	Web Site
		financial resources and foster international cooperation for those initiatives. Projects run the gamut from research, monitoring, land acquisition, law enforcement, education and outreach.	money will be available for projects in Latin America and The Caribbean.			
Partners for Fish and Wildlife	USFWS	Provides technical and financial assistance to private landowners who want to restore or improve habitat on their property through cooperative agreements - does not fund planning and research.	FY 05 est $25.5 mil - avg = $5400 ($200 to $25,000)	1:1 (including cash/in-kind match)	private landowners, tribes, local governments	http://www.fws.gov/partners/; http://www.fws.gov/partners/pdfs/VA-needs.pdf; http://www.federalgrantswire.com/partners_for_fish_and_wildlife.html
Private Stewardship Grants	USFWS	Provides grants and other assistance on a competitive basis to individuals and groups engaged in local, private, and voluntary conservation efforts that benefit federally listed, proposed, or candidate species, or other at-risk species. Eligible projects include those by landowners and their partners who need technical and financial assistance to improve habitat or implement other activities on private lands. The PSGP supports on-the-ground conservation actions as opposed to, for example, education and outreach, planning, or research activities, and we will not fund the acquisition of real property either through fee title or easements.	FY 06 est $6,500,000	10% match of cash or through in-kind contributions is required.	Private landowners and their partners (ex. land conservancies, community organizations, or conservation organizations working with private landowners on conservation efforts are also encouraged to submit project proposals provided they identify specific private landowners who have confirmed their intent to participate on the project or provide other evidence in the project proposal to demonstrate landowner participation will occur).	http://www.fws.gov/endangered/grants/private_stewardship/index.html
State Wildlife Grants (SWG)	USFWS	The SWG program is designed to assist States by providing federal funds for the development and implementation of programs that benefit wildlife and their habitat, including species that are not	The bill directs the apportionment of funds on a formula basis based on land area (1/3) and	For planning-related grant activities, the States must provide a minimum 25 percent match and a 50 percent	state fish and wildlife agencies	http://federalasst.fws.gov/swg/swg.html

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Grant	Granting Entity	Description	Funding	Match (grantee/ grantor)	Applicant Eligibility	Web Site
		hunted or fished. Both planning and implementation of programs are permitted.	population (2/3). No State may receive more than 5 percent or less than 1 percent of the available funds.	minimum match for all other types of eligible activities.		
The North American Wetlands Conservation Act (NAWCA) Small Grants	USFWS	All wetland conservation proposals that meet the requirements of the Act will be accepted. However, funding priority will be given to projects from new grant applicants (individuals or organizations who have never received a NAWCA grant) with new partners, where the project ensures long-term conservation benefits. This does not preclude former NAWCA grant recipients from receiving Small Grants funding.	FY 06 est $2,000,000 - to be considered for funding in 2006, proposals must have a grant request no greater than $50,000.	1:1	Available to private or public organizations or to individuals who have developed partnerships to carry out wetlands conservation projects in the U.S., Canada, and Mexico.	http://www.fws.gov/birdhabitat/nawca/USsmallgrants.html; http://www.fws.gov/grants/conserve.html
The North American Wetlands Conservation Act (NAWCA) Standard Grants	USFWS	Provides funds for wetlands conservation projects in North America. Funds may be used to acquire real property interest in lands or waters, including water rights. Funds may also be used to restore, manage, and/or enhance wetland ecosystems and other habitat for migratory birds and other fish and wildlife. Lands and waters must have as their primary purpose long-term conservation for the benefit of migratory birds and other wildlife dependent thereon.	FY 06 est $75,899,000 - average $710,000 ($50,000 to $1,000,000)	1:1	Available to private or public organizations or to individuals who have developed partnerships to carry out wetlands conservation projects in the U.S., Canada, and Mexico.	http://www.fws.gov/birdhabitat/NAWCA/grants.htm; http://www.fws.gov/grants/conserve.html
Urban Treaty for Migratory Bird Conservation	USFWS	To support a partnership agreement between the Service and a U.S.city to help conserve birds. The focus areas are Habitat Creation, Protection, and Restoration; Education and Outreach; Hazard(s) Reduction; and Non-native, Invasive, or Nuisance Animal and Plant Species Management. Each city will work with the Service to develop a customized action plan that specifies goals and objectives in the four focus areas.	currently unavailable; grants from $10,000 to $150,000	1:1	municipalities; The Treaty cities are selected based on the intent of their proposal and for their commitment to provide habitat for wildlife, particularly migratory birds. Other criteria are a city's location along a major migratory flyway, and its proximity to	http://www.fws.gov/birds/urbantreaty.html; http://www.fws.gov/grants/local.html

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Grant	Granting Entity	Description	Funding	Match (grantee/ grantor)	Applicant Eligibility	Web Site
					Service personnel who are able to provide technical assistance and guidance in achieving the Treaty activities.	
USFWS Coastal Program for Chesapeake Bay	USFWS	The Coastal Program partners with coastal communities to improve the health of their specific watersheds benefiting fish, wildlife and the community. The Service provides funding through the program to 22 high-priority coastal locations, including the Chesapeake Bay. Three of the Bay program's most significant efforts involve the restoration of bay grasses, stream assessment and restoration, and invasive species control; projects on either public or private lands. The project is developed, often with help state fish and game agency or other conservation organizations, through a cooperative agreement with the Service.	For FY06, approximately $13 million nationwide	1:1 (including in-kind contributions) for program as a whole - does not have to be achieved on project-by-project basis	Federal and state agencies, local and tribal governments, conservation organizations, watershed councils, land trusts, academia, businesses, private landowners	http://www.fws.gov/coastal/CoastalProgram/
Wildlife Without Borders - Latin America And The Caribbean	USFWS	To address the management of fish, plant, and wildlife resources in the Western Hemisphere. Of particular interest are projects that strengthen the capacity of Latin American and Caribbean countries to conserve and use sustainably their biological resources, contribute to the integration of environmental concerns with sustained development processes, and result in specific and measurable on-the-ground management actions in agreement with the Western Hemisphere Convention, 1940. Project work should be conducted in Latin America and must address one or more of the following: academic and technical training in the conservation and management of biological resources; training in management of nature reserves and other protected areas; applied research and monitoring in support of	FY 05 est $472,000 - FY 03 average = $27,000 ($5,000 to 50,000)	Applicants and/or other project partners must contribute funds to the project, which may include cash or in-kind contributions.	Federal, State and local governments, nonprofit, non-governmental organizations; and public and private institutions of higher education	http://www.federalgrantswire.com/wildlife_without_borders__latin_america_and_the_caribbean.html; http://www.fws.gov/international/DICprograms/lac.htm

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Grant	Granting Entity	Description	Funding	Match (grantee/ grantor)	Applicant Eligibility	Web Site
		natural resource management activities; community-level conservation education; technology transfer and information exchange; and the promotion of networks, partnerships and coalitions that assist in the implementation of conventions, treaties, protocols and other international activities for the conservation and management of biological resources. If project work is to be conducted in the US the proposal should show a clear international component to be eligible for funding.				
2006 Wilderness Stewardship Challenge	National Forest Foundation	In celebration of the 40th anniversary of The Wilderness Act, the USDA Forest Service issued a Wilderness Stewardship Challenge, calling for all Wilderness Areas in the National Forest System to be managed to standard within the next decade. The NFF, as the official nonprofit partner of the Forest Service, will increase the resources available to meet this challenge by providing grants to implement projects that implement on-the-ground ecosystem restoration-related work in Forest Service Wilderness Areas.	up to $50,000	minimum 1:1	Non-governmental, nonprofit organizations only. Applications cannot be accepted from federal agencies, regional, state or local governmental entities.	http://www.natlforests.org/wilderness_stewardship_criteria.html
Matching Awards Program (MAP)	National Forest Foundation	A common thread connecting NFF's four program areas – community-based forestry, watershed health & restoration, wildlife habitat improvement, and recreation – is an interest in action-oriented projects that enhance the viability of natural resources while considering benefits to, and the involvement of, surrounding communities. During the 2006 MAP, the NFF will concentrate its efforts in five geographic focus areas: Southern Appalachians (TN, NC, SC, GA), Oregon Coast and Central Cascades, the Selway-Bitterroot (MT, ID), Central Colorado Rockies, and Central Sierra (CA). For the 2006 MAP, approximately	Over $2.6 million in matching funds is available in 2006, with past awards ranging from $500 to over $100,000 (most awards in the $20,000-$40,000 range)	minimum 1:1 non-federal cash match. In-kind contributions may be noted to show leverage for a project, but cannot be matched by NFF funds. Projects must be completed within a year from project award date.	The NFF will accept applications from non-governmental, nonprofit 501(c)(3) organizations working on or adjacent to National Forests and Grasslands.	http://www.natlforests.org/consp_04_map.html

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Grant	Granting Entity	Description	Funding	Match (grantee/ grantor)	Applicant Eligibility	Web Site
		80 percent of available funds will be allocated to projects within the five current geographic priority areas, and the remaining 20 percent is available for projects outside these areas.				
Conservation Security Program (CSP)	NRCS	Voluntary conservation program that supports ongoing stewardship of private agricultural lands by providing payments for maintaining and enhancing natural resources. CSP identifies and rewards those farmers and ranchers who are already meeting the highest standards of conservation and environmental management on their operations. *Wildlife habitat* needs are addressed through the enhancement provisions of the program.	For FY-2005, congress has provided $202 million; over the next seven years the administration is committing $13.4 billion in funding	5-10 year contracts, maximum $20,000-45,000 annually	private landowners in annually specified watersheds; for 2006, Great Wicomico-Piankatank watershed in eastern Virginia, and the North Fork Shenandoah watershed in north-western Virginia	http://www.nrcs.usda.gov/programs/csp/
National Wildlife Refuge Friends Group Grant Program	National Fish and Wildlife Foundation	Include Start-up Grants to provide formative and/or initial operational support, Capacity Building Grants to strengthen the capacity of existing refuge Friends organizations to enable them to be more effective, and Project Specific Grants, which may include developing outreach and conservation education programs for private landowners, habitat restoration projects, watchable wildlife programs, etc.	grants range from $1,500 - $5,000	none required	non-profit organizations interested in assisting a National Wildlife Refuge or group of refuges	http://www.nfwf.org/programs/nwrgp.cfm
National Oceanic and Atmospheric Administration Partnership	National Fish and Wildlife Foundation and NOAA	Provides funding for projects that are hands-on, engage local stakeholders in conservation stewardship, and provide measurable benefits for coastal and marine resources, including wildlife and/or critical ecosystems. Where possible, projects should demonstrate a link to other NOAA programs and activities. Preference will be given to those proposals that address marine and coastal conservation at the watershed or ecosystem scale.	grants range from $10,000-$100,000	1:1 minimum, 2:1 strongly encouraged (cash and in-kind contributions)	state and local governments, educational institutions, and nonprofit organizations	http://www.nfwf.org/programs/noaa.cfm
Coastal Counties Restoration Initiative Grants	National Fish and Wildlife Foundation and others	New 2006 program targeting marine habitat restoration in coastal counties. The *Coastal Counties Restoration Initiative* provides financial assistance on a competitive basis to innovative, high	Grants will range from $25,000-$100,000, based upon need.	minimum 1:1, with 2:1 or greater strongly encouraged. Projects that bring matching contributions from third	NACo member counties (visit www.naco.org to determine membership), or	http://www.nfwf.org/programs/ccri.cfm

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Grant	Granting Entity	Description	Funding	Match (grantee/ grantor)	Applicant Eligibility	Web Site
		quality county-led or supported initiatives that foster community-based wetland, riparian, and coastal habitat restoration projects through project planning and hands-on conservation. These projects will improve habitat for NOAA trust resources, including marine, estuarine, and anadromous fish habitat. Grants that are community-based in nature and willing to work in partnership with NOAA will be given special consideration, as NOAA's Community-based Restoration Program is providing major financial support for this partnership.		parties will be favorably considered.	public or nonprofit private agencies, institutions, and organizations, educational institutions, and any form of local government (i.e., departments, townships, cities, villages, boroughs, conservation districts, planning districts, utility districts, or other units of local government) working in partnership with a NACo member county are eligible for funding.	
Living Shorelines Initiative Grant Program	National Fish and Wildlife Foundation and others	First funding in 2005. Promote natural shoreline restoration projects (living shorelines), around the Chesapeake Bay. Living shorelines emphasize the use of natural materials including marsh plantings, shrubs and trees, low profile breakwaters, strategically placed organic material, and other techniques that recreate the natural functions of a shoreline ecosystem. This grant initiative is designed to reverse the trend of shoreline "hardening" by encouraging the creation of living shoreline restoration projects and by enhancing public awareness about the benefits of living shorelines.	funding for fiscal years 2002 through 2007.	none required, but encouraged through partnerships	non-profit organizations, academic institutions, and state and local governments	http://www.nmfs.noaa.gov/habitat/restoration/projects_programs/crp/partners/nfwf.html#lsi
National Coastal Wetlands Conservation Grant Program	USFWS	Funds are used for acquisition of interests in coastal lands or waters, and for restoration, enhancement or management of coastal wetlands ecosystems on a competitive basis with all coastal States. Proposed projects must provide for long	cannot exceed $1 million for an individual project - FY 06 est $13,136,000; for FY 03 average	States provide 50 percent of the total costs of the project. However, if the State has established and maintains a special fund	includes States bordering on the Atlantic	http://www.fws.gov/grants/state.html; http://www.fws.gov/coastal/CoastalGrants/

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Grant	Granting Entity	Description	Funding	Match (grantee/ grantor)	Applicant Eligibility	Web Site
		term conservation of such lands or waters and the hydrology, water quality, and fish and wildlife dependent thereon.	$752,598 ($75,000 to $1,000,000)	for acquiring coastal wetlands, other natural areas or open spaces, the Federal share can be increased to 75 percent.		

APPENDIX F: HABITAT CLASSIFICATIONS USED BY THE STATES

CONNECTICUT

Upland Forest: Characterized by deciduous trees, evergreen trees, or mixed evergreen-deciduous trees with overlapping crowns forming between 60-100% canopy cover. This habitat type includes four sub-habitat identified as being important to wildlife:

Dry Oak Forests: Found in sand, gravel, or shallow soil over bedrock and are dominated by oaks, such as scarlet and chestnut oak, with mixtures of pine and understory shrubs like huckleberry and lowbush blueberry.

Calcareous Forests: Found on pH-neutral soils often associated with limestone bedrock. These are characterized by sugar maple, red oak, and red cedar, with white ask and tulip poplar being found at the base of these slopes.

Coniferous Forests: Found throughout the state on a variety of soil types, either as pure or mixed stands. Eastern hemlock is most prevalent, but has recently declines especially in southern portion of the state due to hemlock wooly adelgid infestation. Includes species such as white and red pine, and spruce and fir trees.

Old Growth Forests: Include both coniferous and deciduous forests and have never been disturbed by timbering or other human activities.

Upland Woodland and Shrub: Characterized by open forests where tree crowns usually do not touch (between 25-60% canopy cover). These woodlands are dominated by evergreen and or deciduous trees with a variety of shrubs, herbs and non-vascular plants in the understory and groundcover. This key habitat classification includes three sub-habitats determined to be important to widlife:

Red Cedar Glades: Found on exposed summits, ledges, and outcrops and include red cedar, low shrubs, and medium-tall grasses/herbs, such as little bluestem. In the western Marble Valleys, red cedar is mixed with hop hornbeam and hickories, with a diverse herbaceous understory that is a unique mixture of plants characteristic of dry sites and those limited to calcareous soils.

Pitch Pine/Scrub Oak Woodlands: Dry forests found on sand and gravel or bedrock, typically including pitch pine, bear oak, and lowbush blueberry. Found in eastern and central CT, and include areas on acidic, dry, rocky summits throughout CT.

Coastal Shrublands: Include dry coastal headlands and dry to moist coastal or maritime forests that are exposed to wind and salt spray effects. Typical trees of coastal shrublands include pitch pine, post oak, red oak, American beech, white oak, tulip tree, scarlet oak, and sassafras. Coastal shrubland understory or groundcover typically includes bayberry, beach plum, flowering dogwood, and switchgrass. These habitats tend to be associated with Long Island Sound and the entrance of major rivers into the Sound.

Upland Herbaceous: Characterized by herbaceous plants such as grasses, herbs and fern, that form 25% or more of the ground cover. Areas with scattered trees, shrubs and dwarf-shrubs are included as long as they provide less than 25% cover. This key habitat classification includes four sub-habitats determined to be important to wildlife:

Coastal Dune: Found adjacent to low energy beaches along Long Island Sound. Vegetation typically includes beach grass, switchgrass, beach plum, and hayberry.

Grassy Glades and Balds: Found on dry exposed summits, ledges, and outcrops, including acidic, subacidic, and pH neutral soil types. Grassy glade and bald vegetation is

typically low shrubs, grasses, and herbs, including bearberry, lowbush blueberry, sand cherry, poverty grass, and little bluestem.

Sandplain and Other Warm Season Grasslands: Found on fine deposits from glacial outwash, distributed primarily in coastal counties and also historically in the Connecticut Valley north to Hartford. These grasslands include shrubby or grassy vegetation maintained by fire, including bear oak, big bluestem, little bluestem, Indian grass, orange grass, and poverty grass.

Sparsely Vegetated Sand and Gravel: Found on unconsolidated sands and gravel that may be stable or actively moving, including actively eroding inland dunes. Plants are usually scattered, covering less than 25% of the substrate. Some areas may be completely void of vegetation, depending on moisture availability and shading. Pioneer species, such as mosses and lichens, may have moderate coverage. Herbaceous vegetation is generally perennial, acidic, and xerophylic. Typical vegetation includes warm season grasses, little bluestem, poverty grass, orange weed, and bluecurls.

Forested Inland Wetland: Characterized by wetland soils, and dominated by evergreen or deciduous trees with crowns forming 60-100% cover. Red maple forests are the most common of this habitat type. This key habitat classification includes four sub-habitats determined to be important to wildlife:

Atlantic White Cedar Swamps: Dominated by Atlantic white cedar, and include highbush blueberry, rosebay rhododendron, swamp azalea, red maple, and yellow birch. These sub-habitats have a variable shrub and herbaceous layer, which can range from poorly developed to well developed, to diverse, depending upon canopy light penetration.

Red/Black Spruce Swamps: These are saturated bog forests of northwestern CT, dominated by red spruce or black spruce. These sub-habitats are often dense, depending upon variable tree cover due to blow-downs from storms. Shrub and herbaceous cover is patchy and typically includes mountain holly, sheep laurel, and highbush blueberry.

Northern White Cedar Swamps: Seasonally flooded forests dominated by white cedar. There is only one known location of this sub-habitat type, and that is in the poorly-drained, seasonally flooded, calcium-rich soils of the Robbins Swamp Natural Preserve.

Flood plain Forests: Well-drained, nutrient-rich soils, including stream bottom forests, floodplain forests, and periodically flooded alluvial swamps adjacent to rivers or streams. This forest typically includes bitternut hickory, silver maple, cottonwood, pin oak, green ash, sycamore, boxelder, sensitive fern, white snakeroot, and false nettle. These temporary flooded, deciduous forests can vary in the diversity of shrub and groundcover layers. Low floodplains and levees along major rivers include silver ample, cottonwood, sensitive ferns, and nettles. Alluvial floodplains of small and mid-gradient rivers include pin oak, green ash, sycamore, boxelder, white snakeroot, sensitive fern, and false nettle.

Shrub Inland Wetland: Dominated by wetland soils and woody vegetation greater than 1.5 feet and less than 20 feet in height, arranged individually or clumped. The shrub layer generally forms more than 25% of the canopy cover, with whatever trees are present forming less than 25% of the canopy. This habitat includes three sub-habitat classifications that are important to wildlife:

Shrub Thickets: Shrub thickets are variable in composition and include red maple sapling swamps, willow and alder thickets, and highbush blueberry/swamp azalea swamps.

Bogs: Bogs are natural peatlands that occur in topographic basins influenced by groundwater.
Fens: Fens are natural peatlands that occur in topographic basins influenced by groundwater, and they are characterized by saturated wetland soils and receive groundwater discharge throughout the year.

Herbaceous Inland Wetland: Dominated by herbaceous layer of grasses, forbs, and ferns and includes less than 25% of scattered tree, shrub, and dwarf-shrub cover. This key habitat classification includes two sub-habitats determined to be important to wildlife:

Calcareous Spring Fens: Naturally open wetlands occupying groundwater discharge sites. In the Marble Valleys, the vegetation is influenced by base-rich organic soils with minimal peat accumulation. Typical vegetation includes inland sedge, bristle-stalked sedge, and other kinds of sedges, with scattered shrubs, such as bush cinquefoil and gray dogwood.
Freshwater Marshes: Typically adjacent to rivers and streams, and periodically flooded and influenced by run-off from adjacent upland areas. Basin freshwater marshes also are found in glacial kettles. Typical plants include cattail, buttonbush, highbush blueberry, water willow, and swamp loosestrife.

Sparsely Vegetated Inland Wetland: Characterized by open water or open mineral substrates with scattered, if any, plants. This key habitat includes two aquatic communities determined to be important to wildlife:

Surface Spring: Distributed throughout CT, and often associated with seeps or cold headwater streams.
Vernal Pools: Depressions that fill with water seasonally, often with the rising water table in the fall and winter, or with meltwater and runoff from snow and spring rain. After containing water for a few months in spring and early summer, vernal pools generally, but not always, dry out by late summer.

Tidal Wetland: Characterized by diurnally flooded areas, typically dominated by herbaceous plants, though some may have trees and shrubs or be sparsely vegetated. This kay habitat includes two sub-habitats determined to be important to wildlife:

Tidal Wetlands: Includes salt, brackish, and fresh marshes, intertidal flats, and regularly flooded intertidal swamps. The intertidal flats are regularly or irregularly exposed mud or sand areas with sparse to dense vegetation. The vegetation changes with the salinity of the water and with the duration and frequency of flooding throughout the lunar cycle. Different plant associations are found as one habitat grades into another, based on each plant's salinity tolerance range. Microelevational changes are clearly visible in these habitats, with changing plant communities and often sharp ecotones based on plant tolerance to root saturation. Typical salt marsh vegetation includes marsh elder, saltmarsh cordgrass, saltmeadow cordgrass, glasswort, switch grass, and spikegrass. Typical brackish marsh vegetation includes saltmarsh cordgrass, three-square bulrush, narrowleaf cattail, saltmeadow cordgrass, eastern lilaeopsis, salt-marsh bulrush, swamp rose-mallow, switch grass spikegrass, and creeping bentgrass. Typical freshwater tidal marsh vegetation includes wild rice, sweet flag, river bulrush, lake sedge, arrowleaf, sensitive

fern, pickerelweed, bluejoint reedgrass, Canadian wild rye, straw-colored nutsedge, and river bulrush.

Intertidal Beaches and Shores: Adjacent to vegetated wetlands, extending from high tide to those areas only occasionally exposed along the coast. Intertidal beaches and Shore vegetation and associations also vary with the salinity of the flooding waters. These may include three-square bulrush, water hemp, and arrowhead species. Sea rocket and pigweed are mostly found on salt shores and along a few tidal rivers.

Freshwater Aquatic: Encompass a variety of bodies of water including large rivers, streams, lakes, and ponds. These include both vegetated shorelines and non-vegetated habitats. The vegetation may be either emergent or submerged. There are 15,000 miles of rivers and streams and 6,000 lakes and ponds in Connecticut and their current water quality data and maps are available through the Connecticut DEP Bureau of Water management (BWM) Rotating Basin Strategy and Lakes and Ponds Survey Program. This key habitat classification includes six sub-habitats determined to be important to wildlife:

The Large Rivers and Streams and their Associated Riparian Zones: These deep freshwater habitats provide adult holding areas, migration staging areas, and foraging and spawning areas for many fish. The associated riparian zone includes flood-scoured rocky and gravelly riverbanks, riverside seeps, and riverside outcrops.

Unrestricted, Free-flowing Streams include riffles, rapids, and other mesohabitats that are unaffected by dams.

Cold Water Streams: Rapidly flowing clear waters with gravelly or cobbly substrate. They include the smaller (< 30 ft wide) perennial streams located at the headwaters of drainage systems, surface springs, seeps, and thermal refuges. These habitats have permanently flooded vegetation and riverweed is often the only vascular plant present, forming a low algal-like crust on submerged rocks.

Head-of-Tide: Includes the upstream limit of waters affected by the tide.

Lakes and their Shorelines: Includes an open water zone, a shallow littoral zone where light penetrates to the bottom, and the adjacent terrestrial shoreline. Lakes vary in depth and productivity. Some deep lakes with greater than average transparency are low to moderately productive, maintaining dissolved oxygen levels at or above 3 ppm during summer. Other less deep lakes are very productive, with low transparency and abundant aquatic plants, but may experience a drop in dissolved oxygen during summer because of the heavy accumulation of organic matter. Submerged and emergent vegetation are found in the littoral zone, including three-way sedge, bog loosestrife, arrow arum, and pickerelweed. Adjacent shoreline terrestrial vegetation includes black willow, fall panic grass, speckled alder, reed canarygrass, bluejoint reedgrass, bog white violet, and upright sedge.

Coastal Plain Ponds: These habitats are associated with sandy substrate areas. They typically have low nutrient sandy soils and seasonally exposed sandy, gravelly, or muddy sediments. Typical submerged and emergent vegetation includes arrow arum, fringed sedge, pickerelweed, meadow beauty, golden hedge-hyssop, beaked-rush, witchgrass species, pipewort, and Dortmann's cardinal flower. Connecticut does not technically support a coastal plain habitat and thus should not technically include Coastal Plain Ponds. However, the bodies of water found in this freshwater aquatic habitat are associated with coastal sandy substrate areas, so for the purposes of this project, these

bodies of water are referred to as such because the term "coastal plain pond" is widely used and understood.

Estuarine Aquatic: These habitats are coastal and tidal waters of varying salinity and substrates that are associated with Long Island Sound. All transitional zones from the Sound to upstream areas influenced by tides and with intermediate salinity levels (at least 0.5 ppt) are included. This key habitat classification includes seven sub-habitats determined to be important to wildlife:

Coastal Rivers, Coves, and Embayments: Those underwater areas contained within semi-enclosed areas. Their salinities range from full strength seawater (30-35 ppt) to slightly brackish (0.5 ppt). Connecticut contains a wide variety of boastal bays, coves, and embayments throughout the state.

Vegetation Beds: These include submerged aquatic beds on various substrates and in various salinities with significant cover of macrophytes, such as eel grass, horned pondweed, and widgeongrass.

Hard Bottoms: Underwater marine substrates ranging from cobble to boulders to bedrock. These may or may not have significant relief and provide a substrate for epifauna and infauna.

Sponge Beds: Underwater marine communities exhibiting significant three-dimensional relief. They include well-developed communities of sponge, such as *Cliona spp*.

Shellfish Reefs and Beds: Underwater concentrations of shellfish. These reefs or beds may include, but are not limited to, the eastern oyster and various mussels.

Sedimentary Bottoms: These include three major subdivisions (sand, transition, mud), based on substrate grain size, ranging from coarse sands to silt/clay. Sandy bottoms are characterized with less than 5% silt/clay, transition bottoms have 5% to 50% silt/clay composition, while mud bottoms have greater than 50% silt/clay sediment composition. All of these sedimentary bottoms are influenced by environmental factors, such as currents, and the sediment characterization will have a major influence on benthic community composition.

Open Water: This sub-habitat includes all the deep water areas of the Long Island Sound estuary. This habitat is directly connected to and influenced by the open Atlantic Ocean water through Block Island Sound and New York Harbor.

Unique and Main-Made: Unique and Man-made habitats not discussed in the previous 10 habitats, includes six sub-habitats determined to be important to wildlife:

Traprock Ridges: These include a variety of habitats, ranging from dense forest to open rocky summits, cliff faces, consolidated rock, boulders, gravel, talus, or unconsolidated materials. Plants are scattered or absent, covering less than 26% of the substrate if present. Of most significance are large contiguous areas of forest, rich, moist lower slopes, and the rocky summit-cliff-talus complex.

Offshore Islands

Coastal Bluffs and Headlands: These include cliffs and escarpments that border Long Island Sound. They can be composed of either consolidated rock (headlands) or unconsolidated sediments (bluffs and escarpments), such as glacial till, with the slope and rate of erosion dependent on the substrate and exposure to wave action.

Urban Habitats: These are areas in and around towns and cities with a high degree of impervious surfaces. City parks are included in this habitat. Building complexes also are included because various species of wildlife have adapted to use these habitats.

Intensively Managed: Intensively Managed habitats have various vegetative cover and hydrology. Their common characteristic is the need for substantial human maintenance through activities such as clearing, grazing, burning, or mowing. Without this maintenance, they would succeed to another habitat type. This key habitat includes three sub-habitats determined to be important to wildlife:

Early Successional Shrublands and Forests: These generally include shrubs less than 0.5m tall with individuals or clumps overlapping but not touching. This forms less than 25% canopy coverage. Tree cover also is less than 25%. Early successional forest stands contain trees less than 4.9 inches dbh and are generally dominated by regenerating stands of late seral stage species (i.e., oaks, maples, hickories, beech). Early successional shrublands and Forests may be either seasonally flooded or non-flooded.

Cool Season Grasslands: These include hayfields and other managed grasslands consisting primarily of naturalized European species, such as timothy, red clover, and red fescue, as well as other herbaceous or broad-leaved plants and flowers. These habitats are routinely mowed or burned prior to or after the conclusion of the avian breeding season.

Wet Meadows: These include a variety of temporarily flooded grasslands. The flooding may be controlled as part of a management plan for the habitat. Vegetation typically includes a variety of herbaceous vegetation, including forbs, grasses, flowers, sedges, and rushes (i.e., reed canarygrass, common reed, big bluestem, bluebell bellflower, bluejoint, tussock sedge).

DISTRICT OF COLUMBIA

Hardwood Forest: There are five major types of hardwood forest are found within the District, including chestnut oak forests, mixed oak—beech forests, tulip poplar forests, loblolly pine—mixed oak forests, and Virginia pine—oak forests.

Chestnut oak forests: This forest type occurs on ridgetops, convex upper slopes, and south-facing slopes, and is often associated with the mid-Atlantic Piedmont. Soils found in these forests are rocky, well-drained, acidic, sandy loams with a poorly developed organic layer and bedrock close to or at the surface. Dominant vegetation includes a chestnut oak, and black gum canopy; a serviceberry and sassafrass sub-canopy; a blueberry and black huckleberry shrub layer; and sparse herbaceous vegetation.

Mixed oak-beech forests: This forest type is mixed hardwood upland forests that occur on mesic to dry-mesic slopes or gentle gradients, primarily on or in close proximity to the mid-Atlantic Coastal Plain. Soils found in these forests are typically well-drained, acidic sandy loams, which may be derived from parent material of relatively greater fertility. Dominant vegetation includes a beech, white oak, and tulip poplar canopy; an American holly, flowering dogwood sub-canopy; a maple-leaved viburnum shrub layer; and an herbaceous layer made up of bellwort, Virginia creeper, Solomon's seal, Christmas fern.

Tulip poplar forests: These forests occur along streams and on mesic, mid-slope to low-slope sites that have been cleared and/or cultivated. They have been found on areas mapped as Manor loam soils that are deep, well-drained and underlain by acidic rock. Dominant vegetation includes a Tulip poplar canopy; a boxelder sub-canopy; a

spicebush, blackberry, multiflora rose, and porcelain berry shrub layer; and a lesser celandine herbaceous layer.
Loblolly pine-mixed oak forests: These forests occur on mid to lower slopes on broad flats or in sheltered ravines, and are associated with the mid-Atlantic Coastal Plain. Soils within the District are well-drained to excessively drained gravelly sandy loams. Dominant vegetation includes a diverse canopy (no dominate species) that includes black cherry, sweet gum, post oak, turkey oak, willow oak, and loblolly pine; no real sub-canopy; no real shrub layer; and sparse herbaceous vegetation.
Virginia pine-oak forests: These forests occur on middle to upper slope positions at elevations below 3,000 feet. Within the District, these forests usually occur on well-drained soils of hilltops. Dominant vegetation includes a Virginia pine, oak, and tulip poplar canopy; and oak sub-canopy; a maple-leaved viburnum shrub layer; and sparse herbaceous vegetation.

Grasslands/ Managed Meadows: These habitat are composed of vegetation that does not mature into successional growth or shrubland. They are primarily composed of grasses and can only sometimes support scattered shrubs and trees. Managed meadows are natural areas that are similar in ecological structure to grasslands but are managed by agencies and organizations by practices such as mowing.

Early Successional/ Shrub-scrub/ Edge: These habitats are habitats that have not matured into forest because of periodic natural or human disturbances. They are characterized by natural or seminatural woody vegetation with aerial stems, generally less than six meters tall, with individuals or clumps not touching or interlocking. Both evergreen and deciduous species of true shrubs, young trees, and trees or shrubs are small or stunted because of environmental conditions. Shrubs dominate this habitat, with shrub canopy accounting for 25 to 100 percent of the cover. Shrub cover is generally greater than 25 percent when tree cover is less than 25 percent.

Urban Landscapes: Usually these areas are mowed, trimmed, experience a great deal of foot traffic, and are exposed to wind because they are cleared. These areas consist of the remaining land not identified under the other twelve habitats listed in this CWCS, including golf courses, school campuses, backyards, cemeteries, land surrounding memorials and monuments, and unvegetated areas such as roads, residential and commercial buildings, and parking lots.

Rivers and Streams

Emergent Non-tidal Wetlands: Emergent non-tidal wetlands are newly-formed wetlands that are not subject to tides.

Forested Wetlands: These habitats support vegetation with roots that are adapted to saturation during the growing season.

Riparian Woodlands: These are woodlands on either side of rivers and streams.

Floodplains: These are low plains adjacent to stream banks, rivers, lakes or oceans and are subject to temporary or irregular flooding.[47] Floodplains are shaped by the frequency and

duration of flooding, by nutrient and sediment deposition, and by the permeability of the soil. Flooding usually occurs during early spring when the snow is melting or during times of unusually heavy rainfall. The flooding of the area is important for the plant and wildlife species that inhabit or utilize the floodplain. The canopy cover is 50-90%, but the understory is more open than hardwood forests due to the frequent flooding. Dominant vegetation includes a sycamore canopy; a box elder sub-canopy; a spicebush shrub layer; and a garlic mustard and jewelweed herbaceous layer.

Emergent Tidal Wetlands: These are newly-formed wetlands that are inundated by tidal waters. They can be seasonally, temporarily, and semi-permanently flooded. Emergent vegetation is important for water quality because it acts as a filter for sediment and other substances. Common plant species include wild rice, duck potato, American lotus, polyganum spp, soft rush, pickerelweed, sedges, bulrush, nuphar, common boneset, spikerush, wool-grass, spatterdock, swamp milkweed, and stiff march bedstraw.

Tidal Mudflats: They are wetlands that occur between vegetated marsh and the water's edge and are alternately exposed and submerged by the tide. Tidal mudflats occur where wave energy is low and herbaceous vegetation covers less than 10% of the mud.

Springs and Seeps: These occur where groundwater flows to the surface. A spring has a concentrated flow, whereas a seep has a diffuse flow. Springs occur when the water table is higher than the ground surface and pressure forces the water out of the land. Seeps are areas where groundwater continuously surfaces and flows down a slope. They support habitats made up of tiny mosses, lichens, ferns and flowering plants that cling to the surface of the slope.

Submerged Aquatic Vegetation: This habitat is made up of permanently submerged vegetation and can be a mix of from one or two species in small patches, to seven to ten species in larger patches.

Vernal Pools: These are seasonal bodies of water that flood each year for a few months during the spring and dry up by the end of summer. Because they are not permanently flooded, they do not support fish populations. Instead, they provide important breeding habitat for many species of amphibians.

Ponds and Pools: These habitats consist of small impoundments which are not presently actively surveyed or managed by the DC Fisheries and Wildlife Division. They often contain some submerged aquatic vegetation, another priority habitat, and can potentially support bird, fish, invertebrate, amphibian, reptilian, and mammalian species.

DELAWARE

Beach and Dune Habitats: These coastal habitats are adapted to the dynamic conditions of shifting sands, strong winds and salt spray unique to the narrow zone along the Atlantic Ocean and Delaware Bay. They range from the beach – covered and exposed by the twice-daily tides – to the first grassy dunes and overwashes, to a complex of shrub-dominated back dunes.

Habitats of Conservation Concern

• Unvegetated Sandy Beach

- Beach Foredune
- Overwash Dune Grassland
- Beachgrass – Panicgrass Dune Grassland
- Wax-myrtle - Groundsel-tree Maritime Shrubland
- Bayberry - Beach Plum Maritime Shrubland
- Greenbrier - Poison Ivy Dune Shrubland
- Beach Heather Dune Shrubland

Early Successional Upland Habitats: Early successional upland habitats typically result from the abandonment of agricultural fields, pastures or other cleared land. Over several decades, pioneering grasses and forbs gradually give way to shrubs and tree seedlings. If left alone, these habitats will eventually succeed into forests.

Habitats of Conservation Concern

- Herbaceous Early Successional Upland Habitats
- Shrub/Brush Early Successional Upland Habitats

Coastal Plain Upland Forests: Found on dry or moist, but not wet, soils, Coastal Plain upland forests vary from mixed deciduous types – mostly oaks and hickories – in central Delaware, to pure stands of loblolly pine in the south. Likewise, vegetation on the forest floor may range from sparse heaths on dry sites to impenetrable thickets of sweet pepperbush in moist areas.

Habitats of Conservation Concern

- Chestnut Oak – Hairgrass Forest
- Tuliptree Rich Wood (Coastal Plain variant)
- Ancient Sand Ridge Forest

Coastal Plain Forested Floodplains and Riparian Swamps: These forests are found upstream of the head of tidal influence on seasonally inundated floodplains, and in floodplain depressions having saturated soils. Red maple is found throughout in association with several other canopy species, most notably bald cypress in certain types. The herbaceous layer is often very diverse.

Habitats of Conservation Concern

- Black Ash Seepage Swamp
- Baldcypress – Red Maple – Swamp Black Gum Swamp

Atlantic White Cedar Non-tidal Wetlands: Known only from southern Delaware, these wetlands are characterized by stands of Atlantic white cedar on poorly drained, mucky soils along slow-flowing streams. Numerous rare plant species, such as swamp pink, may be found in the herbaceous layer of some types.

Habitats of Conservation Concern

- Delmarva Atlantic White Cedar Swamp
- Atlantic White Cedar – Mixed Herb Bog
- Atlantic White Cedar Millpond Headwater Hummock and Peat Mat Woodland

Coastal Plain Seasonal Ponds: More than 1,000 of these small depressional wetlands, usually flooded by groundwater and precipitation in the winter and spring but dry in the summer and fall, are scattered throughout the state. They often occur in groups or complexes that may share a common groundwater source and among which pond-dwelling organisms freely travel. Although

the ponds naturally occur imbedded in a forest matrix, they contain only herbaceous and shrub vegetation within their boundaries.

Habitats of Conservation Concern

- Buttonbush - Mannagrass - Smartweed Coastal Plain Seasonal Pond Vegetation
- Buttonbush - Warty Panicgrass - Eaton's Witchgrass Coastal Plain Pond Vegetation
- Walter's Sedge - Eaton's Witchgrass Coastal Plain Seasonal Pond Vegetation
- Cape May - Delmarva Depression Meadow
- Three-way Sedge - Canada Rush Coastal Plain Seasonal Pond Vegetation
- Creeping Rush - Boltonia Coastal Plain Seasonal Pond Vegetation
- Maidencane Coastal Plain Seasonal Pond Vegetation
- Mixed Grass Depression Meadow
- Waterlily Deepwater Coastal Plain Seasonal Pond Vegetation

Interdunal Wetlands: These small wetlands are found only among maritime dunes along the Atlantic Coast. Despite their proximity to the ocean, their seasonal flooding is driven by groundwater and precipitation. As dynamic as many other beach and dune habitats, these swales are periodically created or destroyed by major storms. Some types have purely herbaceous vegetation, while others are dominated by shrubs.

Habitats of Conservation Concern

- Cranberry Interdunal Swale
- Twig Rush Interdunal Swale
- Round-head Rush - Common Threesquare Interdunal Swale

Piedmont Stream Valley Wetlands: This is a somewhat artificial grouping of wetlands that is in need of further definition. Some types result from the emergence of groundwater on, or at the base of, forested slopes above streams, while others are in or adjacent to the stream channel where they are subject to occasional flooding. Vegetation is dominated by sedges and rushes in most types, although some support a variety of forbs.

Habitats of Conservation Concern

- Piedmont Streamside Seepage Wetland
- Forested Seepage Slope Wetland
- Streamside Backwater Marsh
- Streamside Tussock Meadow
- Twisted Sedge Sand Bar

Peat Wetlands: These herbaceous wetlands occur on deep, mucky peat that forms in open-water depressions, impoundments, and seeps within a shrub-dominated swamp matrix. They are found along only a few creeks in southern Delaware. Several rare plants occur here, including sundews and purple pitcher plant.

Habitats of Conservation Concern

- Mixed Herb Deep Peat Wetland

Riverine Aquatic and Submerged Vegetation: These habitats are characterized by plants that are either entirely submerged or that float on the water surface in stream channels and backwaters. They are found throughout the Coastal Plain, most extensively in the Nanticoke watershed.

Habitats of Conservation Concern

• Mixed Species Submergent Vegetation
• Submerged Tapegrass Community

Freshwater Tidal Forested and Scrub-Shrub Wetlands: This group of wetlands ranges from thinly forested types to those dominated by small trees and shrubs. They are typically found at the head of tide or along the fringes of tidal creeks, where tidal flooding is irregular.

Habitats of Conservation Concern
• Atlantic White Cedar - Red Maple - Pumpkin Ash Freshwater Tidal Swamp
• Red Maple - Ash Tidal Swamp
• Smooth Alder - Silky Dogwood Shrub Swamp

Freshwater Tidal Marshes: These are wetlands of the intertidal zone above the reach of saline waters, characterized by the complete absence of woody plants. Vegetation is sparse in some types (e.g. quillwort flat) but extremely dense in others (e.g. mixed broadleaf marsh). The mixed broadleaf marsh is found throughout the Coastal Plain, from the Christina to the Nanticoke, while the others have more restricted distributions.

Habitats of Conservation Concern
• Mixed Broadleaf Freshwater Tidal Marsh
• Sea Level Fen
• Freshwater Intertidal Quillwort Flat

Tidal High Marshes: These are usually the more landward of the coastal salt marshes, occurring at a slightly higher elevation where they are subjected to a shorter period of tidal inundation. Most types consist almost entirely of grasses, sedges and rushes, but a few (e.g. bishop-weed marsh) are composed primarily of broadleaf plants.

Habitats of Conservation Concern
• Spartina High Salt Marsh
• Bishop-weed – Mixed Species Brackish Marsh

Tidal Low Marshes: The more seaward of the coastal salt marshes, these habitats are flooded for longer periods of time during daily tidal cycles. Again, most types are dominated by grasses and grass-like plants, although mudflats may be largely devoid of vascular plants.

Habitats of Conservation Concern
• Spartina Low Salt Marsh
• Unvegetated Intertidal Mudflat

Non-tidal Coastal Plain Streams: These are the upper reaches of streams that originate in the Coastal Plain. Most drain to the Delaware River or Bay, but some head west towards the Chesapeake Bay. Generally, stream gradients are low, current velocity is slow and substrate consists of sand and silt. Many of these streams have been ditched in order to lower water tables in adjacent areas for agriculture.

Habitats of Conservation Concern
• None described at this time.

Nearshore Habitats: Nearshore habitats consist of open water and benthic features in the Delaware Bay, the Inland Bays, and the Atlantic Ocean out to a distance of three miles from the coast. Though the typical nearshore habitat is a rather featureless area of sand and mud, there are

also many smaller areas of diverse nearshore marine habitats such as oyster beds, *Sabellaria* (tubeworm) reefs, sulfur sponge reefs, mussel beds, shoal and flat areas, and artificial reefs.

Habitats of Conservation Concern

- Open Water
- Oyster Reef
- Tubeworm Reef
- Clam Bed
- Mussel Bed
- Sand Bar/Sand Flat

Impoundments: Impoundments are man-made coastal habitats where water levels can be manipulated by some sort of control structure. Some are freshwater environments that may be groundwater-dependent. Many are brackish and are connected to tidal streams.

Habitats of Conservation Concern

None described at this time.

Forest Blocks: Forest Blocks may include upland forests and/or wetland forests that were previously described.

Wetland Blocks: Wetland Blocks may contain non-tidal wetlands, freshwater tidal wetlands, and/or saltwater and brackish tidal wetlands (as described previously).

MAINE

Marine Open Water: Watered marine areas

Estuaries and Bays: Subtidal estuarine channels and tidal aquatic beds.

Rocky Coastlines and Islands: Areas adjacent to water where ledge, gravel, rock, boulders, bedrock, or stones predominate.

Unconsolidated Shore (Beaches and Mudflats): Dunes, flats, beaches with vegetation, sand, mud, or gravel.

Estuarine Emergent Saltmarsh: Estuarine/intertidal waters with emergent, herbaceous (non-woody) vegetation.

Freshwater Lakes and Ponds: Permanently flooded fresh waterbodies without emergent vegetation.

Emergent Marsh and Wet Meadows: Fresh, shallow wetlands and waterbodies with emergent, herbaceous (non-woody) vegetation and wet meadows dominated by grasses and sedges.

***Forested Wetland*:** Fresh, shallow wetlands and waterbodies with tall woody vegetation or dead, standing trees.

Shrub-scrub Wetland: Fresh, shallow wetlands and waterbodies with short woody vegetation.

***Peatlands*:** Vegetation dominated by mosses, ericaceous shrubs, or sedges.

Rivers and Streams: Fresh, flowing water

Deciduous and Mixed Forest: Forests with >75% canopy closure composed of deciduous or mixed coniferous and deciduous trees.

Coniferous Forest: Forest with >75% canopy closure composed of at least 75% coniferous trees.

Dry Woodlands and Barrens: Pitch pine / scrub oak woodlands and barrens

Mountaintop Forests: Forests above 3,000 feet

Alpine: Mountain zones between the treeline

Shrub / Early Successional and Regenerating Forest: Areas dominated by woody shrubs and/or harvested before 1991 with seedling to sapling-sized trees; forestland where >50% of the overstory has been removed.

Grassland, Agricultural, Old Field: Abandoned agricultural fields, blueberry barrens, crop fields, bare ground, grasslands (hay fields, pastures, lawns, golf courses).

Urban/Suburban: Areas where percent cover by buildings, roads, and other impervious surfaces is greater than vegetative cover.

Cliff Face and Rocky Outcrops (including talus slopes): Exposed bedrock, talus, bare mountain tops, gravel pits.

MARYLAND

Old Growth Forest: An old growth forest is a minimum of 2 ha (5 acres) in size with a preponderance of old trees, of which the oldest trees exceed at least half of the projected maximum attainable age for that species, and that exhibits most of the following characteristics:
1. Shade tolerant species are present in all age/size classes.
2. There are randomly distributed canopy gaps.
3. There is a high degree of structural diversity characterized by multiple growth layers (canopy, understory trees, shrub, herbaceous, ground layers) that reflect a broad spectrum of ages.
4. There is an accumulation of dead wood of varying sizes and stages of decomposition, standing and down, accompanied by decadence in live dominant trees.
5. Pit and mound topography can be observed, if the soil conditions permit it.

Early Successional Forests: These are upland areas dominated by shrubs and small trees (< 8 m tall). This habitat can be divided into five sub-habitats:

> *Recently logged forests*: Early successional habitat begins to develop within one year of a timber harvest and may persist for 10-20 years or more depending, in part, on preharvest forest conditions, soil type, the size and type of regeneration cut (e.g., clearcutting,

single-tree selection, shelterwood), and post-harvest silvicultural treatments (e.g., seedling plantings vs. natural regeneration, thinnings).
Succeeding nonforested land: Examples include former cropland, pasture, old fields and reclaimed strip mines that are reverting to a forested state via natural succession or plantings.
Temporary natural forest openings: Natural forest canopy openings result from a variety of natural disturbances including windthrow, ice storms, fire, beavers, tree senescence, insect outbreaks and pathogens.
Shrub-dominated natural communities: Shrubs and small trees perpetually dominate a number of natural community types and ecotones. These conditions may occur within shale barrens, sandstone glades, dry oak-pine forests, maritime forests and shrublands and along extensive, ridgetop rock outcrops.
Forest edges: Forest edges are usually abrupt, narrow (usually 1-10 m wide), linear ecotones between a forested and nonforested habitat (e.g., cropland, road, transmission line right-of-way, backyard) or between two dissimilar forest age classes (e.g., a mature forest and a recent clearcut).

***Maritime Forests and Shrublands*:** The distribution and vegetation of these habitats is largely controlled by oceanic influences such as salt spray and deep sand deposits. Although oceanic influences are the primary contributing factors in vegetation structure and distribution, soil moisture and drainage also play a critical role in shaping these habitats. Shrublands or "scrub" vegetation develops on inland edges of back dunes and leeward dune slopes where they are moderately protected from ocean salt spray. The vegetation is best characterized as "scrubby" in appearance typically including stunted trees and low growing, dwarfed shrub species such as beach heather, bayberry, and high- tide bush. Herbaceous species are sparse however; frequent canopy gaps support many species that are recruited from adjacent maritime grassland communities. These shrublands often occur in a mosaic with woodlands and forests dominated by Loblolly pine. Both occur on sheltered back dunes away from the primary dune where the effects of salt spray are minimal however, soil moisture is the major difference with woodlands typically restricted to rapidly drained, xeric dunes.

Loblolly Pine – Oak Forests: Upland habitats vary from dry to mesic, with sands or sandy loam soils on gently rolling topography. Various hardwoods are present and may include such species as southern red oak, white oak, and post oak. Other associates may include sassafras, pignut hickory, black oak, willow oak, white flowering dogwood, and sweetgum. On extremely dry sites where growing conditions are unfa vorable, trees may not reach full stature and canopies are generally open. Shrubs are predominately ericaceous and are characterized by patches of huckleberries, blueberries, and mountain laurel. American holly is often dominant in the understory of more mesic sites. Herbs are generally sparse but may include pink lady's slipper, bracken fern, wintergreen, and spotted wintergreen. Loblolly pine also dominates many temporarily flooded wetlands such as "wet flatwoods" throughout the lower Eastern Shore. These habitats develop on broad flats between stream drainages, but may also occur on floodplains and isolated upland depressions. Loblolly pine swamps usually retain water throughout the winter months when water tables are high, but are relatively dry la te in the growing season. Soils are best characterized as sandy loams. Associated trees may include red maple, black gum, pond pine, white oak, willow oak, swamp chestnut oak, American holly, and bayberry. Shrubs and vines are common and include species such as sweet pepperbush, southern

bayberry, highbush blueberry, poison ivy, and common greenbrier. Herbs are sparse, generally consisting of patches of slender spikegrass, broomsedge, partridge berry, wool grass, and various sedges.

Mesic Deciduous Forests: These forests are found on both acidic and basic substrates and are characterized by an assortment of mixed hardwoods in moist habitats, such as sheltered ravines and coves, low mountain slopes, and well-drained terraces or flatwoods.
Many different forest types fall into this category and are largely distinguished from one another by species composition and by the substrate on which they develop. In general, mesic forests over acidic substrates contain mixed canopies of tulip poplar, American beech, oaks, and hickories and understories of white flowering dogwood, pawpaw, and American hornbean. Many of the oaks and other associated trees of these forests vary by region. These forests are widespread occurring throughout much of Maryland on moist low slopes, steep north- facing slopes, ravines, and well-drained uplands and occasionally in stream bottoms. Soils are characterized as acidic and nutrient-poor and rarely support lush layers of herbaceous vegetation, although species such as Christmas fern may be abundant in patches. Sheltered coves and slopes in mountainous regions often support very fertile habitats with lush herbaceous layers containing a diverse assemblage of spring ephemerals. The soils are weathered from various substrates but can range from moderately acidic to moderately alkaline. Trees common in these "rich cove forests" include basswood and sugar maple, and tulip poplar often characterizes the canopy. Cove forests may also occur on substrates underlain by acidic bedrock, such as sandstone or quartzite. A mixture of hemlock and hardwoods such as yellow birches and a dense understory of rhododendron distinguish these forests from rich cove forests. Herbaceous species are limited by dense shade and poor soils, and are much sparser and less diverse than in rich cove forests.

Dry Oak-Pine Forests: These habitats represent a broad group of dry upland forests and woodlands. They occur on highly droughty, infertile soils that range from strongly acidic or basic. The associated plant communities are structurally intermediate between more mesic forests and ultra-xeric barrens and glades and, on many sites, may represent an ecotone between these two contrasting conditions.

Northern Conifer – Hardwood Forests: These habitats typically on mesic sites above 600 m, as forest ecotones bordering high elevation wetlands, along stream bottoms and north-facing slopes, and in deep ravines. In northern conifer forests, eastern hemlock, red spruce, and/or white pine is co-dominant or dominant, and often mixed with northern hardwoods. Northern ha rdwood forests are dominated by sugar maple, yellow birch, and black cherry. Associates include basswood, white ash, northern red oak, red maple, American beech, and northern conifers. In both forest types, common midstory and understory species include striped maple, witch hazel, maple- leaf viburnum, and frequently dense patches of great laurel and mountain laurel. The herb layer is often quite diverse, especially in less acidic soils. In the Ridge and Valley physiographic region, this habitat is much more limited and mostly confined to mesic, northfacing slopes and stream ravines where eastern hemlock, white pine and northern hardwoods may be dominant. White pine also occurs as a dominant or co-dominant on drier slopes in association with various oaks and hickories.

Floodplain Forests: Floodplain forests comprise a variety of nontidal and tidal forest habitats that occur along streams and rivers and their adjacent floodplains. Examples of floodplain forests

can be found statewide but some of the largest tracts occur on the Upper and Lower Coastal Plain. Along tidally influenced rivers in these regions, broad expanses of floodplain forests occur between gradually sloping uplands on the landward side and tidal shrublands followed by oligohaline and/or mesohaline marshes bordering the river channel. The forest canopy is often semi-open and, along many river sections, there is a gradual forestshrubland- marsh wetland ecotone. The shrub layer in tidal floodplain forests is usually dense and diverse often including species, such as northern arrow-wood, winterberry, silky dogwood, swamp azalea, swamp rose, fetterbush, and sweet pepperbush. Climbing vines are common in multiple layers and may include species such as common wild yam, poison-ivy, common greenbrier, and Virginia creeper. Pronounced hummock-and- hollows microtopography is characteristic of tidal floodplain forests. Hollows are regularly inundated by tidal water, whereas hummocks are less frequently flooded thus supporting the establishment of trees and mesophytic herbs.

***Upland Depression Swamps*:** These are seasonally flooded forested wetlands. Hydroperiods are variable between swamps and largely dependent on rainfall and drought cycles. The forested canopy structure of upland depression swamps ranges from open to closed and is primarily oak-dominated with other hardwoods less frequent. Common tree species include willow oak, pin oak, swamp chestnut oak, green ash, red maple, and black gum. In the understory, shrubs and vines are common but variable, often including an abundance of common greenbrier. The herbaceous layer is often sparse and may include species of sedges, manna-grasses, and rushes. Slightly elevated hummocks of sphagnum mosses frequently form large patches. Upland depression swamps are isolated wetlands.

Carolina Bays (also known as Coastal Plain ponds and Delmarva bays): These are rare habitats generally described as shallow, seasonally flooded depression wetlands. The majority of Carolina bays have been shaped by these wind processes into elliptical depressions up to one meter in depth with prominent sand rims. A perched water table and seasonal fluctuations in groundwater recharge and precipitation cause these wetlands to be irregularly flooded or seasonally inundated. During very dry seasons, surface water may be absent or limited to the deepest point within the bay. Likewise, dur ing very wet years when rainfall is abundant, bays may retain water throughout the entire growing season. Depth and duration of seasonal inundation are apparently the most important factors influencing plant communities and the degree to which woody species become established. Dry-season fires in adjacent uplands may spread into bays and may be another factor limiting the invasion of woody species, although fire frequencies throughout the region have been much reduced in recent decades. The vegetation of Carolina bays is closely linked to its hydrologic regime. As water levels draw down or recede during the growing season, plant communities typically develop concentric rings from the outer edge towards the center or deepest point in the bay. Outer rings of a bay may include shrubs of buttonbush, fetterbush, swamp loosestrife, and sweet pepperbush or nearly monospecific stands of Walter's sedge, maidencane and Virginia chain fern. Interior portions of bays may include species such as Eaton's witchgrass, warty panicgrass, and Virginia meadow-beauty. Many of these species grade into the "draw down pocket" or lowest portion of a bay, which is the last to desiccate during the growing season. Common to this zone are slender fimbry and flood tolerant shrubs of buttonbush. Carolina bays are often embedded in a matrix of seasonally flooded swamp forests that are dominated by red maple, sweetgum, and persimmon.

Forested Seepage Wetlands: These habitats occur around large seepage areas or springs, along the uppermost reaches of gently sloping headwater streams, and along ravine bottoms and toe slopes. They occur where groundwater is forced to the surface along an impermeable clay or rock layer due to hydrostatic pressure resulting from gravity or artesian flow. Surface water appears as broad, diffuse zones of wetness, percolation and/or highly braided, small rivulets where soils usually remain saturated during most or all of the year. Soils are typically moderately to strongly acidic and nutrient-poor. Occasionally, circumneutral conditions exist where sites overlie calcareous rock strata. These are predominantly forested wetlands with a mostly closed to semi-open canopy. However, often a mosaic of small shrub and open, sedge- and graminoid-dominated emergent wetland patches are also present. The forest floor is characterized by spaghnum-covered hummocks, dense fern and skunk-cabbage patches, and saturated sand, muck- or peat- filled depressions. On the coastal plain, a red maple-black gum-swamp magnolia forest community is usually dominant. The understory tends be dense with swamp azalea, huckleberries, greenbrier, poison-ivy, and blueberries. West of the Fall Line, red maple and black gum continue to be frequent dominants but various ashes, yellow and black birch, and tulip poplar may be common canopy species as well. Common understory species include spicebush, winterberry, and arrowwood.

Bog and Fen Wetland Complexes: Bogs and fens are open seepage wetlands supporting a patchwork of saturated shrub and herbaceous vegetation. In Maryland, bogs and fens are groundwater-fed (minerotrophic) and best developed on seepage slopes, along headwater streams, oxbows of streams, and margins of beaver ponds, established millponds, and sandpits. Bog soils vary from mineral to deep peat, are extremely acidic, nutrient-poor, and often support a variety of sphagnum mosses. Shrubs common to these habitats include speckled alder, narrowleaved meadowsweet, mountain holly, and black chokeberry. Small openings interspersed amongst the shrub growth support dense mats of sphagnum and haircap mosses and herbaceous species such as Virginia cotton- grass, rose pogonia, round- leaved sundew, and a variety of ferns, rushes, and sedges. Bogs locally referred to as *Magnolia bogs* occur at the bases of sand and gravel terraces near streams where groundwater seepage is abundant and forced to the surface by an impermeable clay lens or aquiclude. Unlike true bogs, Magnolia bogs are not characterized by accumulations of peat or organic soils. Nutrient-poor and acidic seepage flows from groundwater, often forming mucky depressions and braided channels around hummocks of sphagnum mosses. Shrubs common to these habitats include sweetbay magnolia, swamp azalea, highbush blueberry, fetterbush, dangleberry, poison sumac, and possum haw. Herbaceous openings include species such as cinnamon fern, cypress panicgrass, partridge-berry, coastal carrionflower, wild yam, Indian cucumber-root, brownish beaksedge, and primrose-leaved violet. *Sea-level fens* are small, maritime seepage wetlands that occur above the high tide line at the bases of slopes where abundant groundwater discharges along the upper edges of estuarine bays. The hydrology of these sites is best characterized as saturated, although shallow standing water and small, muck- filled pools are locally present at all sites. Soils are characterized as organic and nutrient-poor. The vegetation exhibits characteristics of both inland seepage bogs and slightly brackish tidal marshes. Stands are generally a physiognomic mosaic of open woodland, scrub, and herbaceous patches. Woody species include red maple, black gum, bayberry, and southern bayberry. Characteristic herbs include twig rush, beaked spikerush, white beakrush, spatulate-leaved sundew, ten-angled pipewort, coinleaf, brownfruited rush, and bladderworts.

Non-Tidal Shrub Wetlands: Nontidal shrub wetlands are inland freshwater wetlands dominated by shrubs and small trees (< 8 m tall). They usually exist as small patch plant communities (< 10 ha) or as transitional or ecotonal habitats within larger freshwater wetland systems. On the Coastal Plain, this habitat occurs in seasonally to semi-permanently flooded depressional wetlands such as Delmarva bays (also referred to as coastal plain ponds) and vernal pools. It also occurs in beaver impoundments, along shorelines of millponds and farm ponds, and as scattered patches in floodplain forest openings created by windthrow, floods and beavers. Common dominants include buttonbush, silky dogwood, southern arrowwood, highbush blueberry, and/or smooth alder mixed with small deciduous trees such as red maple, black gum, sweetbay magnolia, black willow, and green ash. In the Piedmont and Ridge and Valley Provinces, nontidal shrub wetla nds occur in a number of settings, including wet meadows, beaver impoundments, seepage swamps and floodplain forest openings. The dominant species include buttonbush, spicebush, smooth alder, black willow, silky dogwood, common elderberry, and multiflora rose, an introduced species. Shrub wetlands on the Allegheny Plateau typically occur within a variety of larger wetland complexes such as high elevation bogs, fens, seepage wetlands and beaver impounded streams. A variety of species may be dominant in the shrub wetlands including smooth alder, speckled alder, northern arrowwood, smooth winterberry, black chokeberry, red chokeberry, and mountain holly.

Tidal shrub wetlands are shrub-dominated transitional habitats of freshwater and brackish systems. In freshwater portions of tidal rivers they commonly form small, linear patches on floodplains between tidal emergent marshes and tidal swamp forests. On narrow or constricted floodplains, discrete shrub-dominated communities occur along ecotones or transitional areas and may not be physiognomically distinct. Stands occupying rather expansive marshes or large estuary meanders on broader floodplains are commonly fronted or surrounded by emergent marshes forming depositional islands. Slightly elevated and distanced from tidal influence, these communities tend to be less frequently flooded. The vegetation of tidal freshwater shrub wetlands is very diverse and typically contains species characteristic of both tidal marshes and swamp forests. Shrubs such as smooth alder, winterberry, swamp rose, northern arrow-wood, and silky dogwood are common. Pronounced hummock and hollow microtopography is characteristic and contributes to relatively high species richness with most species confined to irregularly flooded hummocks.

Nontidal Emergent Wetlands: These are inland freshwater wetlands dominated by herbaceous vegetation. Unlike tidal fresh marshes (see description under Tidal Marshes), which can encompass large areas (> 100 ha), most nontidal emergent wetlands are small (< 10 ha), frequently occurring as small patches within nontidal forest, shrub and emergent wetland complexes. Across the state, their composition and hydrology vary greatly. On the coastal plain, nontidal emergent wetlands frequently occur in Carolina bays where the y dominate the center of these seasonally to semi-permanently flooded depressional wetlands. Common dominants include Walter's sedge, twig rush, giant beardgrass, maidencane, warty panic grass, and mild water-pepper. Emergent wetlands also occur within coastal plain seepage bogs. These acidic wetlands are associated with oligotrophic spring- heads, toe slope seepage areas and small, braided headwater streams. The vegetation is typically a mosaic of shrubs, sphagnum and graminoid-dominated

herbaceous vegetation. West of the Fall Line, seasonally flooded meadows are the most common type of emergent wetland. Common plant species include cattails, soft rush, rice cutgrass, tussock sedge, halbeard- leaved tearthumb, sweetflag, and skunk-cabbage. The vegetation in these wetlands varies widely depending on the region, wetland hydrology, depth, size, substrate and other conditions.

Tidal Marshes: Tidal marshes include freshwater, brackish, and salt marshes that are flooded twice daily by lunar tides. The vegetation in freshwater marshes is very diverse, dominated by aquatics that are emergent at high tide. Typically there are two distinct zones in a tidal freshwater marsh: a low elevation zone dominated by short, broad- leaf emergents bordering mudflats or open water, and a slightly higher-elevation area dominated by tall graminoids. Plants in the low zone may include spadderdock, arrow arum, and pickerel weed, while higher zones often support species such as wild rice, jewelweed, sweetflag, dotted smartweed, rice cutgrass, tearthumbs, and beggar-ticks. Tidal brackish marshes are transitional wetlands between tidal freshwater systems and salt marshes. Species diversity in brackish marshes is low and dominated by graminoids that often form extensive dense patches. Salt marshes or salt meadows along the coast and lower portions of the Chesapeake Bay form essentially flat plains of low-statured vegetation with moderate species diversity and distinct zonation between low and high salt marshes. Lower, more regularly flooded salt zones with lower salinity are often dominated by saltmarsh cordgrass and extensive stands of black needlerush. Shorter-statured salt marshes or salt meadows are dominated by saltgrass and small saltme adow cordgrass and generally occur on slightly elevated surfaces where tides may be less regular and where soils may concentrate salts. High salt marsh zones often support a diverse assemblage of plants that may include species such as annual salt-marsh
aster, perennial salt- marsh aster, sea-oxeye, sea- lavender, glassworts, sea rose-pink, saltmarsh false foxglove, and narrow-leaved loosestrife.

Grasslands: These habitats are upland treeless areas dominated (> 80% cover) by herbaceous vegetation. Most of the state's remaining grassland fauna mostly persists in one or more of the following settings: (1) agricultural fields (e.g., hayfields, pastures, certain croplands, grass buffer plantings); (2) fallow fields; (3) recent clearcuts; (4) reclaimed strip mines on the Allegheny Plateau; (5) mowed edges of airports and military airfields; and (6) remnant natural grassland communities.

Barrens and Dry Glades: These habitats include habitats that have developed on shallow soils over bedrock of serpentine, sandstone, and shale. The plant communities associated with them are structurally intermediate between forests and open canopy uplands, often consisting of sparse woodlands, shrublands, and grass savannas. Most of these habitats are kept from succeeding to closed forests by periodic fire, edaphic factors, and unstable substrates.

Rock Outcrops and Cliffs: These are tall (up to 50 m high), steep to vertical expanses of bare to sparsely vegetated bedrock and/or soil. The differences between the two are subtle but cliffs are generally considered tall, sheer vertical walls of rock or soil while outcrops consist of steep to vertical, exposed rock formations with well developed fissures and crevices. Vegetation in and around outcrops also varies depending on the physiographic region, elevation, slope, aspect, geological formation and other factors. On the steepest, most exposed sections, vegetation is absent except for patches of lichens and mosses growing on rock surfaces. On less exposed

areas, scattered, sometimes dense patches of shrubs (e.g., mountain laurel, great- laurel), huckleberry, and blueberry along with scattered, stunted trees (e.g., chestnut oak, pitch pine, America mountain-ash, table mountain pine, and eastern hemlock) may be present. The surrounding vegetation, which influences the types of outcrop fauna present, ranges from northern conifer-hardwoods and mesic deciduous forest to dry oak-pine forest.

Coastal Beaches, Dunes, and Mudflats: These habitats are subject to extreme conditions associated with maritime environments such as salt spray, high winds, flooding, and shifting sands. Beaches are situated in front of primary dunes (foredune) above the mean high tide line and composed of unconsolidated sands and shells, which are constantly being shifted by winds and floods of storm surges and spring high tides. This dynamic disturbance regime severely limits vegetation to salt tolerant, succulent annuals such as American sea rocket and glassworts. In addition, broad overwashed flats may develop behind primary dunes when breaching occurs during storm surges. Most dunes in maritime environments are dominated by grasses and dwarf shrubs well adapted to gradients of soil moisture and salt spray. Sand movement is also an important factor in shaping dune communities. Active dunes, where sand movement is greatest, tend to support grasses such as American beachgrass, beach panic grass, and bitter seabeach grass, whereas stabilized dunes support low growing shrubs such as beach heather. Intertidal mudflats are subject to regular tidal flooding and exposure cycles twice a day. Substrates are variable depending on region ranging from fine-textured to moderately-coarse alluvium (i.e., unconsolidated sand, silt, clay, or gravel). The vegetation is notably sparse in these habitats, but is typically dominated by herbaceous species adapted to the flooding and exposure cycles.

Highland Rivers: Highland rivers consist of riffle/run and pool habitat sequences with substrate ranging from large boulders to sand and silt. The energy base for these systems includes large woody debris and leaf litter, as well as primary production by periphyton, phytoplankton, and aquatic macrophytes.

Piedmont Rivers: Large rivers of the Piedmont physiographic province are transition habitats between headwater streams and tidal portions of Chesapeake Bay. Physically, Piedmont rivers consist of large riffle/run and pool sequences with substrate ranging from large boulders to sand and silt. Although logs and leaf litter continue to play a large role in the food base of these systems, open tree canopies allow for the growth of periphyton, phytoplankton, and aquatic macrophytes providing additional sources of energy to the food chain. Connectivity between river channels and the adjacent floodplain is important for the movement and exchange of organic matter in these systems.

Large Coastal Plain Rivers: These habitats consist of predominately pool/glide habitat with sand and silt substrates. Large woody debris is an important element in structuring pool habitat and serves as an important source of coarse organic matter to riverine food webs. Open tree canopies allow for the growth of periphyton, phytoplankton, and aquatic macrophytes. These primary producers also form the base of energy flow within these systems. Connectivity between river channels and the adjacent floodplain is important for the movement and exchange of organic matter in Coastal Plain river systems.

Oligohaline Estuaries: This habitat is defined as waters whose depth is influenced by the position of the moon (tidal) that normally range from 0 to 5 parts per thousand salinity. It also

includes typically small segments of tributaries that drain into the Coastal Bays section of Maryland. Bottom sediments in this key wildlife habitat vary from large boulders and outcrops of bedrock near the limit of tidal influence to sands, silts and clays that often form relatively hard bottom. Water depths in this zone range from 0 to over 30 meters, with the shallowest areas exposed to air at low tide. Subtidal benthic habitats of low-salinity estuaries may include SAV beds and unvegetated mud, silt and/or sandy bottoms. Plant life may consist of SAV and macroalgae, with characteristic species including redhead grass, slender pondweed, naiads, sago pondweed, horned pondweed, wild celery, water stargrass and muskgrass.

Mesohaline Estuaries: This habitat is defined as Chesapeake Bay and Coastal Bays tidal waters that normally range from 5 to 18 parts per thousand salinity. Bottom sediments in this key wildlife habitat typically vary from hard-packed sands and clays to soft, mayonnaise-like silt in the deepest areas. Gravel beds do exist, however, in some well- flushed shallow areas. Critical shallow water features created by plants and animals include submerged aquatic vegetation (SAV) beds and American oyster beds. Because of the connection with upstream, high productivity habitat, animal and plant biomass is quite high. Subtidal benthic habitats of mid-salinity estuaries may include SAV beds, clam and oyster beds, and bare mud, silt and/or sandy bottoms. Plant life may consist of SAV and macroalgae, including widgeon grass, eelgrass, sago pondweed, wild celery and sea lettuce. The distribution and abundance of flora varies with water clarity, nutrient loads and other factors.

Polyhaline Estuaries: This habitat is defined as tidal waters of the Chesapeake Bay and Coastal Bays that normally range from 18 to 30 parts per thousand salinity. Bottom sediments in this key wildlife habitat typically vary from hard-packed sands and clays to soft, mayonnaise- like silt in the deeper troughs. Depths in this habitat range from tidally exposed to more than 40 meters. Critical shallow water features created by plants and animals include submerged aquatic vegetation (SAV) beds and American oyster beds. Because of the connection with the upper estuary zones, animal and plant biomass is quite high. Subtidal benthic habitats of polyhaline estuaries may include SAV beds, clam and oyster beds, and unvegetated mud, silt and/or sandy bottoms. Plant life may consist of SAV and macroalgae (seaweed), with widgeon grass, eelgrass, and sea lettuce as characteristic species. The distribution and abundance of flora varies with water clarity, nutrient loads and other factors.

Ocean: The Atlantic Ocean consists of benthic, pelagic and surface water habitats. This community is defined as open marine waters (salinity exceeding 30 ppt) and includes all substrate types: unconsolidated sands, muds and gravels; rock; reef; and aquatic beds. Bottom topography is generally gently sloping away from the shoreline, with occasional shoals, sand waves or shipwrecks providing local topography. Marine habitats are typically high energy, with waves and currents mixing waters of varying temperatures, salinities and nutrient levels. Lunar tides alter the water levels in the nearshore region
and generate currents at inlets, where marine waters are diluted with estuarine waters. Longshore currents transport sediment and zooplankton along nearshore margins, creating a dynamic habitat that is continually changing. Along the Mid-Atlantic coast, open ocean vegetative associations are limited to phytoplankton and macroalgae.

MASSACHUSETTS

Connecticut and Merrimack River Mainstems: Mainstem river habitats are characterized by wide, low gradient streambeds meandering through broad river valleys with extensive flood plains. Rapid or riffle habitat is extremely rare. Channel formation occurs during periods of extreme flow (often described by the period of occurrence; e.g., 100-year or 500-year floods).

Large- an Mid-sized Rivers: Large and mid-sized riverbeds shift and form braids and bend pools, as geology and gradient dictate. The rivers are typically not fully enclosed by tree canopies and begin to produce more of their energy through primary productivity. These changes in turn result in changes to the fauna that live within the habitat.

Coastal Bay: A coastal bay is a large body of water partially enclosed by land but with a wide outlet to the ocean.

Estuaries: Estuaries occur where fresh water rivers and streams reach the salt water areas of the coast. Estuaries are affected by tidal flows and are considered brackish water. The degree of salinity of estuaries varies along the length of the estuary and with tidal ebb and flow. Estuaries often have associated salt marsh habitat and are rich in nutrients

Upland Forest: Upland forest is land dominated by tree cover where soils are not saturated by water for extensive portions of the growing season. Two general types of upland forest occur in Massachusetts, namely northern hardwood (beech, birch, maple) forest (in western and north-central Massachusetts), and central hardwood (oak/hickory) forest (in eastern and south-central Massachusetts). Within each of these two general types, two "sub-types" occur, including northern hardwood, hemlock, white pine and spruce-northern hardwood, along with oak-hickory/white pine/hemlock and pitch pine-oak. Within the northern hardwood region of Massachusetts, the northern hardwood/hemlock/white pine type is most common, with the spruce-northern hardwood type occurring only in the higher elevations of the northern Berkshire mountains of Western Massachusetts and the Worcester-Monadnock plateau of north-central Massachusetts. Within the central hardwood region of Massachusetts, oak- hickory/white pine/hemlock is most common, with pitch pine-oak occurring on the relatively infertile, sandy soils associated with coastal areas of eastern Massachusetts and portions of the Connecticut River valley in central Massachusetts.

Large Landscape Mosaics: These are an aggregation of habitat patches, corridors, and matrices of adequate size and connectivity to support residency and long-term viability of wildlife populations. Natural lands which include both forest and open wetlands may be considered as a general descriptor for this habitat type.

Pitch Pine/Scrub Oak: This habitat applies to a broad suite of closely related, highly dynamic vegetation communities best described as a continuum. Pitch Pine/Scrub Oak communities occur on coarse sandy substrates that drain rapidly or on ridgetops with exposed bedrock. PPSO communities are associated primarily with the glacial moraines and outwash plains. communities are all disturbance-dependent and influenced by periodic fire, ice storms, tropical storms, insect irruptions, salt spray, land use history, and combinations of these and other factors. Pitch Pine/Scrub Oak composition and architecture depends on the timing, frequency, severity, intensity, and types of disturbances to which it is exposed. Frequent disturbance produces a

community dominated by low multi-stemmed scrub oak, with sparse emergent pitch pines, tree oaks with interspersed heath and grass patches, or a scrub oak savanna.

Small Streams: Small streams are the first locations in the upper reaches of the watershed where rainfall, runoff, and groundwater come together to form a defined stream channel, typically with year-round flow. Examples of small streams would be first- to third-order streams with a full canopy of mature trees and associated understory. The channel would most often be less than 30 feet wide and the drainage area could be less than 30 square miles. These streams often have naturally low fish diversity, low productivity and relatively high gradients. The substrates may be dominated by boulder and cobble in high-gradient watersheds like the Westfield, or gravel and sand in lower gradient watersheds like the Taunton. In most cases, small streams are dependent on groundwater for a high percentage of their annual flow and have food webs that are highly dependent on additions of nutrients from the surrounding vegetation.

Shrub Swamps: These are shrub-dominated wetlands occurring on mineral or mucky mineral soils that are seasonally or temporarily flooded or saturated. They often occur as a successional area between freshwater marsh and forested swamp and occur in association with other wetland types in wetland complexes. These wetland tall shrub thickets are generally flooded in spring and early summer, with water levels dropping below the soil surface by late summer or early fall. Shrubs are perennial woody plants that have multiple stems and are generally less than 20 feet tall. There are usually at most scattered trees in shrub swamps, and the shrubs themselves produce at least 25% ground cover. The variability comes from effects of different climatic influences, topography, hydrologic regimes, amount and types of mineral enrichment in surface and groundwater, and particularly from the effects of past land use, all of which provides much confusion in interpretation of succession and direction. Shrub swamps can be dominated by one of, or a few of, or have a mixture of, the following shrub species: alders, sweet pepper-bush, buttonbush, winterberry, highbush blueberry, swamp azalea, maleberry, dogwoods, arrow-woods, meadowsweet, sweet gale, willows, poison sumac, and the non-native shrub European alder-buckthorn. Scattered red maple or gray birch saplings also occur. Shrub swamps in areas with circumneutral water are often dominated by spicebush. Willows are particularly common in swamps with more calcium-rich waters. Shrub swamps are often found in areas of transition from either uplands or open water to peatland habitats. In areas with calcium-rich water where peat is not well developed, shrublands are particularly found in transitional areas. Many such areas are mosaics of patches of shrubs and more open sedges or cattails. Dense shrub zones often develop around the edges of bogs where mineral water influence keeps peat from developing. Shrub swamps often succeed to forested swamps. Other areas that support shrub swamps include kettleholes that receive frost late enough in the spring to kill tree species. Since shrubs often form dense thickets, the herbaceous layer of shrub swamps is often sparse and species-poor. A typical mixture of herbaceous species might include skunk cabbage, various ferns (especially cinnamon fern, sensitive fern, and royal fern), sedges, and sphagnum moss, with common arrowhead in wetter areas. Water-willow grows in the more open areas of shrub swamps.

Forested Swamps: These are wetlands where trees dominate the vegetation and there is generally little buildup of peat. Soils are saturated for much of the growing season, often with standing water in the spring. Forested swamps are the most abundant types of all wetlands in the northeastern United States. They usually occur as patches or large patches within the surrounding upland matrix forest. They follow patterns of differences similar to the upland forests: in the

northern hardwood zone of western and north-central Massachusetts, forested swamps are cold and often conifer dominated. In the warmer southern and eastern sections of the state and in the central hardwood area, forested swamps are dominated by red maple or Atlantic white cedar. They occur in stream headwaters, behind floodplain forests, and in poorly drained basins. Spruce-fir Boreal Swamps, Hemlock Hardwood Swamps, and Atlantic White Cedar Swamps are coniferous, thus dark and acidic with year-round cover. Red Maple Swamps are the most common forested wetlands in Massachusetts. Red maples often occur with other hardwood tree species in particular situation. Calcareous seepage swamps are among the least common types of forested wetlands. Forested swamps develop in poorly drained areas throughout the state. Depending on the physical setting, forested swamps receive water through surface runoff, groundwater inputs, or stream and lake overflow. The hydrogeologic setting is the primary determinant of water regime and the plant community structure and composition, and so of animal habitat. Although some swamps are on mineral soils, most have some amount of muck - shallow to thick organic layers overlying mineral sands/silts or even bedrock. Peat accumulation is minimal at most sites for most types of forested swamps, but some accumulation does occur. Many occurrences of forested swamps have some groundwater seepage at their edges.

Lakes and Ponds

Salt Marsh: These are wetland habitats located between the high spring tide and mean tide levels of protected coastal shores. . Low marshes flood with salt water in every tide and are only exposed for brief periods during low tide. High marshes, on the other hand, are submerged only during the highest tides. Shrubby areas, salt shrub, are on slightly higher areas within the marsh or towards the upper edges. Slightly lower areas within the marshes can form salt pannes where seawater is held as tides recede.

Coastal Dunes, Beaches, and Small Islands:

Maritime Beach Strand Community: This is the classic upper beach, familiar to all who have visited the coast. Sparsely vegetated, this long, narrow natural community lies between the wrack line and low tide, saturated or subaqueous zone of and high tide and the foredunes. Usually part of a barrier beach system, seaward of the dunes, this part of the beach is above the daily high tides and is highly dynamic. However, beach strands are subject to overwash during storms and spring tides and are continuously reshaped by wind and water. Beach strands are often separated from the mainland by lagoons, estuaries and great salt ponds.

Maritime Erosional Cliff Community: These sand or and clay sea cliffs are composed of glacially derived sands, cobbles and boulders eroded by the sea, especially during storms. Active erosion of the cliffs by wind and wave dictate slope and stability at any given moment. While vegetation is generally very sparse on these cliffs, it is most diverse where freshwater seepage emerges through the bluff and in portions with low relief.

Maritime Dune Community: This is the classic community of sand dunes, dominated by dune grass with patches of herbaceous plants interspersed with areas of bare sand and shrubs. In well-developed systems, interdunal swales occur. The maritime dune community occurs on windswept dunes, within the salt spray zone, often landward of the

Beach Strand Community and grading into shrubland, heathland or woodlands on the more sheltered back dunes. Dunes are deposited by wind, water action or and storm overwash. The propensity of dunes to move over time, because of wind and wave action, is an important component of this habitat.

Small Islands: Small islands off the Massachusetts coast are varied in their composition. Some are small sandy or cobbly bars, just barely above high tide. Some are resistant bedrock, with steep rock cliffs dropping directly into the ocean. Some harbor short, wind-twisted trees, but many are grassy or shrubby, in part due to wind and salt spray, but also because many islands were cleared of timber and used for grazing or agriculture during colonization historically. Often, these cleared islands have not yet and may never revert to woodlands.

Grasslands: Disturbance-dependent habitats dominated by grasses are almost entirely anthropogenic communities and exist as a wide variety of types in Massachusetts.

Active pastures: Active pastures have usually been planted with non-native, cool-season forage grasses and are maintained by grazing livestock or mowing.

Airports and military bases: A few large grasslands located on airports and military bases in the state support grassland-dependent birds, such as Upland Sandpiper and Grasshopper Sparrow, and serve as important habitats for grassland dependent insects. These are the only mainland sites in Massachusetts large enough to support area-sensitive grassland birds.

Abandoned pastures: Abandoned pastures are extremely ephemeral and show a rapid increase in woody vegetation. These serve as habitat for a succession of animal communities that parallels the sere of the vegetation communities.

Native upland grasslands: Native grasslands dominated by little bluestem occur throughout the state in various sizes and configurations. The best and largest extant examples occur on Martha's Vineyard and Nantucket on lands that were plowed and grazed for decades. The effects of tropical storms, salt spray, coastal winds delayed their succession to shrubland, woodland and forest.

Wet meadows: Wet meadows occur in numerous situations, resulting from agricultural practices or controlled by hydrological dynamics.

Young Forests and Shrublands: These are also collectively referred to as "thicket" habitats. Young forest habitats are typically dominated by rapidly growing trees and shrubs, and generally occur when a mature forest canopy is disrupted, allowing sunlight to stimulate the growth of herbaceous and woody vegetation on the forest floor. Shrublands are defined here as relatively ephemeral, upland habitats that are dominated by low woody vegetation (generally <3 m tall), with varying amounts of herbaceous vegetation and sparse tree cover. Shrublands primarily include abandoned field sites and power line corridors that would ultimately revert to forest absent some human or natural disturbance (e.g., mowing or burning), and abandoned beaver

flowages along forested stream courses, which typically succeed from wet meadow to drier herb/shrub habitat, and eventually revert to forest in the decades following abandonment. Enduring shrubland habitats also occur, and include both pitch pine-scrub oak communities on relatively dry upland sites, as well as shrub-dominated wetland communities.

Riparian Forests: Riparian forests occur in a linear form along streams or rivers, following the stream or river meanders. Their soils and moisture levels are influenced by the adjacent streams and rivers. Riparian forests include all the types of floodplain forests, alluvial forests, and streamside forests. Along bigger rivers the floodplain is quite wide; narrower streams have narrower riparian zones. Floodplains are of variable width, sometimes with adjacent uplands occurring distinctly; in other places the changes are gradual, reflecting occasional flooding and flatter topography. In general, riparian forests are flooded in the spring and dry out during the growing season, although floods may occur at anytime. Riparian zones vary with timing, magnitude and duration of flooding, flow rate, and the types of sediments carried and dropped by the floodwaters. These transition areas connect rivers to uplands and they provide distinct habitats in themselves. They protect the uplands from the river in flood, and protect the river by slowing runoff and absorbing inputs from the uplands.

Peatlands: Peatlands are freshwater wetlands where plants grow on partially decomposed plant remains. The "soil" – peat – is usually saturated for most of the year (if not, it decomposes). Deep peat separates the plants from the mineral soil and its nutrients, leaving vegetation composed of plants adapted to low-nutrient, usually acidic, wet conditions. Peatlands can be forested or open. Peatland areas often include a mosaic of forested, shrub-covered, and open peatlands.

Bogs: Bogs are among the best-known peatlands and generally have the thickest peat. Bog communities receive little or no streamflow and they are isolated from the water table, making them the most acidic and nutrient-poor of peatland communities. The pH of bogs is in the range of 3 to 4. Bogs occur in a variety of physical settings such as along pond margins, at the headwaters of streams, in kettleholes, or in isolated valley bottoms without inlet or outlet streams. Most are dominated by dwarf ericaceous shrub species growing on sphagnum moss, generally with pronounced hummock-hollow topography. Forested bogs are late-successional peatlands that typically occur on thick peat deposits. Most forested bogs are dominated by spruce or tamarack, although some, mostly in the southeastern part of the state, have an open canopy in which Atlantic white cedar is the characteristic tree species.

Fens: These are shallower peatlands where plants have more access to mineral water and, so, to more nutrients. They tend to be less acidic than bogs. Acidic fens tend to have more diversity of plant species than do bogs. Acidic graminoid fens typically have some standing water present throughout much of the growing season. Peat mats are quaking and often unstable.

Marshes and Wet Meadows: As defined here, this habitat type includes deep and shallow emergent marshes, wet meadows, kettlehole wet meadows, coastal interdunal marshes/swales, calcareous sloping fens, calcareous seepage marshes, calcareous basin fens, and acidic graminoid fens.

Deep Emergent Marsh: Deep emergent marshes generally form in broad, flat areas bordering low-energy rivers and streams or along pond and lake margins. The soils are a mixture of organic and mineral components. There is typically a layer of well-decomposed organic muck at the surface overlying mineral soil. There is standing or running water during the growing season and throughout much of the year. Water depth averages between 6 inches and 3 feet. Deep emergent marshes are associated with shrub swamps, and the two communities intergrade.

Shallow Emergent Marsh: Shallow emergent marshes occur in settings similar to those of deep emergent marshes, i.e., in broad, flat areas bordering low-energy rivers and streams, often in backwater sloughs, or along pond and lake margins. Unlike deep emergent marshes, shallow marshes commonly occur in abandoned beaver flowages, and in some states this type of natural community is named "abandoned beaver meadows" or "beaver flowage communities." The soils are a mixture of organic and mineral components. There is typically a layer of well-decomposed organic muck at the surface overlying mineral soil. There is standing or running water during the growing season and throughout much of the year, but water depth is less than deep emergent marshes and averages less than 6 inches.

Wet Meadow: Wet meadows occur in lake basins, wet depressions, along streams, and in sloughs and other backwater areas with impeded drainage along rivers. The mucky mineral soils are permanently saturated and flood occasionally, but standing water is not present throughout the growing season, as in deep and shallow emergent marshes. As these communities flood only temporarily, continued disturbance is necessary to prevent encroachment by woody plants.

Kettlehole Wet Meadow: Kettlehole wet meadows are a variant of wet meadows that are restricted to glacial kettleholes in sandy outwash soils that have seasonal water level fluctuations. They are seasonally inundated by local runoff and groundwater fluctuations, and they typically have no inlet or outlet. For most of the summer, they look like shallow ponds, but by late summer they are covered by emergent vegetation. Soils are typically shallow, mucky peats. Deep peat does not develop due to the seasonal drawdown of water. The hydrology of kettlehole wet meadows is similar to coastal plain ponds. Both are characterized by a series of plant associations occurring along a gradient from the higher, drier margins to the lower, wetter centers. Kettlehole wet meadows can function as vernal pool habitat if water remains standing for 2-3 months; these areas provide important amphibian breeding habitat.

Coastal Interdunal Marsh/Swale: Interdunal swales are low, shallow depressions that form between sand dunes along the coast. They occur as part of a dune system, and the best examples are complexes of numerous swales. Soils generally have a thin organic layer (about 1 cm) over coarse sand. The water regime ranges from seasonally flooded to permanently inundated.

Calcareous Sloping Fen: These fens are open, sedge-dominated wetlands occurring on slight to moderate slopes where there is calcareous groundwater seepage. Where there is

heavy groundwater discharge, the mineral soil is exposed. There can also be small hummocks of organic matter accumulation. Sites that are more highly disturbed have less woody shrub growth.

Calcareous Seepage Marsh: This natural community is a mixed herbaceous/graminoid/shrub wetland, which experiences some calcareous groundwater seepage. This community type is found in a variety of physical settings - in basins, in canopy gaps in rich forested swamps, in current or former beaver drainages, or in level to slightly sloping sites associated with sloping fens. There are typically 50-200+ cm of moderately to well-decomposed organic sediments.

Calcareous Basin Fen: Calcareous basin fens are sedge-shrub peatlands occurring in well-defined basins that have calcareous groundwater, and sometimes surface water, inputs. Calcareous basin fens are the least rich of the three calcareous fen communities described in Massachusetts. Calcareous basin fens occur in well-defined basins with deep organic sediments, permanently saturated conditions, and consolidated or floating, sedge-dominated organic mats. Based on sediment core information from one such fen in western Massachusetts, this community appears to have existed at the site for a few thousand years and there is no evidence of rapid infilling or terrestrialization.

Acidic Graminoid Fen: Acidic graminoid fens are mixed graminoid/herbaceous acidic peatlands that experience some groundwater and/or surface water flow, but no calcareous seepage. Shrubs occur in clumps but are not dominant throughout. Acidic graminoid fens typically have some surface water inflow and some groundwater connectivity. Inlets and outlets are usually present, and standing water is present throughout much of the growing season.

Rocky Coastlines

Rocky Cliffs, Ridgetops, Talus Slopes, and Other Similar Habitats: This habitat type is a composite of several separate and distinctive natural communities, but often these natural communities are adjacent to each other (e.g., a rock cliff may have a talus slope below it and a rocky ridgetop and open rock outcroppings above it). Rock cliffs, talus slopes, and rocky ridgetops and outcroppings may be of acidic, circumneutral, or calcareous bedrock, and may be open to the sun or partially to mostly shaded by woodland forest. Often there is little soil formed on these areas, in part because of steepness and the resulting rapid erosion, but also because these areas are likely to be well-drained, open to the drying effects of the wind and sun, and subject to more frequent fire than many lowland areas. Small fires started by lightning or people in these rocky areas are likely to spread more than similar fires in lowland areas because the litter in rocky areas is drier, and fire suppression efforts are likely to be more difficult. Wind storms, ice storms and boulder slides also influence vegetation composition and structure on ridgetops and talus slopes.

NEW HAMPSHIRE

Alpine: In New Hampshire, alpine habitat occurs above treeline (trees taller than 6 ft) at approximately 4,900 ft, primarily within the Franconia and Presidential Ranges. This region

endures high winds, precipitation, cloud cover, and fog, resulting in low annual temperatures and a short growing season. The interaction between severe climate and geologic features—such as bedrock, exposure, and aspect—determine the distribution and structure of alpine systems. Alpine habitat is comprised of low, treeless tundra communities embedded in a matrix of bedrock, stone, talus, or gravel, with or without thin organic soil layers, and interspersed with krummholz. Soils are well drained, highly acidic, nutrient poor, and weakly developed (Sperduto and Cogbill 1999).

Alpine systems are comprised of 5 broad groups of communities: diapensia shrublands, alpine herbaceous snowbank/wet-mesic alpine communities, alpine/subalpine bogs, heath-krummholz communities, and dwarf shrub-sedge-rush meadow communities. Diapensia shrublands occur on exposed windblown ridges above 4,300 ft and are characterized by a high abundance of *Diapensia lapponica* supported on a rock or gravel substrate. Alpine herbaceous snowbank/wet-mesic alpine communities are typically sloped, have shallow organic soils, and associated with late-melting snowpacks, seeps, rills, and ravine settings. They are by dominated by *Geum peckii, Solidago macrophylla,* and *Calamagrostis canadensis* and occur between 4,400 and 5,500 ft. Alpine/subalpine bogs occur at elevations ranging from 2,900 to 4,900 ft within concavities and are dominated by *Vaccinium uliginosum* and *Empetrum nigrum*. Heath-krummholz communities are composed of wind-dwarfed thickets of trees, primarily *Picea mariana* or *Abies balsamea*, distributed as a continuous zone between 3,800 and 4,800 ft or intermixed with heath shrubs, primarily bilberry, cranberry, and blueberry. Dwarf shrub-sedge-rush meadow communities dominate much of the vegetated portion of the alpine zone at elevations ranging from 4,600 to 5,600 ft. *Carex bigelowii*, *Juncus trifidus*, bilberry heaths, and cranberry heaths characterize this habitat.

Appalachian Oak Pine Forest: These systems are found mostly below 900 ft elevation in southern New Hampshire south of and at lower elevations than the hemlock-hardwood-pine forest system. The southern-most portions of the state are associated with the warmer and drier climatic conditions and apparently more fire-influenced landscapes that prevail south of New Hampshire in lower New England. Substrates in these forests include nutrient-poor, dry to mesic sandy glacial tills, and some large areas of sand plain or shallow-to-bedrock tills, particularly in the seacoast and lower Merrimack and Connecticut River valleys. Sand plains in these areas that have a frequent fire history correspond to pitch pine sand plain; those with a less frequent fire regime (i.e., more than 50 to 100 years) are classified as oak pine forest or sometimes hemlock hardwood pine forest systems depending on the composition of trees. More isolated patches of oak pine forest systems are found to the north in central New Hampshire associated with dry rocky ridges or sand plains with a historic fire regime.

Cliffs: These are steep rocky outcrops greater than 65° in slope and 3 m in height. They are more fractured and limited in soil accumulation than other types of rocky outcrops (Sperduto and Nichols 2004). Cliffs are exposed to the elements, do not accumulate significant amounts of snow pack, and may be protected from runoff by overhangs. Vegetation is sparse and is usually restricted to cracks and crevices where soil accumulates. Although cliffs are generally dry, seeps do occur and may influence vegetation, pH, and nutrients. Vegetation of acidic cliffs commonly includes three-toothed cinquefoil (*Potentilla tridentata*), fragile fern (*Cystopteris fragilis*), mountain cranberry, (*Vaccinium vitis-idaea*), sheep laurel (*Kalmia angustifolia*), and stunted trees such as red oak (*Quercus rubra*) and paper birch (*Betula papyrifera* var. *papyrifera*).

Circumneutral cliffs—which are rare in New Hampshire—are often vegetated with the state endangered smooth woodsia (*Woodsia glabella*) and creeping juniper (*Juniperus horizontalis*), state threatened fragrant fern (*Dryopteris fragrans*), and rare bryophytes such as *Distichium capillaceum, Gymnostemum aeruginosum*, and *Tortella tortuosa*. Calcareous cliffs are even more rare than circumneutral cliffs and support species such as bulblet bladder fern (*Cystopteris bulbifera*), zig-zag goldenrod (*Solidago flexicaulis*), and small trees and shrubs, such as eastern red cedar (*Juniperus virginiana*) and downy arrow-wood (*Viburnum rafinesquianum*).

Coastal Islands: Coastal islands have rocky shores, are usually remote, undisturbed, and free of predators. Coastal islands are vegetated by grasses, herbaceous plants, and shrub thickets that grow among rocky outcrops, and have few to no trees. These islands tend to be rocky and barren, and overgrown by grasses, herbaceous plants, and dense shrubs. The rocky intertidal areas are dominated by blue-green algae, lichens, and various mollusks and gastropods. The vegetation on mainland islands closely reflects the upland and wetland communities that are typical of the mainland near that island.

Connecticut River Mainstem Watersheds: Bedrock geology is more calcareous in this watershed group than in any other in New Hampshire. Bedrock geology changes dramatically on the Vermont side, becoming even more enriched. This enriched bedrock extends into New Hampshire towns immediately adjacent to the Connecticut River. Despite the potentially distinct geologic difference between New Hampshire and Vermont, the aquatic species moving throughout the Connecticut River and its immediate tributaries are likely to be similar. Large-scale threats and land-use patterns are similar throughout the Connecticut River corridor. Watersheds in this group have moderate elevations and moderate or gentle hill and side slopes. Every watershed in this group borders or encompasses the mainstem of the Connecticut River, and so there are also low floodplain terraces and wet flat landforms. The Connecticut River mainstem, tributaries, and small headwater streams provide a wide range of aquatic habitats for both warm and coldwater species. Rivers in this watershed group can have diverse habitats with moderate and slow moving sections and a variety of substrates and vegetation. Elevation is the dominant characteristic that splits the Connecticut River watershed group into two distinct systems. Fine scale system 1 is a more northerly, upstream collection of watersheds. It is higher in elevation with slightly more side slope and hilltop landforms. The Connecticut River mainstem meanders through large adjacent floodplains in this region. Fine scale system 2 has slightly more calcareous bedrock, more than any other watershed type in the state, which is mixed with acidic bedrock. In this area, the Connecticut River mainstem is more confined, flowing through deep coarse sediment rather than the deep fine sediment of wetlands and floodplains in fine scale system 1.

Coastal Sand Dunes: These are areas of sand and gravel that are deposited by wave and wind action within a marine beach system. Dunal formations include beach berms, frontal dunes, dune ridges, back dunes, and other sand and gravel areas. The coastal sand dune system is characterized primarily by American beach grass (Ammophila breviligulata) in the frontal dunes and by beach plum (Prunus maritime) in the back dunes. Coastal sand dunes are typically transverse dunes that form at right angles to prevailing winds. Waves bring sand to the shore where it is transported by onshore winds. Sand is considered any loose, granular material with grains 0.05 to 2.0 millimeters in diameter. Sand comes from igneous, metamorphic, and

sedimentary rock. Obstacles such as driftwood, fencing, or vegetation reduce wind speed and cause sand to accrete. As sand accumulates, plants adapted to the beach environment emerge, stabilizing the surface and promoting further dune formation. Dune plants are subject to fluctuating environmental conditions that affect their growth, survival, and community structure. The most important factors include temperature, desiccation, low moisture retention, soil erosion, sand accretion, soil salinity, salt spray, changes in organic matter and pH. Other types of vegetation that occur in the shifting sands of the frontal dunes and dune ridges include seaside goldenrod (Solidago sempervirens), hair hudsonia (Hudsonia tomentosa var. tomentosa), poverty oat grass (Danthonia spicata), little bluestem (Schizachyrium scoparium), beach pea (Lathyrus japonicus), seabeach pinweed (Lechea martima), jointweed (Polygonella articulata), perennial umbrella-sedge (Cyperus lupulinus), sea-beach needlegrass (Aristida tuberculosa) and Gray's umbrella-sedge (Cyperus grayi). Sandy soils are typically more stable in the back dunes, allowing other types of vegetation to grow, including climbing poison ivy (Toxicodendron radicans), Virginia rose (Rosa virginiana), small sundrops (Oenothera perennis), yarrow (Achillea millefolium) and large climbing false buckwheat (Polygonum scandens).

***Floodplains*:** These habitats occur in river valleys adjacent to river channels and are prone to periodic flooding. Floodplains are often comprised of forests, oxbows, meadows, and thickets. The habitats, vegetation, and hydrologic regime of floodplains are strongly influenced by watershed size, gradient, and channel morphometry. Most open or partially wooded floodplain communities occur on low floodplains. Sloughs, oxbows, vernal pools, and other depressions in the floodplain tend to be inundated for longer periods than low floodplains. Floodplain soils range from well-drained coarse sand on levees to poorly drained silts and mucks in depressions, and tend to be moderately to strongly minerotrophic.

Montane/near-boreal floodplains are found primarily along rivers in the White Mountains or northern New Hampshire, and have relatively high gradients and flashy flood regimes compared to other floodplain systems. Sugar maple and balsam fir are dominant trees, and riparian wetlands such as oxbows and sloughs are uncommon in these high-gradient floodplains.

M*ajor river silver maple floodplains* occur primarily along the Connecticut and Merrimack Rivers, and occasionally on lower reaches of major tributaries. These floodplains are often interspersed with oxbow marshes and shrub communities. The forested areas are characterized by a canopy of silver maple (*Acer saccharinum*) over a lush herbaceous layer, with a sparse shrub layer.

Temperate minor river floodplains are found along large streams and small rivers in central and southern New Hampshire. These ecosystems are usually comprised of a mosaic of red maple forests, oxbows, vernal pools, and shrub thickets. Minor river floodplains generally have reduced flood intensity and duration compared to large river floodplains. In addition to red maple, sycamore and swamp white oak floodplain forests occur less commonly.

Grasslands: Extensive grasslands are defined as areas greater than 10 ha that are dominated by grasses, forbs, and sedges with little shrub or tree cover (generally les than 10%). Grasslands include hayfields and pastures, fallow fields, cropland (cornfields and other row crops), airports, military installations, landfills, forb, and sedge-dominated meadows, heathlands, and similar non-alpine areas. Native plant species typical of northeastern grassland include goldenrod (*Solidago* spp.), aster (*Aster* spp.), big bluestem (*Andropogon gerardii*), little bluestem

(*Schizachyrium scoparium*), and meadowsweet (*Spirea alba*). Rare plant species found in New England grassland include wild lupine (*Lupinus perennis*), butterfly weed (*Asclepias tuberosa*), and northern blazing star (*Liatris scariosa* var. *novae-angliae*).

Hemlock Hardwood Pine Forests: These are a transitional forest regions or "tension zones" in New Hampshire. In latitude and elevation, they occur between hardwood conifer forests to the north (mostly above 1,400 ft) and oak pine (Appalachian or central hardwood) forests to the north (mostly below 900 ft). This transitional forest lacks most boreal species and central hardwood species that characterize these other forests, but has many Alleghanian species such as *Pinus strobus* (white pine) and *Tsuga canadensis* (hemlock). Many of the other species of this system are common throughout eastern United States. Dry-mesic to mesic glacial till soils are most abundant, but this system also occupies river terraces, sand plains, and stabilized talus areas covered by a forest canopy. It includes dry, sandy soils with red oak and white pine that have not been burned enough to support pitch pine sand plains system. These areas are likely to succeed to hemlock and/or beech over the long term without the return of fire. The main matrix forest community that defines this system is hemlock beech oak pine forest. Hemlock and beech are the primary late-successional trees in this community, with maximum ages of about 500 and 300 years, respectively. *Quercus rubra* (red oak) and *Pinus strobus* (white pine) are also typically abundant, in contrast to their absence or low abundance in northern hardwood conifer forest systems. *Acer saccharum* (sugar maple) and *Betula alleghaniensis* (yellow birch) are occasional but of less importance than in northern hardwood conifer forests. They are most frequent in mesic areas such as concavities and along drainages where *Fraxinus americana* (white ash) is frequent, or locally abundant in patches of semi-rich sugar maple forests. *Picea rubens* (red spruce) and *Abies balsamea* (balsam fir) are generally sparse or absent, but are occasional on the lower slopes of some mountains south of the White Mountains (i.e., Ossipee Mountains, Mt. Monadnock). Central hardwood/ Appalachian species are essentially absent, including hickories (*Carya* spp.), oaks (*Quercus* spp.) other than red oak, dogwoods, and southern herbs (see oak – pine forest description). These more southern species appear in occasional outposts in the south, where oak pine forests dominate.

Numerous herbs are ubiquitous in both the northern hardwood conifer and hemlock hardwood pine forest regions, including *Trientalis borealis* (starflower), *Aralia nudicaulis* (wild sarsaparilla), and *Maianthemum canadense* (Canada mayflower). Plants more prominent in hemlock hardwood pine forests than in northern hardwood conifer forests include *Hamamelis virginiana* (witch hazel), *Betula lenta* (black birch), *Prunus serotina* (black cherry), *Ostrya virginiana* (ironwood), *Viburnum acerifolium* (maple-leaved viburnum), *Gaultheria procumbens* (wintergreen), and *Gaylussacia baccata* (black huckleberry).

Variation in soils or landscape position within this system explains much of the variation in community composition. Hemlock forests often occur in ravines or extremely rocky sites; beech forests occur on coarse washed till soils; semi-rich mesic sugar maple forests occur in colluvial landscape positions or are associated with bedrock or till with greater base-cation contributions to the soil; hemlock beech northern hardwood forest occurs in more mesic settings or at higher elevations near the transition to northern hardwood conifer forests; dry red oak – white pine forests occur on sandy or rocky soils that may perpetuate oak and pine dominance locally with repeated disturbance.

High Elevation Spruce Fir Forests: Harsh climatic extremes and highly erosive soils play a significant role in determining the structure and species composition of high elevation spruce fir forests found in New Hampshire. Increased rainfall (more than 6 in per 1000 ft in elevation), snow cover (increase in weeks of snow cover per year), relative humidity (resulting in prolonged cloud cover) and wind movement (up to 25% more at 3,800 ft), coupled with decreased mean air temperature (decrease in number of frost free days) and shallow, nutrient poor soils result in stands predominated by coniferous tree species. The coniferous stands found at high elevations experience drastically slowed and limited growth due to the truncated growing season and harsh climatic extremes and have been separated into 4 primary natural communities: high elevation spruce fir, high elevation balsam fir, montane black spruce-red spruce, and northern hardwood-spruce fir. High elevation spruce-fir forests can be found between 2,500 and 3,500 ft. in elevation on upper mountain slopes and ridge tops. Forest composition has been influenced by disturbance history, soils, and elevation. High elevation soils are generally very nutrient-poor, with a deep, slowly decomposing humus layer and therefore can impact species composition and growth. Characteristic vegetation includes red spruce (*Picea rubens*), balsam fir (A*bies balsamea*) and heartleaf, paper and yellow birches (*Betula spp.*).

High elevation balsam fir forests are found within the spruce-fir zone (3,500 to 4,500 ft) and can be considered the transition zone to black spruce (*Picea mariana*)/balsam fir krummholz or heath/krummholz which was categorized with the alpine zone for this process. Fir waves are often found within this zone and are characterized as linear patches of blow down or standing dead trees, oriented perpendicular to the prevailing wind, and arranged in a progression of waves of different age regeneration. Characteristic vegetation includes balsam fir (dominant), birch, and red spruce (occasional).

Montane black spruce-red spruce forests are uncommon to rare in New Hampshire and are found at mid to high-elevation valley bottoms (2,500 to 3,000 ft.) in the White Mountains. Characteristic vegetation includes black spruce, and red spruce, mixing in with balsam fir.

Northern hardwood-spruce-fir forests are a transitional forest type found at intermediate elevations (2,100 to 2,800 ft). This forest type generally has lower productivity, increased moisture availability, and a higher percent cover of herbaceous species compared to lower elevation forests. Habitats that may be embedded in high elevation spruce-fir forests include alpine communities, rocky ridges, cliffs, talus slope, and high elevation wetlands. See associated profiles.

Coastal Transitional Watersheds: These systems encompass watersheds with low elevation and some areas of moderate elevation between 800-1,700 ft. These watersheds include major tributaries to the Merrimack River and those watersheds dominated by large lakes and their tributaries in New Hampshire's Lakes Region. Acidic bedrock and sandy outwash plains are dominant. Several watersheds extending into Maine have a much higher percentage of calcareous bedrock, but these enriched sections do not influence the New Hampshire headwaters. The larger rivers in this watershed group are low gradient and meandering. There are greater percentages of moderate and high gradient tributaries in this watershed group than in the low tidal and low non-tidal groups, although low and very low gradient tributaries still dominate and very high gradient tributaries are nonexistent. Habitats in this group are dominated by riffle-pool systems. There are some habitats with step-pool systems in high gradient areas and some with dune-ripple systems in areas of very low gradient, high sinuosity, and deep sands. Fish communities are dominated by warmwater species, although some coldwater communities may

be found in areas with high groundwater input and/or higher elevation. The large lakes found in this watershed group provide unique habitats for a variety of lake-associated plant and animal species.

Non-tidal Coastal Watersheds: These contain river systems that are similar to low tidal watersheds except they are above the tidal extent and many are connected to the deep and large Merrimack River mainstem. Low non-tidal watersheds contain extensive, deep, and coarse sediment deposits, although this watershed group contains a large swath of moderately calcareous metasedimentary bedrock and less fine marine clay than low tidal watersheds. Low non-tidal watersheds have a relatively high percentage of low to mid-elevation landforms with gentle sloping hills and abundant wet and flat landforms. Low to moderate gradient streams dominate the tributaries of this system. They are generally composed of riffle-pool habitats with occasional dune-ripple habitats in areas of deep and extensive coarse sediment. There is no strictly tidal marsh community of plants and animals as in low tidal systems.

Pine Barrens: These are early-successional habitats occurring on northeastern coastal sand plains or on sandy, glacial outwash deposits of major river valleys. Soils are acidic, droughty, nutrient-poor, and excessively well-drained. In New Hampshire, pine barrens are dominated by pitch pine (Pinus rigida) and scrub oak (Quercus ilicifolia) and form a matrix of dense scrub oak thickets and heath barrens interspersed with pockets of pitch pine forest and grassy openings. This structural and compositional heterogeneity is in constant flux, a process maintained by frequent disturbances such as wildfire. Fires occur naturally and regularly in pine barrens, with lightning serving as the primary ignition source. These fires are able to spread rapidly across the community's flat expanse of dry, fire-prone vegetation. Lee sides of habitat features, such as eskers, rivers, and slopes act as natural firebreaks, creating variation in species composition as well as vegetational age distributions.

Tidal Coastal Watersheds: These include tidal rivers and their watersheds. These rivers support runs of diadromous fish, such as American shad, alewife, American eel, Atlantic salmon, and blueback herring. These basins are dominated by abundant tributaries that are at low and very low elevations, are connected to larger meandering mainstem rivers, flow over acidic bedrock, and have extensive areas of deep and coarse sediment. There are a few moderate gradient tributaries in the upper headwaters of some of these watersheds, but the majority are low-gradient rivers. Instream habitats are dominated by riffle-pool habitats in the low gradient and unconfined valleys. In the low or very low gradient and highly sinuous channels with coarse sediments and sands, dune-ripple habitats may also occur. Dune-ripple habitats are dominated by sand-sized substrates and lack riffle-pool structure. The tributaries and mainstems in the lowest portions of these watersheds occur in areas of deep and extensive fine marine clay, which provides additional buffering capacity. Finer streambed substrates and connected wetland and floodplain communities are common in these areas of deep, fine surficial geological deposits.

Marsh and Shrub Wetlands: Emergent marsh and shrub swamp systems have a broad flood regime gradient that is often affected by the presence or abandonment of beaver (*Castor canadensis*) activity. Generally, the trophic regime of these systems is moderately to strongly minerotrophic, with soils consisting of poorly drained decomposed muck and mineral with a pH between 5 and 6.

The emergent marsh-shrub system is often grouped into three broad habitat categories: *wet meadows, emergent marshes,* and *scrub-shrub wetlands*. Wet meadows often are dominated by herbaceous vegetation (especially sedges) often less than 1 m in height and saturated for long periods during the growing season, but seldom flooded. Because wet meadows are a subset of an overall herbaceous emergent vegetation category, they will be discussed in this profile along with marshes unless stated otherwise. NHNHB terminology will be used to describe different wet meadow communities. Examples of 'wet meadow' natural communities in New Hampshire may include tall graminoid emergent marsh, northern medium sedge meadow marsh, and short graminoid-forb emergent marsh/mud flat. Representative wildlife that use wet meadows include ribbon snake (*Thamnophis sauritus sauritus*), sedge wren (*Cistothorus platensis*), northern harrier (*Circus cyaneus*), northern leopard frog (*Rana pipiens*), king rail (*Rallus elegans*), common moorhen (*Callinula chloropus*), and spotted turtle (*Clemmys guttata*).

Marshes are dominated by emergent herbaceous vegetation and have a water table that is generally at or above the surface throughout the year, but can fluctuate seasonally. Examples of marsh natural communities in New Hampshire include cattail marshes and deep-emergent marsh-aquatic beds. Woody vegetation, predominantly saplings and shrubs, dominates shrub-swamps. They frequently flood in the spring or contain pockets of standing water. Examples of natural communities include: highbush blueberry-winterberry shrub thicket, buttonbush basin swamp, and alder-dogwood-arrowwood alluvial thicket.

Northern Upland Watersheds: The landforms, elevations, and geology of northern upland watersheds are similar to moderate- south watersheds, but moderate-north watersheds are distinct because of their northern terrestrial communities, higher elevations, and separation from watersheds south of the White Mountains. Higher gradient, coldwater stream communities likely dominate this watershed group. Where there are wetlands, there may be some sinuous stream habitats with more stable water flows and warmer waters. There are few long reaches of mature rivers, which would tend to have slower water, deeper pools, and habitats within meanders and laterally varied substrates.

Southern Upland Watersheds: These are similar to northern upland watersheds. They both have cold water, moderate to high gradient, confined valley streams, and medium to large rivers, although they differ in landscape setting. The rivers in moderate-south watersheds are typical, medium-sized tributaries of the southern New Hampshire. They represent the middle range of most attributes, lacking the extremes of elevation or gradient in other watershed groups. Moderate-south watersheds have features with considerably lower elevation than those of moderate-north and high elevation watersheds, but they have features with relatively high elevation when compared to the rest of New Hampshire. With the lowest average of enriched bedrock of all watershed groups in New Hampshire, the rivers in moderate-south watersheds likely have the lowest buffering capacity and highest natural acidities. As with other moderate and high elevation watersheds, moderate-south watersheds have a higher percentage of hills and side slopes and a relatively high percentage and mileage of medium-sized rivers. Step-pool and riffle-pool habitats likely dominate the moderate to high gradient tributaries, with step-pool habitats occurring in the more confined river sections and riffle-pool habitats occurring in the more sinuous and unconfined river sections. In the higher elevations, aquatic ecosystems are subject to colder seasonal temperatures, relatively large daily variations in temperature, and

relatively unstable hydrologic regimes due to snow melt or precipitation flowing over shallow soils.

Montane Watersheds: These are characterized by high elevation and steep or very steep acidic streams that flow over granite bedrock in and around the White Mountains. This watershed group has a high percentage of the two highest elevation zones and the highest percentage of steep slopes, cliffs, ridge tops, slope crests, and small cove headwater streams. The bedrock is mostly acidic, with little buffering capacity. These headwaters are primarily cold mountain streams with cascade and step-pool habitats. Stream channels are narrowly confined by valley walls, and streambeds consist of bedrock, boulders, and cobbles. Very shallow soils and geologic materials create streams with variable flow that responds to runoff events. In some cases, as the stream size increases, the main stems flow through areas of deep, coarse-grained sediments and become more sinuous within wider valleys. However, high watersheds also contain plane bed systems, where the stream runs directly on resistant bedrock, which creates long, featureless runs and the absence of discrete pools, riffles, and point bars.

Peatlands: The peatland habitat described here includes 11 different natural communities. Peatlands are defined by limited inputs of groundwater and surface runoff that result in low nutrient content and acidic water. A lack of nutrients causes slower decomposition of organic materials, resulting in the accumulation of peat. Some plant species are specifically adapted to low-nutrient, acidic conditions found in peatlands.

Open Peatlands: Open peatlands are dominated by *Sphagnum* mosses, sedges, and shrubs. Several open peatland systems are found in New Hampshire. Alpine/subalpine bogs and montane sloping fens are found at higher elevations, generally above 760 meters (2500 feet). Alpine bilberry (*Vaccinium uliginosum*) and black crowberry (*Empetrum nigrum*) are dominant plants in alpine/subalpine bogs, whereas sedges are dominant plants in montane sloping fens (Sperduto and Nichols 2004). These peatlands are small and can sometimes be found interspersed with dry subalpine heath/krummholtz systems or at the heads of old beaver drainages. Calcareous sloping fens and patterned fens are two open peatland systems found in northern New Hampshire. Calcareous sloping fens are influenced by groundwater seepage from bedrock high in calcium and other base cations. The diverse plant communities of calcareous fens include sedges, brown mosses, willow (*Salix* sp.) and dogwoods (*Cornus* sp.). Patterned fens are more common in northern regions and only three examples are known in New Hampshire. Also influenced by groundwater, patterned fens form a series of strings (linear, raised areas) and flarks (low, wet areas) that run perpendicular to the direction of groundwater flow. Strings have a typical bog species such as leather-leaf (*Chamaedaphne calyculata*), sheep laurel (*Kalmia angustifolia*), stunted black spruce (*Picea mariana*), and eastern larch (*Larix laricina*). Flarks have open pools and *Sphagnum* carpets. Poor level fen/bog systems and medium level fen systems are widespread and can be quite expansive. Poor level fen/bog systems have very little drainage and no input from groundwater, lakes or streams. Medium level fens can have stream and groundwater input, and therefore tend to be less acidic and more nutrient-rich than poor level fens/bogs. These two systems can often be found adjacent to each other. Vegetation in each includes open *Sphagnum*, tall or medium shrubs, and sparse black spruce (*Picea mariana*) or eastern larch (*Larix laricina*). The kettlehole bog is an open peatland usually found in central and southern New Hampshire. These bogs are small patches where pieces of glacial ice melted, leaving holes that

subsequently filled in from the edges with peat. Kettlehole bogs typically have a marshy border surrounding a tall shrub or black spruce (*Picea mariana*) swamp, within which is a boggy area of black spruce and leather-leaf (*Chamaedaphne calyculata*), and often an open *Sphagnum* carpet, sometimes with a pool of water, in the middle.

Forested Peatlands: Several forested peatland systems are found in New Hampshire. The black spruce peat swamp is dominated by black spruce (*Picea mariana*) and eastern larch (*Larix laricina*). It often forms a border around more open peatlands such as the poor level fen/bog system or kettlehole bog system. Temperate peat swamps, found in central and southern New Hampshire, are dominated by red maple (*Acer rubrum*), red spruce (*Picea rubens*), eastern hemlock (*Tsuga canadensis*), and other hardwoods. This system is not as acidic as many other peatlands. Northern white cedar minerotrophic swamps, found in northern New Hampshire, contain more nutrients than other peatlands and are dominated by northern white cedar (*Thuja occidentalis*) and other conifers including balsam fir (*Abies balsamea*) and various spruces (*Picea* spp.). Coastal conifer peat swamps dominated by Atlantic white cedar are located in coastal New Hampshire with a few examples farther inland.

Salt Marshes: Salt marshes are grass-dominated tidal wetlands existing in the transition zone between ocean and upland. These marshes are dominated by detritus-based food chains. Salt marsh plants are salt-tolerant and adapted to fluctuating water levels. Salt marshes are composed of 3 distinct vegetative zones in response to tidal regime: low marsh, high marsh, and marsh border. The low marsh, occurring as a narrow band along the seaward edge of the marsh, and along creeks and ditches, becomes flooded during most tides, but is exposed during low tide. Tall-form smooth cordgrass (*Spartina alterniflora*) is the predominant plant species found in the low marsh and can grow up to 2 meters. The high marsh occurs between the low marsh and the marsh border. The high marsh becomes flooded usually only during extreme high tides, such as the new-moon and full-moon tides. Throughout the high marsh, grasses and rushes dominate. Species such as salt hay grass (*Spartina patens*), spike grass (*Distichlis spicata*), black grass (*Juncus gerardii*), short-form smooth cordgrass (*Spartina alterniflora*), salt marsh aster (*Aster tenufolius*), and sea lavender (*Limonium nashii*) are common. Pannes and pools found in the high marsh zone are also important salt marsh components. Pannes are shallow depressions of standing water that typically dry out during long, dry periods (e.g., end of summer). Only the most salt-tolerant plant species can occur at panne edges, such as common glasswort (*Salicornia europaea*), seaside plantain (*Plantago maritima*), and short-form smooth cordgrass. Pools are larger and deeper than pannes and hold submerged aquatic vegetation, such as widgeon grass (*Ruppia maritima*).

The marsh border is located at the upland edge of a salt marsh but can also be found in pockets of the marsh where elevation level is higher than that of the high marsh. The marsh border has the highest plant diversity in a salt marsh, with the following dominant species: marsh elder (*Iva frutescens*), sweet gale (*Myrica gale*), seaside goldenrod (*Solidago sempervirens*), and switchgrass (*Panicum virgatum*).

Frequency and duration of tidal flooding are key environmental factors that create and influence salt marsh vegetative patterns. In addition, salinity, substrate, fine-scale topography, availability of nutrients and oxygen, and human modifications influence vegetative patterns. Nutrients that stimulate marsh plant growth are carried in with the tides, and organic matter that

feeds fish and other organisms is carried out by the tides. Over time, organic matter accumulates on the marsh and forms peat. By building up more peat, salt marsh elevation can keep apace with rising sea level, unless the rate of sea-level rise becomes too great.

Shrublands: Shrubland habitat refers to shrub-dominated areas with scattered forbs and grasses. These habitats are typically the result of some disturbance and include dry shrublands, utility rights-of-way, old agriculture fields, and reverting gravel pits.

Talus Slopes and Rocky Ridges: This profile covers two related but distinct habitats: talus slopes and rocky ridges. Talus slopes range from open, lichen covered talus "barrens" to closed-canopy forested talus communities. Rocky ridges generally occur on outcrops and shallow-to-bedrock ridge and summit settings.

While it is opportune to lump them together for the purposes of habitat modeling, each is treated separately in certain text portions of this profile.

Talus Slopes: Both forested and unforested talus slopes commonly occur below steep mountain slopes and cliffs, usually as a result of mass wasting of the cliff above. The boulders and other component rock material can be stabilized or loose. Some plant species and natural communities are associated with the conditions of talus slopes. Four talus slope natural community systems occur in New Hampshire: montane acidic talus, temperate acidic talus, rich north-temperate talus/rocky woods, and rich Appalachian oak rocky woods. These systems are distinguished from each other primarily by climate, elevation, and level of nutrient availability. Montane acidic talus slopes are found at mid to high elevations in the White Mountains and are characterized by spruce, fir, and various other northern species. This system tends to have an open woodland character, with frequent canopy gaps and lichen-dominated talus barren openings. Soil development is variable on these slopes, and moisture conditions range from dry to mesic. Larger examples have giant talus blocks at their base with late-melting ice that produces a cold, moist microclimate supporting alpine plants well below treeline. This system mostly occurs above 670 m (2,200 ft) in elevation, but occasionally down to about 450 m (1,500 ft). This system includes a few low-elevation "talus gorges." Montane acidic talus slopes are often found below montane cliff systems, and surrounded by either northern hardwood or high-elevation spruce–fir forests. Temperate acidic talus slopes are found at low elevations (below 550 m [1,800 ft] elevation) in central and southern New Hampshire characterized by oaks (*Quercus* spp.), black birch (*Betula lenta*), and other temperate species. This system tends to have an open woodland character, with frequent canopy gaps and occasional lichen-dominated talus barren openings. Soil development is variable on these slopes, and moisture conditions range from dry to mesic. Most examples are smaller than montane acidic talus systems. A few temperate acidic talus slopes in the state have giant talus blocks with late-melting ice that produces a relatively cold, moist microclimate compared to the rest of the talus slope. These areas support patches of montane species such as red spruce (*Picea rubens*) and American mountain ash (*Sorbus americana*) within the larger temperate mosaic. This system transitions to forested talus or forested till areas characterized by hemlock–hardwood–pine forest or oak–pine forest systems. Temperate cliff systems, and sometimes, Appalachian oak rocky ridges, are often associated upslope. Rich north-temperate talus/rocky woods system is found on enriched talus and other rocky slopes in central New Hampshire from about 150–365 m (500 - 1,200 ft) in elevation, and occasionally up to about 600 m (2,000 ft) in the low elevation valleys in

the White Mountain region. The larger talus slopes often have patches of temperate lichen talus barren, and occasionally patches of rich mesic or semi-rich mesic sugar maple forest communities in mesic, colluvial areas at the base of the talus slopes. A few examples at intermediate elevations in the White Mountains (around 450 m [1,500 ft]) include patches of spruce-birch-mountain maple wooded talus, which is otherwise indicative of montane acidic talus systems. Tree canopy dominants usually include sugar maple (*Acer saccharum*) and red oak (*Quercus rubra*), with lesser amounts of basswood (*Tilia americana*), white ash (*Fraxinus americana*), ironwood (*Carpinus caroliniana*), black birch (*Betula lenta*), red maple (*Acer rubrum*), and occasionally yellow birch (*Betula allegheniensis*) and paper birch (*Betula papyrifera*). Softwoods are sparse or absent. This system often transitions to montane rocky ridge and montane cliff systems upslope and northern hardwood–conifer forest or hemlock–hardwood–pine forest systems downslope. Rich Appalachian oak rocky woods system is the southern equivalent of rich north-temperate talus/rocky woods system (see above). It occurs on rocky to shallow till hillsides mostly below 150 m (500 ft) within 48 km [30 mi] of the coast or Massachusetts border. It is indicated by a host of southern plants that do not occur further north or at higher elevations. There are 2 primary natural communities, rich Appalachian oak rocky woods, and red oak-ironwood-Pennsylvania sedge woodland. Temperate lichen talus barrens are small and rare in this system, as are patches of rich mesic forest. This system typically transitions to more nutrient-poor, rocky conditions on the ridge tops classified as Appalachian oak rocky ridge system, but occasionally they occupy the ridge top settings as well where the red oak-ironwood-Pennsylvania sedge woodland community dominates. The hillsides on which this system occurs includes talus, other unconsolidated, loose rocky slopes, and relatively shallow till soils with occasional outcrops.

Rocky Ridges: Rocky ridges occur on outcrops and shallow-to-bedrock ridge and summit settings below those that are classified as alpine habitat (Sperduto and Nichols 2004). There are two major rocky ridge natural community systems in New Hampshire: montane rocky ridge system and Appalachian oak rocky ridge system. The primary differences between these 2 systems are climate and elevation, and because of this, they have distinctly different geographic distributions in New Hampshire (D. D. Sperduto, NHNHB, personal communication). Montane rocky ridges occur on outcrops and shallow-to-bedrock ridges and summits at mid-elevations in New Hampshire. They are dominated by some combination of red spruce (*Picea rubens*), red pine (*Pinus resinosa*), and red oak. Outcrops include cliff slabs, which are steep bedrock exposures of < 65° slope. This system includes nearly all the rocky ridges in the White Mountain region and other rocky exposure between 400-900 m (1300–3000 ft) in elevation elsewhere in the state. These rocky ridges, summits, and slabs have a woodland to sparse woodland canopy structure (ranging from completely open patches to thin forest cover > 65%), much open bedrock exposure, and one or more of the three primary diagnostic communities that overlap in their elevation ranges. Small cliffs are found in some examples of this system. Downslope, this system sometimes transitions to montane cliff, montane acidic talus, or rich north-temperate talus/rocky slope systems. Upslope (when it exists), this system becomes subalpine heath–krummholz/rocky bald, northern hardwood–conifer, or high-elevation spruce–fir–northern hardwood forest systems.Appalachian oak rocky ridges occur on outcrops and shallow-to-bedrock ridges and summits below 356 m [1,200 ft]) in southern New Hampshire. They are dominated by southern oaks and pines with little if any red spruce, red pine, and other northern plants

diagnostic of montane rocky ridge and slab systems. Outcrops include small cliff slabs, which are steep bedrock exposures of < 65° slope. This system includes nearly all the rocky ridges in southern New Hampshire and most other ledges below 300m (1,000 ft) in elevation. These ridges, summits, and slabs typically have a woodland to sparse woodland canopy (ranging from completely open patches to thin forest cover >65%) and much open bedrock exposure. Red oak is typically present, but the presence of other oaks is the key diagnostic feature of this system (in combination with the absence of red spruce and red pine and other northern plants in any abundance). This system typically transitions to oak–pine forest systems, though rich Appalachian oak rocky woods are occasionally found below it on mid- to lower-slope positions.

Lowland Spruce Forest: This system is a mosaic of lowland spruce - fir forest and red spruce swamp communities that occur on mineral soils. In northern New Hampshire, these range from well or moderately well drained upland forests to poorly or very poorly drained swamps. Somewhat poorly drained soils are intermediate and very common. The average condition for red spruce swamps is acidic and poorly drained, with shallow, well decomposed organic soils (10 – 40 cm) over sandy to silty mineral soil. When soils are very poorly drained, these systems tend toward black spruce peat swamps. In steeper areas at moderate elevation, such as the White Mountains, swampland may be dominated by red spruce. These areas may border areas of narrow spruce fir, hardwood forest, or high elevation spruce fir. Lowland spruce fir is more minerotrophic than black spruce peat swamps, but less so than northern white cedar or near-boreal hardwood-conifer minerotrophic swamp systems. Diagnostic natural communities:

- Red spruce swamp
- Lowland spruce - fir forest
- Montane black spruce - red spruce forest

Associated natural community systems: Black spruce peat swamp systems occur on adjacent very poorly drained peat soils. In more minerotrophic settings this system can be adjacent and transition into northern white cedar or near-boreal hardwood-conifer minerotrophic swamp systems. Upslope, lowland spruce-fir forest/swamps typically transition to northern hardwood-conifer systems.

Northern Hardwood – Conifer Forest: These forests are characterized by *Fagus grandifolia* (American beech), *Acer saccharum* (sugar maple), and *Betula alleghaniensis* (yellow birch). In latitude and elevation, these northern hardwood forests are positioned between the high-elevation spruce-fir forest and hemlock-hardwood-pine forest systems. Northern hardwood forests are generally found between 1,400 and 2,500 ft. in elevation in northern New Hampshire and along the western highlands, although the tolerance of individual species varies. Some occurrences can be found down to about 1,000 ft. elevation. The upslope transition to spruce - fir forest is marked by the appearance of *Picea rubens* (red spruce), *Abies balsamea* (balsam fir), the increased importance of yellow birch, and the disappearance of sugar maple and beech; the downslope transition to the hemlock – hardwood – pine forest system is marked by the appearance of more *Tsuga canadensis* (hemlock) along with *Quercus rubra* (red oak), *Pinus strobus* (white pine), and occasionally *Ostrya virginiana* (ironwood) and decreased dominance of yellow birch and sugar maple. This system is a matrix of sugar maple, beech, and yellow birch forest and mixes with patches of several other communities. Hemlock-beech-northern hardwood forests occur at lower elevations (800 to 2,000 ft.) and are differentiated from the matrix community by a

substantial presence of hemlock. Hemlock-spruce-northern hardwood forests are also found at elevations below 2,000 ft. This is a conifer to mixed community type with considerable hemlock and spruce mixing with variable amounts of birches, other northern hardwoods, balsam fir, and sometimes white pine. It occurs primarily on river terraces, stream ravines, and compact till settings in the mountains where it transitions to more pure northern hardwoods on better soils (e.g., fine tills). Semi-rich mesic sugar maple forests are a common but relatively small part of the mosaic formed by this system where there is slightly enriched till or fine river terrace sediments. Both beech forest and hemlock forest types are occasional in this and the hemlock-hardwood-pine forest systems, but generally form relatively small patches. Northern hardwood-spruce- fir forests mark the transition to high-elevation spruce-fir forest, but in most cases are considered part of the northern hardwood-conifer forest system because the hardwood trees that disappear in high-elevation spruce-fir (due to climate and/or soil conditions) are still present. Some spruce- fir or mixed forests that have been cut or heavily disturbed may currently support a hardwood or mixed forest canopy, and may or may not succeed to greater spruce-fir prominence. Herbs such as *Aralia nudicaulis* (wild sarsaparilla) and *Trientalis borealis* (starflower) are common to both transitional and northern hardwood forests. Species of the northern hardwood forests generally not found in transitional forests include *Dryopteris campyloptera* (mountain wood fern), *Lonicera canadensis* (Canadian honeysuckle), *Polystichum braunii* (Braun's holly fern), and other northern herbs also found in the spruce - fir forest. Species that tend to be more abundant in northern hardwoods including *Oxalis acetosella* (northern wood sorrel), *Huperzia lucidula* (shining clubmoss), *Clintonia borealis* (blue-bead lily), and *Streptopus spp*. (twisted stalks).

Diagnostic natural communities:

- Sugar maple - beech - yellow birch forest
- Hemlock – spruce – northern hardwood forest
- Hemlock - beech - northern hardwood forest
- Semi-rich mesic sugar maple forest
- Northern hardwood - spruce - fir forest

Peripheral or occasional natural communities:

- Beech forest
- Hemlock forest

Associated natural community systems: Northern hardwood – conifer forest systems transition upslope to high-elevation spruce - fir forest systems. Downslope they transition to either 1) hemlock – hardwood – pine forest systems, especially in low elevation valleys of White Mountains and further south; or 2) lowland spruce – fir forest/swamp systems in the North Country and some valley bottoms.

NEW JERSEY

Each of the landscape sections (i.e. Piedmont Landscape) includes a brief subsection that mentions some of the habitats found in the ecoregion, but no definition of habitat types are provided. Also, it is not clear whether or not the plan may use different terms for the same habitat type, or whether use of certain language was carefully reviewed to ensure that habitats were delineated consistently throughout the plan. The plan acknowledges the existence of the following habitat types in the State of New Jersey:

- Beaches
- Dunes

- Tidal salt marsh
- Tidal freshwater marsh
- Brackish bay
- River estuaries
- Barrier islands
- Ocean
- Upland forests (includes "scrub-shrub" habitat, "deciduous forest," "mixed deciduous-coniferous forest," "pitch pine-oak forest," "hemlock ravine")
- Forested wetlands (includes "scrub-shrub" habitat, "hardwood swamps," "white cedar swamps," "cranberry bogs")
- Agricultural lands
- Cultivated/Grasslands
- Estuarine emergent wetlands

NEW YORK

The NY plan does not offer detailed definitions of the various habitat types it references, it merely mentions them by name. The following habitat types of NY were adapted from Edinger et al., (2002):

Estuarine

- Cultural
    - Shoreline
    - Structure

- Deep subtidal
    - Mud
    - Other
    - Pelagic
    - Rocky
    - Sand/gravel
    - SAV
    - Structure

- Intertidal
    - Emergent marsh
    - Mudflats
    - Other
    - Rocky
    - Sand/gravel
    - Shoreline
    - Structure

- Shallow subtidal
    - Mud
    - Other
    - Pelagic

- Rocky
- Sand/gravel
- SAV
- Structure

Lacustrine

- Coastal plain
  - Mud
  - Other
  - Pelagic
  - Rocky
  - Sand/gravel
  - SAV
  - Structure

- Cold water deep
  - Mud
  - Other
  - Pelagic
  - Rocky
  - Sand/gravel
  - SAV
  - Structure

- Cold water deep
  - Mud
  - Other
  - Pelagic
  - Rocky
  - Sand/gravel
  - SAV
  - Structure

- Cultural
  - Cement pond
  - Treatment pond

- Warm water deep
  - Mud
  - Other
  - Pelagic
  - Rocky
  - Sand/gravel
  - SAV
  - Structure

- Warm water shallow
    - Mud
    - Other
    - Pelagic
    - Rocky
    - Sand/gravel
    - SAV
    - Structure

Marine

- Cultural
    - Shoreline
    - Structure

- Deep subtidal
    - Mud
    - Other
    - Pelagic
    - Rocky
    - Sand/gravel
    - SAV
    - Structure

- Intertidal
    - Emergent marsh
    - Mudflats
    - Other
    - Rocky
    - Sand/gravel
    - Shoreline
    - Structure

- Shallow subtidal
    - Mud
    - Other
    - Pelagic
    - Rocky
    - Sand/gravel
    - SAV
    - Structure

Palustrine

- Cultural
    - Impoundment
    - Other

- Mineral soil wetland
    - Coniferous forested
    - Deciduous forested
    - Emergent marsh
    - Meadow
    - Deciduous/coniferous
    - Other
    - Pond/lake shore
    - Shrub swamp
    - Vernal pool

- Peatlands
    - Bog/fen
    - Other

Riverine

- Coastal plain stream
    - Marsh
    - Other
    - Rocky bottom
    - Sand/gravel bottom
    - SAV
    - Mud bottom
    - Structure

- Cultural
    - Culvert/concrete channel

- Cold water stream
    - Marsh
    - Other
    - Rocky bottom
    - Sand/gravel bottom
    - SAV
    - Mud bottom
    - Structure

- Deep water river
    - Pelagic
    - Mud bottom
    - Rocky bottom
    - Sand/gravel bottom
    - Structure

- Deep water stream
    - Other

- Warm water stream
    - Marsh
    - Other
    - Rocky bottom
    - Sand/gravel bottom
    - SAV
    - Mud bottom
    - Structure

Terrestrial

- Alpine/mountain
    - Northern coniferous
    - Northern deciduous
    - Cliffs and open talus
    - Other

- Barrens/woodlands
    - Cultural
    - Deciduous/coniferous
    - Northern coniferous
    - Northern deciduous
    - Other
    - Shrublands
    - Southern coniferous
    - Southern deciduous

- Coastal
    - Beach/shoreline
    - Cultural
    - Dunes
    - Other
    - Sand/gravel bar

- Forested
    - Cultural
    - Deciduous/coniferous
    - Northern coniferous
    - Northern deciduous
    - Other
    - Southern coniferous
    - Southern deciduous

- Maritime
    - Beach/shoreline
    - Cultural

- Dunes
- Grasslands
- Heathlands
- Other
- Shrublands

- Open upland
  - Beach/shoreline
  - Cliffs and open talus
  - Cultural
  - Dunes
  - Grasslands
  - Heathlands
  - Other
  - Sand/gravel bar

PENNSYLVANIA

Coniferous Terrestrial Forests

Hemlock (White Pine) Forest

[**Crosswalk:** Smith's "Northern Conifer Forest," TNC's *Tsuga canadensis - Pinus strobus* Forest Alliance, SAF's White pine-hemlock (22) and Eastern hemlock (23).]

Conifer-Broadleaf Terrestrial Forests

Serpentine Pitch Pine – Oak Forest

[**Crosswalk:** Smith's "Eastern Serpentine Barren" (in part), TNC's *Quercus falcata - Quercus alba* Forest Alliance, SAF's Pitch pine (45).]

Serpentine Virginia Pine – Oak Forest

[**Crosswalk:** Smith's "Eastern Serpentine Barren" (in part), TNC *Pinus virginiana - Quercus (alba, stellata, falcata, velutina)* Forest Alliance, *Pinus (echinata, taeda, virginiana)* Forest Alliance, *Pinus virginiana / Quercus marilandica* Community, SAF's Virginia pine (79).]

Pitch Pine – Mixed Oak Forest

[**Crosswalk:** Smith's "Xeric Central Hardwood - Conifer Forest," TNC's *Pinus (rigida, echinata) - Quercus* Forest Alliance, SAF's Pitch pine (45).]

Virginia Pine – Mixed Hardwood Forest

[**Crosswalk:** Smith's "Xeric Central Hardwood - Conifer Forest," TNC's *Pinus virginiana - Quercus (alba, stellata, falcata, prinus, velutina)* Forest Alliance, SAF's Virginia pine-oak (78).]

Dry White Pine (Hemlock) – Oak Forest

[**Crosswalk:** Smith's "Dry - Mesic Acidic Central Forest," TNC's *Pinus strobus - Quercus (rubra, alba, velutina)* Forest Alliance and *Tsuga canadensis - Pinus strobus* (dry) Forest Alliance, SAF's White pine - chestnut oak (51).]

Hemlock (White Pine) – Northern Hardwood Forest

[**Crosswalk:** Smith's "Northern Hardwood - Conifer Forest," TNC's *Tsuga canadensis - Pinus strobus* Forest Alliance. If split, *Tsuga canadensis* (mesic) Forest Alliance, SAF's Hemlock - yellow birch (24).]

Hemlock (White Pine) – Red Oak – Mixed Hardwood Forest

[**Crosswalk**: Smith's "Dry - Mesic Acidic Central Forest" (in part), TNC's *Tsuga canadensis - Pinus strobus* Forest Alliance, SAF's White pine - northern red oak - red maple (20).]

Hemlock – Tulip Tree – Birch Forest

[**Crosswalk:** Smith's "Dry - Mesic Acidic Central Forest," TNC's "*Tsuga canadensis* (mesic) Forest Alliance, *Tsuga canadensis - Fagus grandifolia* Community, SAF's Yellow poplar eastern hemlock (58).]

Rick Hemlock – Mesic Hardwoods Forest

[**Crosswalk:** Smith's "Mesic Central Forest" (in part), TNC's *Tsuga canadensis* (mesic) Forest Alliance, SAF's Eastern hemlock (23) and Yellow poplar - white oak - northern red oak (59).]

Broadleaf Terrestrial Forests

Dry Oak – Heath Forests

[**Crosswalk:** Smith's " Xeric Central Hardwood Forest," TNC's *Quercus - Ericaceae* Forest Alliance and *Quercus (prinus, coccinea, velutina)* Forest Alliance, SAF: most of Chestnut oak (44), and parts of Northern red oak (55) and White oak - black oak - northern red oak (52).]

Dry Oak – Mixed Hardwood Forests

[**Crosswalk:** Smith's "Dry-Mesic Calcareous Central Forest," "Xeric Central Hardwood Forest," TNC's *Quercus (prinus, rubra) - Carya* Forest Alliance and parts of *Carya - Fraxinus - Quercus* Forest Alliance, although the latter is generally richer and more mesic, SAF's White oak - black oak - northern red oak (52).]

Red Oak – Mixed Hardwood Forests

Related types: The "Hemlock (white pine) - red oak - mixed hardwood forest" type is distinguished from this by the presence of at least 25% relative cover by hemlock and/or white pine. The "Northern hardwood forest" is distinguished by a greater percentage of birches, maples, and beech, and less oak.

Northern Hardwood Forests

[**Crosswalk:** falls between Smith's "Dry - Mesic Acidic Central Forest" and " Mesic central forest," TNC's *Quercus rubra - Acer saccharum* Forest Alliance (mostly) and *Quercus (prinus, rubra) - Carya* Forest Alliance (to a lesser extent), SAF's Northern red oak (55).]

Tulip Tree – Beech – Maple Forests

[**Crosswalk:** Smith's " Northern Hardwood (Broadleaf) Forest," TNC's *Acer saccharum - Betula alleghaniensis - Fagus grandifolia* Forest Alliance, SAF's Sugar maple - beech - yellow birch (24).]

Sugar Maple – Basswood Forest

[**Crosswalk:** Smith's "Talus Slope Forest," TNC's *Acer saccharum - Fraxinus americana - Tilia americana* Forest Alliance and *Acer saccharum - Fraxinus americana - Ulmus americana* Forest Alliance, *Acer saccharum - Liriodendron tulipifera - Fraxinus americana - Staphylea trifolia* Community, SAF's Sugar maple - basswood (26).]

Mixed Mesophytic Forest

[**Crosswalk:** Smith's "Mesic Central Forest" (in part), TNC's *Liriodendron tulipifera - Tilia americana var. heterophylla - Aesculus flava - Acer saccharum* Forest Alliance, SAF's Yellow-poplar - white oak - northern red oak (59)—richer examples.]

Sweet Gum – Oak Coastal Plain Forest

[**Crosswalk:** Smith's "Coastal plain forest" (in part), TNC's *Quercus - Fagus grandifolia - Ilex opaca* Forest Alliance, *Quercus - Fagus grandifolia / Podophyllum peltatum* Community, SAF's White oak (53) (in part).]

Red Maple (Terrestrial) Forest

[**Crosswalk:** Smith - no crosswalk, TNC - no crosswalk, SAF's Red maple (108).]

Black-gum Ridgetop Forest

[**Crosswalk:** none.]

Aspen/Gray Birch Forest

[**Crosswalk:** Smith's "Young Miscellaneous Forest," TNC's Populus tremuloides Forest Alliance, SAF's Aspen (16) and Gray birch - red maple (19).]

Black Locust Forest
[**Crosswalk:** Smith's "Young Miscellaneous Forest," TNC - no crosswalk, SAF's Black locust (50).]

Coniferous Palustrine Forest

Black Spruce - Tamarack Peatland Forest
[**Crosswalk:** Smith's "Boreal Conifer Swamp," TNC's *Picea mariana - Larix laricina* Saturated Forest Alliance, SAF's Black spruce-sphagnum (12d).]

Red Spruce Palustrine Forest
[**Crosswalk:** Smith's "Boreal Conifer Swamp," TNC's *Picea rubens* Saturated Forest Alliance, SAF's Red spruce (32).]

Hemlock Palustrine Forest
[**Crosswalk:** Smith's "Northern Conifer Swamp," TNC's *Tsuga canadensis* (eastern hemlock) Wetland Forest Alliance, SAF's Eastern hemlock (23).]

Conifer-Broadleaf Palustrine Forest

Hemlock – Mixed Hardwood Palustrine Forest
[**Crosswalk:** Smith's "Broadleaf - Conifer Swamp" - subtype "a", TNC's *Tsuga canadensis - Acer rubrum* Saturated Forest Alliance, SAF's Hemlock - yellow birch (24) and parts of Eastern hemlock (23).]

Red Spruce – Mixed Hardwood Palustrine Forest
[**Crosswalk:** Smith's "Broadleaf - Conifer Swamp" - subtype "a", TNC's *Picea rubens - Acer rubrum* Saturated Forest Alliance, SAF's Red spruce (32).]

Bottomland Oak – Hardwood Palustrine Forest
[**Crosswalk:** Smith's "Circumneutral Broadleaf Swamp" (in part), TNC's *Quercus (palustris, bicolor)* Seasonally Flooded Forest Alliance, closest SAF's type is Pin oak - sweet gum (65).]

Red Maple – Black-gum Palustrine Forest
[**Crosswalk:** subtypes "a" and "d" of Smith's "Acidic Broadleaf Swamp," and parts of "Circumneutral Broadleaf Swamp," TNC's *Acer rubrum - Nyssa sylvatica* Forest Alliance, SAF's Red maple (108).]

Red Maple - Black Ash Palustrine Forest
[**Crosswalk:** Smith's "Eastern calcareous seepage swamp," TNC's *Acer rubrum - Fraxinus nigra* Saturated Forest Alliance, SAF's Red maple (108).]

Red Maple – Magnolia Coastal Plain Palustrine Forest
[**Crosswalk:** Smith's "Coastal Plain Forest" (in part), TNC's *Acer rubrum - Liquidambar styraciflua* Seasonally Flooded/Saturated Forest Alliance, SAF's Red maple (108).]

Great Lakes Region Lakeplain Palustrine Forest
[**Crosswalk:** none.]

Sycamore – River Birch – Box-elder Floodplain Forest
[**Crosswalk:** Smith's "Floodplain Forest" (in part), TNC's *Platanus occidentalis - Betula nigra - Acer negundo* Seasonally / Temporarily Flooded Forest Alliance, SAF's River birch - sycamore (61).]

Silver Maple Floodplain Forest
[**Crosswalk:** Smith's "Floodplain Forest" (in part), TNC's *Acer Saccharinum* Temporarily Flooded Forest Alliance, SAF's Silver maple - American elm (62).]

Red Maple – Elm – Willow Floodplain Swamp
[**Crosswalk:** Smith's "Floodplain Swamp," TNC's *Acer (rubrum, saccharinum) - Ulmus americana - Quercus (bicolor, palustris)* Temporarily Flooded Forest Alliance, SAF's Silver maple - American elm (62).]

<u>Coniferous Terrestrial Woodlands</u>

Pitch Pine – Heath Woodland
[**Crosswalk:** Smith's "Ridgetop Dwarf-tree Forest" (in part), "Appalachian Sand Barren" (in part), TNC's *Pinus rigida / Vaccinium* Woodland Alliance, SAF's Pitch pine (45).]

Pitch Pine – Scrub Oak Woodland
[**Crosswalk:** Smith's "Ridgetop Dwarf-tree Forest" (in part), "Appalachian Sand Barren" (in part), TNC's *Pinus rigida / Quercus ilicifolia* Woodland Alliance, *Pinus rigida/Quercus ilicifolia/ Aronia melanocarpa* Community, SAF's Pitch pine (45).]

Red Spruce Rocky Summit
[**Crosswalk:** TNC's *Picea rubens* Woodland Alliance, *Picea rubens – Vaccinium angustifolium* Community, SAF's Red spruce (32).]

Pitch Pine – Rhodora – Scrub Oak Woodlands

[**Crosswalk:** Smith's "Mesic Scrub Oak - Heath - Pitch Pine Barrens" (in part), TNC's *Pinus rigida* Seasonally Flooded (sic.) Woodland Alliance, *Pinus rigida - Quercus ilicifolia - Rhododendron canadense* Community, SAF's Pitch pine (45).]

Conifer - Broadleaf Terrestrial Woodlands

Pitch Pine – Mixed Hardwood Woodlands

[**Crosswalk:** Smith's "Ridgetop Dwarf-Tree Forest" (in part), TNC's *Quercus (coccinea, velutina) - Pinus rigida* Woodland Alliance, *Quercus (coccinea, velutina) - Pinus rigida - Schizachyrium scoparium* Community, SAF's Pitch pine (45).]

Virginia Pine - Mixed Hardwood Shale Woodland

[**Crosswalk:** *Pinus virginiana* Woodland Alliance, and *Quercus (rubra, prinus) - Pinus (strobus, virginiana)* Woodland Alliance, SAF's Virginia pine - oak (78).]

Red-cedar – Mixed Hardwood Rich Shale Woodland

[**Crosswalk:** Smith's "Appalachian Shale Barren - Central Appalachian subtype," TNC's *Juniperus virginiana - (Fraxinus americana, Ostrya virginiana)* Woodland Alliance, *Juniperus virginiana - Fraxinus americana - Carya glabra / Carex pensylvanica - Chelianthes lanosa* Woodland, SAF's Eastern red-cedar (46).]

Broadleaf Terrestrial Woodlands

Dry Oak – Heath Woodland

[**Crosswalk:** Smith's "Ridgetop Dwarftree Forest" (in part), TNC's *Quercus rubra - Quercus prinus* Woodland Alliance, SAF's parts of Chestnut oak (44), Northern red oak (55) and White oak - black oak- northern red oak (52).]

Birch (Black-gum) Rocky Slope Woodland

[**Crosswalk:** Smith's "Talus Slope Forest"- much modified, TNC - no crosswalk, SAF - no crosswalk.]

Yellow Oak – Redbud Woodland

[**Crosswalk:** Smith's "Dry-Mesic Calcareous Central Forest," TNC's *Acer saccharum - Quercus muhlenbergii* Forest Alliance, SAF - no crosswalk.]

Great Lakes Region Scarpe Woodland

[**Crosswalk:** Smith's "Eastern Great Lakes Bluff/Cliff Community," TNC - no crosswalk, SAF -no crosswalk.]

Great Lakes Region Bayberry – Cottonwood Community (also a Shrubland type)

[**Crosswalk:** Smith's "Eastern Great Lakes Dune Community," TNC - no crosswalk, SAF - no crosswalk (the Cottonwood (63) type is closest).]

Coniferous Palustrine Woodlands

Pitch Pine – Leatherleaf Palustrine Woodland

[**Crosswalk:** TNC's *Pinus rigida* Saturated Woodland Alliance, *Pinus rigida / Chamaedaphne calyculata / Sphagnum* spp. Community, SAF's Pitch pine (45).]

Black Spruce – Tamarack Palustrine Woodland

[**Crosswalk:** Smith's "Non-Glacial Bog" (in part), "Oligotrophic Kettlehole Bog" (in part), TNC's *Picea mariana* Saturated Woodland Alliance, *Picea mariana / Ledum groenlandicum / Sphagnum* spp. Community, SAF's Black spruce - tamarack (13).]

Red Spruce Palustrine Woodland

[**Crosswalk:** Smith's "Boreal Conifer Swamp" (in part), TNC's (Southeast Region) *Picea rubens* Saturated Woodland Alliance, SAF's Red spruce (32).]

Broadleaf Palustrine Woodland

[**Crosswalk:** Smith's "Acidic shrub swamp" (in part), "Broadleaf-conifer swamp" (in part), TNC's *Vaccinium corymbosum* Shrubland Alliance, SAF's Red maple (108).]

Red Maple - Sedge Palustrine Woodland

[**Crosswalk:** Smith's "Acidic Broadleaf Swamp" (in part), TNC's *Acer rubrum - Carex stricta* Saturated Woodland Alliance, SAF's Red maple (108).]

Broadleaf Palustrine Woodlands

Red Maple – Highbush Blueberry Palustrine Woodlands

[**Crosswalk:** Smith's "Acidic shrub swamp" (in part), "Broadleaf-conifer swamp" (in part), TNC's *Vaccinium corymbosum* Shrubland Alliance, SAF's Red maple (108).]

Red Maple – Sedge Palustrine Woodland

[**Crosswalk:** Smith's "Acidic Broadleaf Swamp" (in part), TNC's *Acer rubrum - Carex stricta* Saturated Woodland Alliance, SAF's Red maple (108).]

Red Maple – Mixed Shrubland Palustrine Woodland

[**Crosswalk:** Smith's "Circumneutral Shrub Swamp" (in part), "Circumneutral Broadleaf Swamp" (in part), TNC's *Acer rubrum - Fraxinus Nigra* Saturated Forest Alliance, SAF's Red maple (108).]

Coniferous Terrestrial Shrubland

Red-cedar – Prickly Pear Shale Shrubland

[**Crosswalk:** "Smith's Northern Appalachian Shale Barren," TNC's *Juniperus virginiana - Fraxinus americana* Woodland Alliance, *Juniperus virginiana - Fraxinus americana / Senecio antennarifolius - Oenothera argillicola* Community.]

Red-cedar – Pine Serpentine Shrubland

[**Crosswalk:** Smith's "Eastern Serpentine Barren" (in part), TNC's *Pinus (virginiana, rigida) / Schizachyrium scoparium* Herbaceous Alliance, *Pinus virginiana - Pinus rigida / Schizachyrium scoparium - Scleria pauciflora* Community.]

Conifer - Broadleaf Terrestrial Shrubland

Red-cedar Redbud Shrubland

[**Crosswalk:** Smith's "Northern Appalachian Calcareous Rocky Summit Community," TNC's *Juniperus virginiana - Fraxinus americana* Woodland Alliance, *Juniperus virginiana - Ostrya virginiana - Bouteloua curtipendula* Community and *Quercus muhlenbergii* Woodland Alliance, *Quercus muhlenbergii - Cercis canadensis / Senecio obovatus - Lithospermum canadense* Community.]

Broadleaf Terrestrial Shrubland

Low Heath Shrubland

[**Crosswalk:** Smith's "Northern Appalachian Low Elevation Acidic Rocky Summit." and "Ridgetop Dwarf-Tree Forest" (in part), TNC's *Vaccinium (myrtilloides, pallidum, angustifolium)* Dwarf-Shrubland Alliance, *Vaccinium (myrtilloides, pallidum, angustifolium)* high Alleghenies (HAL) Community.]

Low Heath – Mountain Ash Shrubland

[**Crosswalk:** Smith's "Northern Appalachian High Elevation Acidic Rocky Summit," TNC's *Vaccinium (myrtilloides, pallidum, angustifolium)* Dwarf-Shrubland Alliance, *Vaccinium angustifolium - Sorbus americana* Community.]

Scrub Oak Shrubland

[**Crosswalk:** Smith's "Northern Appalachian Sand Barren" (in part), "Ridgetop Dwarf-Tree Forest" (in part), TNC's *Quercus ilicifolia* Shrubland Alliance.]

Rhodora - Mixed Heath – Scrub Oak Shrubland

[**Crosswalk:** Smith's "Mesic Scrub Oak - Heath - Pitch Pine Barrens" (in part), TNC's *Pinus rigida* Seasonally Flooded (sic.) Woodland Alliance, *Pinus rigida - Quercus ilicifolia - Rhododendron canadense* Community.]

Great Lakes Region Bayberry – Cottonwood Community

[**Crosswalk:** Smith's "Eastern Great Lakes Dune Community," TNC - no crosswalk.]

Broadleaf Palustrine Shrublands

Buttonbush Wetland

[**Crosswalk:** Smith's "Circumneutral Shrub Swamp" (in part), TNC's *Cephalanthus occidentalis* Shrubland Alliance.]

Alder – Ninebark Wetland

[**Crosswalk:** Smith's "Circumneutral Shrub Swamp" (in part), TNC's *Alnus (serrulata, incana)* Shrubland Alliance, *Alnus serrulata - Physocarpus* Community.]

Alder Sphagnum Wetland

[**Crosswalk:** Smith's "Acidic Shrub Swamp" (in part), TNC's *Alnus (incana, serrulata)* Shrubland Alliance, *Alnus (incana, serrulata) - Osmunda cinnamomea - Sphagnum* spp. Community.]

Highbush Blueberry – Meadow-sweet Wetland

[**Crosswalk:** Smith's "Acidic Shrub Swamp" (in part), TNC's *Vaccinium corymbosum* Shrubland Alliance.]

Highbush Blueberry – Sphagnum Wetland

[**Crosswalk:** Smith's "Nonglacial Bog" (in part), "Acidic Shrub Swamp" (in part), TNC's *Vaccinium corymbosum* Shrubland Alliance, *Vaccinium corymbosum / Sphagnum* spp. Shrubland Community.]

Leatherleaf - Sedge Wetland

[**Crosswalk:** Falls between Smith's "Nonglacial Bog" and "Acidic Shrub Swamp" types, TNC's *Chamaedaphne calyculata - Carex lasiocarpa* Sparse Shrubland Alliance.]

Leatherleaf – Bog Rosemary Peatland

[**Crosswalk:** Smith's "Oligotrophic Kettlehole Bog," and "Weakly Minerotrophic Lakeside Bog," TNC's *Chamaedaphne Calyculata* Dwarf - Shrubland Alliance.]

Leatherleaf – Cranberry Peatland

[**Crosswalk:** Smith's "Oligotrophic Kettlehole Bog" and "Nonglacial Bog," TNC's *Chamaedaphne Calyculata* Dwarf - Shrubland Alliance.]

Water Willow Shrub Wetland
[**Crosswalk:** TNC's *Decodon verticillatus* Shrubland Alliance.]

River Birch – Sycamore Floodplain Scrub
[**Crosswalk:** Smith's "River Gravel Community," TNC's *Betula nigra* Shrubland Alliance.]

Black Willow Scrub/Shrub Wetland
[**Crosswalk:** Smith's "River Gravel Community," TNC's *Salix nigra* Shrubland Alliance.]

Poison Sumac – Red-Cedar – Bayberry Fen
[**Crosswalk:** Smith's "Shrub Fen," "Basin Graminoid Forb Fen," TNC's *Carex (flava, hystericina, interior, sterilis) - Campylium stellatum* Herbaceous Alliance.]

Buckthorn – Sedge – Golden Ragwort Fen
[**Crosswalk:** Smith's "Shrub Fen," "Basin Graminoid Forb Fen," TNC's *Carex (flava, hystericina, interior, sterilis) - Campylium stellatum* Herbaceous Alliance.]

Great Lakes Region Scarp Seep
[**Crosswalk:** Smith's "Eastern Great Lakes Bluff/Cliff Community."]

Great Lakes Region Bayberry – Mixed Shrub Palustrine Shrubland
[**Crosswalk:** Smith's "Eastern Great Lakes Dune Community."]

<u>Terrestrial Herbaceous Openings</u>

Little Bluestem – Pennsylvania Sedge Opening
[**Crosswalk:** Smith's "Acidic Rocky Summit," "Ridgetop Dwarf-Tree Forest" (in part), TNC - no crosswalk.]

Side-oats Gramma Calcareous Grassland
[**Crosswalk:** Smith's "Northern Appalachian Calcareous Rocky Summit" (in part), TNC's *Schizachyrium scoparium - Bouteloua curtipendula* Herbaceous Alliance.]

Calcareous Opening/Cliff
[**Crosswalk:** Smith's "Northern Appalachian Calcareous Cliff Community," TNC's *Pellaea atropurpurea* Sparsely Vegetated Calcareous Cliff Alliance.]

Serpentine Grassland

[**Crosswalk:** Smith's "Eastern Serpentine Barren," TNC's *Pinus (virginiana, rigida) / Schizachyrium scoparium* Herbaceous Alliance, *Pinus virginiana - Pinus rigida / Schizachyrium scoparium - Scleria pauciflora* Community.]

Serpentine Gravel Forb Community

[**Crosswalk:** Smith's "Eastern Serpentine Barren," TNC's *Cerastium arvense* Sparsely Vegetated Alliance.]

Great Lakes Region Dray Sandplain

[**Crosswalk:** Smith's "Eastern Great Lakes Sand Plain," TNC's *Panicum virgatum - Schizachyrium scoparium* Herbaceous Alliance.]

Great Lakes Region Sparsely Vegetated Beach

[**Crosswalk:** Smith's "Eastern Great Lakes Beach Community," TNC's *Cakile edentula* Herbaceous Alliance, *Cakile edentula - Potentilla anserina* Community).]

Persistent Emergent Wetlands

Bluejoint - Reed Canary Grass Marsh

[**Crosswalk:** Smith's "Graminoid Marsh" (in part). TNC's *Calamagrostis canadensis - Phalaris arundinacea* Herbaceous Alliance.]

Cattail Marsh

[**Crosswalk:** Smith's "Graminoid Marsh" (in part), TNC's *Carex stricta Herbaceous* Alliance.]

Mixed Forb Marsh

[**Crosswalk:** Smith's "Freshwater Intertidal Marsh Community" (although here not restricted to tidal areas), TNC-includes several alliances.]

Herbaceous Vernal Pond

[**Crosswalk:** Smith's "Ephemeral / Fluctuating Natural Pool," TNC–no direct crosswalk.]

Wet Meadow

[**No crosswalk.**]

Bulrush Marsh

[**Crosswalk:** Smith's "Robust Emergent Marsh" (in part), TNC's *Scirpus* spp. Herbaceous Alliance.]

Great Lakes Palustrine Sandplain

[**Crosswalk:** Smith's "Eastern Great Lakes Sand Plains," TNC - no crosswalk.]

Prairie Sedge - Spotted Joe-pye Weed Marsh
[**Crosswalk:** Smith's "Calcareous Marsh," TNC's (?).]

Open Sedge Fen
[**Crosswalk:** Smith's "Hillside Graminoid-Forb Fen," TNC's (proposed) *Carex stricta- Carex prairea* Herbaceous Alliance.]

Golden Saxifrage – Sedge Rich Seep
[**Crosswalk:** Smith's " Northern Appalachian Calcareous Seep," TNC's *Carex (flava, hystericina, interior, sterilis) - Campylium stellatum* Herbaceous Alliance (?).]

Skunk Cabbage – Golden Saxifrage Forest Seep
[**Crosswalk:** Smith's "Northern Appalachian Acidic Seep," no direct crosswalk to TNC, in part resembles openings in *Acer rubrum - Fraxinus nigra* Saturated Forest Alliance.]

Serpentine Seepage Wetland
[**Crosswalk:** Smith's "Eastern Serpentine Barrens" (in part), TNC's *Deschampsia cespitosa* Herbaceous Alliance.]

Golden Saxifrage Pennsylvania Bitter-cress Spring Run
[**Crosswalk:** Smith's "Spring Community" and "Spring Run Community," TNC's *Chrysosplenium americanum - Nasturtium officinale* Herbaceous Alliance.]

Sphagnum – Beaked Rush Peatland
[**Crosswalk:** Smith's "Oligotrophic Kettlehole Bog" (in part), "Nonglacial Bog" (in part), TNC's *Chamaedaphne calyculata - Carex* spp. Saturated Shrub Herbaceous Alliance.]

Many Fruited Sedge Bladderwort Peatland
[**Crosswalk:** Smith's "Poor Fen," TNC's *Carex lasiocarpa - Myrica gale - Campylium stellatum* Herbaceous Alliance.]

River Side Ice Scour Community
[**Crosswalk:** Smith's "Riverside Outcrop / Cliff Community," TNC–no direct crosswalk.]

Big Bluestem - Indian Grass River Grassland
[**Crosswalk:** Smith's "River Gravel Community," TNC's *Andropogon gerardii - Sorghastrum nutans* Herbaceous Alliance.]

<u>Non-Persistent Emergent Wetlands</u>

Pickerel-weed – Arrow-arrum – Arrowhead Wetland
[**Crosswalk:** Smith's "Natural Pond (in part), "Artificial Pond" (in part), "Stable Natural Pool" (in part), TNC's *Pontederia cordata - Peltandra virginica* Herbaceous Alliance.]

Spatterdock - Water Lily Wetland

RHODE ISLAND

Forests: Forests are defined by Anderson et al. (1976) as having a treecrown aerial density of at least 10 percent crown closure, stocked with trees capable of producing timber or other wood products, and exerting an influence on the climate or water regime. Anderson et al. (1976) classifies forests into three categories: Deciduous, Evergreen, and Mixed. In Rhode Island these categories are further classified by Enser and Lundgren (2005) into 12 upland forest communities and several cultural (planted) types are recognized as well.

Deciduous Forests: Anderson et al. (1976) defines "deciduous forest land" as all forested areas having a predominance of trees that lose their leaves at the end of the frost- free season or at the beginning of a dry season. These include hardwoods such as oak, maple, or hickory and "soft" hardwoods, such as aspen.

- Deciduous Forest Beech-Maple
- Deciduous Forest Oak/Heath
- Deciduous Forest Oak-Hickory
- Deciduous Forest Oak/Holly
- Deciduous Forest Unspecified

***Evergreen Forests*:** Evergreen forests include all forested areas in which the trees are predominantly those that remain green throughout the year; these include both coniferous and broad-leaved evergreens (Anderson et al. 1976).

- Evergreen Forest Hemlock
- Evergreen Forest Pine
- Evergreen Forest Red Cedar
- Evergreen Forest Spruce (Plantation)
- Evergreen Forest Unspecified

***Pitch Pine Communities*:** Pitch pine-dominated communities are dependent on the recurrent natural disturbance of fire to prevent succession to oak-dominated forests, and to stimulate the reproduction of fire-adapted plants, including pitch pine. Although pitch pine is always the dominant component of the canopy, the form of the canopy and the presence of other species in the understory depend on the specific fire history of the site. Where fires are frequent the canopy may consist of few individual trees within a matrix of scrub oak (*Quercus ilicifolia* and *Q. prinoides*). There may be occasional patches of

bare sand with islands of low vegetation. Where fire has been precluded, pitch pine may form an almost closed canopy with a tall shrub understory and little ground cover.

- Evergreen Forest Pitch Pine-Oak Barren
- Evergreen Forest Pitch Pine/Scrub Oak Barren

***Mixed Forests*:** Mixed Forest Land is defined by Anderson et al. (1976) as forest areas containing both deciduous and evergreen trees but with neither type dominating. A minimum of one-third of the forest area must be mixed deciduous and evergreen in order to be classified as Mixed Forest (Anderson et al. 1976).

- Mixed Forest Deciduous Unspecified
- Mixed Forest Evergreen Unspecified
- Forest Unspecified

Non- Forested Terrestrial Habitats: These habitats include early successional / managed habitats, agricultural communities, and sparsely vegetated communities. Key early successional / managed habitats include maritime shrublands and maritime grasslands, while agricultural communities include artificial grasslands – hayland, pastureland, old fields – idle agriculture, and other agricultural land. Sparsely vegetated communities that have been selected as being in greatest need of conservation include barrens, rock outcrops, dunes, freshwater beaches, and the artificial habitats created by gravel pits and quarries.

Agricultural and Maintained Open Lands (Managed Communities): Agricultural Land is defined by Anderson et al. (1976) as land used primarily for production of food and fiber.

- Agricultural Cropland Hay
- Agricultural Grazing
- Idle Agriculture
- Agricultural Land Unspecified

Early Successional Habitats (Non-agricultural Habitats /Natural Communities): Early successional habitats in the U.S. are defined by Anderson et al. (1976) as upland where the potential natural vegetation is predominantly grasses, grass-like plants, forbs, or shrubs and where natural herbivory was an important influence in its precivilization state.

- Maritime Grassland
- Coastal Shrubland

***Sparsely Vegetated Habitats*:** Sparsely vegetated habitats may be natural or artificial (manmade) and are noted for their lack of vegetation. These communities are generally composed of thin soils, rock or sand.

- Barren Land Unspecified
- Beach Grass Dune
- Freshwater Beaches
- Gravel Pits and Quarries
- Inland Dune / Cobble
- Inland Dune/ Sand Barren

- Natural Quartz Rock Outcrops

Wetland Habitats: Anderson et al. defines wetlands as those areas where the water table is at, near, or above the land surface for a significant part of the year (1976). The hydrologic regime is such that aquatic or hydrophytic vegetation usually is established, although alluvial and tidal flats may be nonvegetated. Wetlands frequently are associated with topographic depressions. Examples include marshes, mudflats, and swamps situated on the shallow margins of bays, lakes, ponds, streams, and manmade impoundments such as reservoirs. They include wet meadows or perched bogs and seasonally wet or flooded basins with no surface-water outflow (Anderson et al. 1976).

Emergent Wetlands: Emergent wetlands are characterized by erect, rooted, herbaceous hydrophytes occurring in all water regimes except sub-tidal and irregularly exposed. This vegetation is present for most of the growing season (Cowardin et al. 1979). Most communities are dominated by perennial plants. Freshwater emergent wetlands of Rhode Island are dominated by non-persistent grasses, sedges, rushes, forbs, and other grass-like plants, with minimal representation by woody trees or shrubs. These communities are primarily non-tidal, freshwater habitats known as marshes, wet meadows, pond shores, bogs, and fens, the one exception being the freshwater tidal marsh, which is a rare type in Rhode Island.

- Emergent Fen/Bog
- Coastal Plain Quagmire
- Emergent Marsh Deep
- Emergent Marsh Shallow/ Wet Meadow
- Freshwater Wetland Unspecified
- Coastal Plain Pondshore

***Shrub Wetlands*:** Cowardin et al. defines Scrub-Shrub Wetlands as areas dominated by woody vegetation less than 6 m (20 feet) tall occurring in all water regimes except sub-tidal, with species including true shrubs, young trees, and trees or shrubs that are small or stunted because of environmental conditions. Scrub-Shrub Wetlands – or Shrub Wetlands – may represent a successional stage leading to Forested Wetland, or they may be relatively stable communities (Cowardin et al. 1979). Freshwater (palustrine) shrub wetlands of Rhode Island are characterized by a dominance of shrubs or tree saplings (less than 20 feet tall).

- Shrub Bog Unspecified
- Shrub Swamp Alder
- Shrub Swamp Water Willow

***Forested Wetlands*:** Palustrine (freshwater) forested wetlands are characterized by woody vegetation that is 6 m tall or taller found within all water regimes, except sub-tidal. They possess an over-story of trees, an understory of young trees or shrubs, and a herbaceous layer.

- Forested Coniferous Wetland White Cedar
- Forested Coniferous Wetland Unspecified
- Forested Deciduous Red Maple Swamp

- Forested Deciduous Wetland Unspecified

Freshwater Aquatic Communities: This category includes aquatic habitats of freshwater streams, rivers, ponds, lakes, seasonally flooded ponds (including vernal pools), and springs. In general these habitats are of flowing or impounded nontidal waters with persistent emergent vegetation either sparse or lacking, but may include areas with abundant submerged or floating-leaved aquatic plants.

***Springs*:** Springs are aquatic communities of very small, cold stream sources where the flow is perennial. They are characterized by water with constant cold temperatures and rich in dissolved oxygen. These streams are typically very shallow and have short lengths and relatively constant, low discharge. Most springs are typically found in association with headwater streams and may simply originate from below the ground, or often may appear as natural or man-crafted pools from which streams flow.

***Rivers and Streams*:**
- River Blackwater Creek
- River Upper Perennial
- River Lower Perennial

***Lakes and Ponds*:**
- Lacustrine Eutrophic Lake/Pond
- Lacustrine Oligotrophic Lake/Pond
- Permanent Fishless Pond
- Seasonally Flooded Pond
- Semi-permanently Flooded Pond

Marine and Estuarine Habitats: Cowardin et al. (1979) defines the Marine System as including the open ocean and its associated outer coastline. In general, salinity is greater than 18.0 parts per thousand (ppt) ocean-derived salts. The Estuarine System is characterized by salt marshes and brackish marshes and the area of fresh and salt water mixing.

Intertidal (includes both Marine and Estuarine): This is defined as the area that is regularly flooded by semidiurnal tides, bounded by the spring tide.
- Estuarine Intertidal Emergent Brackish Marsh
- Estuarine Bluff Clay
- Estuarine Rocky Shore Bedrock
- Estuarine Unconsolidated Sand Dune
- Estuarine Unconsolidated Shore Cobble / Shell
- Estuarine Unconsolidated Shore Sand Beach
- Estuarine Beaches Unspecified

Subtidal (includes both Marine and Estuarine):
- Estuarine Subtidal Aquatic Bed Rooted Vascular
- Hard / Rocky Bottom
- Soft Bottom / Unconsolidated Sediments

- Varied Bottom - Invertebrate Beds
- Marine and Estuarine (Open Water)

Other Habitats: Several key habitats are not completely categorized by any one standardized natural vegetation or other classification systems above for a variety of reasons. Since they support GCN species, they are included in this CWCS and listed below.

***Predator-free Islands*:** This category of habitat is necessary to represent those species for which the primary habitat component is not the type of vegetation or substrate but rather the lack of predators. The habitat for such species cannot be identified with vegetation classifications or by remote sensing – it is rather inferred by the presence of the target species.

Urban Habitats: These habitats are defined by Anderson et al. as areas of intensive use with much of the land covered by structures including cities, towns, villages, strip developments along highways, transportation, power, and communications facilities, and areas such as those occupied by mills, shopping centers, industrial and commercial complexes, and institutions that may, in some instances, be isolated from urban areas (Anderson et al. 1976).

VIRGINIA

Forest Habitat: This habitat includes areas that contain trees that are predominantly larger than saplings.

- ***Deciduous Forest:*** Includes forested areas that are predominantly hardwoods, though some conifers may be present.

- ***Coniferous Forest:*** Includes forested areas that are predominantly conifers (especially pine in Virginia), though some hardwoods may be present.

- ***Mixed Forest:*** Those forested areas that are fairly evenly composed of hardwoods and conifers (include those areas that were historically fire-maintained pine forests but have since been invaded by hardwood).

Open Vegetated Habitat

- ***Open Vegetated*:** Refers primarily to grasslands, pastures, and highly managed grasslands, such as extensive mowed areas at airports. These areas contained little or no woody vegetation, and such vegetation that is present is sparsely scattered throughout the habitat.

- ***Open Scrub:*** Refers primarily to regenerating open fields and clearcuts. The main vegetation is tall grasses and forbs with a significant shrubby/woody component. Most trees in the habitat will be no larger than sapling size.

Wetland Habitat

- ***Emergent:*** Refers to wetlands with a significant component of vegetative cover, such as cattails, sedges, or rushes. There may be some small, widely scattered trees or shrubs or open water.

- ***Forested:*** Refers to wetlands that are relatively forested. They may sometimes contain small open patches. This generally does not include patches of forest that are occasionally flooded, but rather semi-permanent to permanent wetlands with predominantly forest cover.

Barren Habitat

- ***Beach:*** Sand ocean shoreline habitats and may also include similar adjacent habitats, such as tidal mudflats.

- ***Balds:*** Refers to rocky balds that occur in mountainous areas.

- ***Developed:*** Includes residential areas and other areas influenced heavily by human construction.

- ***Other Barren:*** These include sandpits, quarries, and other unvegetated habitats.

Subterranean Habitats

- ***Cave***

APPENDIX G: SUMMARY FROM BCR 30 ALL-BIRD WORKSHOP, DECEMBER 2004

BCR 30 Workshop Summary
Cape May, New Jersey, December 7-9, 2004

15 January 2005

Note

This document is a compilation of materials developed by breakout groups over the course of the two-and-a-half-day workshop and has not yet been synthesized. Workshop participants should review this summary and make certain the information appropriately reflects the breakout group results from the groups they were in. Once reviewed and commented on by participants, ACJV staff will compile the information into a plan summarizing bird conservation priorities for the New England/Mid-Atlantic Bird Conservation Region for partners to use for implementing projects and for states to incorporate into comprehensive wildlife conservation strategies.

Summary

The Atlantic Coast Joint Venture, New Jersey Division of Fish and Wildlife and the International Association of Fish and Wildlife Agencies hosted a workshop for the Southern New England/Mid-Atlantic Bird Conservation Region (BCR 30) December 7-9, 2004 in Cape May, New Jersey. This workshop brought together 85 state, federal and non-governmental organization partners from ten states to review and reach consensus on the highest priorities for bird conservation in BCR 30, the region encompassing the coastal plain from southern Maine to northern Virginia. Using information from the major continental and regional bird conservation plans as well as the draft State Comprehensive Wildlife Conservation Strategies and refuge plans, partners reached consensus on priority bird species, habitat-species suites, threats to these species and habitats, focus areas, and priority conservation actions (habitat and non-habitat conservation projects as well as monitoring, research and outreach projects). A database and maps created for the workshop allowed workshop participants to compare priorities among state and refuge plans and other bird conservation programs and initiatives, and to determine the ability of specific agencies and organizations to meet habitat objectives in the region.

An abundance of information developed out of the breakout groups and can be found in detail in the sections that follow this summary. However, there were a number of threats and priority actions that overlapped across the breakout sessions and can be condensed into the following "themes."

Threats

1. Habitat loss – Not surprisingly, this was consistently the number one threat to all habitat types. Coastal marsh and forested habitats were raised most often as priorities due to pressures, rate of loss, or lack of information on rate of loss and present spatial distribution.
2. Habitat quality – for all habitat types, including salt marsh, early successional habitats, forest habitats and wetlands.
3. Invasive species
4. Predation – for beach-dependent species and many coastal marsh-dependent species such as breeding waterfowl, shorebirds, terns and rails.

Priority Actions

1. Spatial analyses to identify priority breeding and nonbreeding habitat patches (largest and highest quality patches remaining) in saltmarsh and forested habitats and analyses on rate/extent of loss.
2. Restoration/management of priority patches to produce high-quality habitat.
3. Coordinated regional species inventory and monitoring programs for high priority species.

4. Predator management programs (coastal habitats).
5. Policy work/public outreach to effect zoning, smart growth programs, open space protection, etc.

The Next Steps

1) Post workshop materials on the web
The workshop summary and materials from the workshop, including PowerPoint presentations and digital files of materials used during the workshop (tables, maps, etc.), will be posted on the ACJV website as soon as possible (an email note will be sent out with the link when available)

2) Update and present State Comprehensive Wildlife Conservation Plan database
The USFWS Division of Migratory Birds (Division) will work with states and the Division of Federal Assistance to update the species conservation database created for the workshop to compare the priority species and actions among the state plans. This database will be posted on the web and will allow states to update their information directly or to send information to the Division to update. State partners need to provide updated lists and bird conservation actions to the Service as soon as possible to facilitate this process. (A separate note will be sent to the State Directors with this request). The results of this analysis will be presented to the ACJV Management Board in March as well as at the Northeast Fish and Wildlife Conference.

3) Organize Steering Committee conference call
In early February, the BCR 30 Steering Committee will meet via conference call to review the results of the workshop, and plan the next steps for summarizing the results and getting the resources to implement high priority projects identified in the workshop.

4) Present initial meeting results to the ACJV Management Board
The initial results will be presented to the Atlantic Coast Joint Venture Management Board at their meeting on March 15, 2005 at the North American Wildlife and Natural Resources Conference in Arlington, Virginia

5) Complete draft BCR plan
During winter and spring of 2005, ACJV staff will synthesize information from the existing bird plans, the results of the workshop (including any comments on this document received by workshop participants) and subsequent analyses and will produce a BCR plan for distribution to workshop participants and other partners. The BCR plan will include a list of priority actions that came out of the workshop, in addition to suggested partnerships and potential funding opportunities for implementation.

6) Organize a habitat mapping workgroup
The ACJV staff, steering committee and interested partners will organize a workgroup to determine the needs and methods for the habitat patch mapping that has been identified as the highest priority for the BCR. The group or groups will identify the questions that need to be answered through the habitat patch mapping, the existing resources that can be used and the additional projects that need to be undertaken.

7) Organize additional regional workgroups as needed
The steering committee may want to identify and organize additional work groups to address priorities such as predator control.

8) Submit projects for funding through State Wildlife Grants and other funding sources
States will submit priority projects for consideration for funding by State Wildlife grants and other funding sources.

BREAKOUT SESSIONS

Workshop attendees participated in 3 breakout sessions during the workshop. Breakout sessions focused on species, habitat, and geographic area bird conservation priorities.

SPECIES BREAKOUT SESSIONS

The first breakout session was the species breakout session and groups were composed of individuals with expertise and/or interest in waterfowl, waterbird, shorebird and landbird conservation. Species breakout groups centered discussions around draft species lists from bird conservation initiatives, reviewed focus area delineations, and discussed and reached consensus on major threats and limiting factors to priority species (at BCR scale), priority non-habitat conservation actions (such as by-catch issues for seabirds), priority research and monitoring needs, and priority bird conservation actions. Groups were asked to review existing information and lists and develop (1) regional priority species lists with population and habitat goals for each state where appropriate, (2) lists of regional threats and priority non-habitat conservation actions, and (3) lists of monitoring and research needs.

WATERFOWL BREAKOUT SESSION RESULTS

Species List

Twenty-nine priority species were discussed from a list based on the North American Waterfowl Management Plan. Two species were removed from the priority species list (Blue-winged Teal and King Eider). A priority species is defined as The list that resulted is:

Species	BCR Tier
American Black Duck	HIGHEST
Atlantic Brant	HIGHEST?
Canada Goose - Atlantic	HIGHEST
Black Scoter	HIGH
Bufflehead	HIGH
Canada Goose - North Atlantic	HIGH
Canvasback	HIGH
Common Eider	HIGH?
Greater Scaup	HIGH
Lesser Scaup	HIGH
Long-tailed Duck	HIGH
Mallard	HIGH
Surf Scoter	HIGH
Tundra Swan - Eastern	HIGH
White-winged Scoter	HIGH
American Wigeon	MODERATE
Common Goldeneye	MOD HIGH
Gadwall	MODERATE
Green-winged Teal	MODERATE
Harlequin Duck	MODERATE
Hooded Merganser	MODERATE
Northern Pintail	MODERATE
Red-breasted Merganser	MODERATE
Ruddy Duck	MODERATE
Wood Duck - Eastern	MODERATE

Population Objectives

Discussion occurred about the whether or not there is a need for population objectives and if so, how to set population objectives. The group decided that there was a well-defined need for objectives. For waterfowl, population objectives are under development as part of the North American Waterfowl Management Plan. The group agreed on setting directional population objectives.

Focus Areas

Waterfowl focus area maps were reviewed, discussed and accepted as reasonable.

Threats and Limiting Factors

1. *Habitat loss & degradation*
- Shoreline/waterfront development, (e.g., residential, commercial, marinas, etc.)
- Invasive exotic plants (e.g., *Phragmites*, water chestnut, purple loosestrife) and animals (e.g., Mute Swans, zebra mussels)
- Historic and current ditching, dredging, or draining
- Urbanization/sprawl
  - Landscape fragmentation; loss of upland forests, grasslands, and shrublands; mismanagement of habitat buffers (e.g. mowing)
  - Human disturbance (e.g., jet-skis, recreational boating)
- Decreased water quality
  - Non-point source (e.g., stormwater run-off, fertilizer, pesticides, etc.)
  - Sewage discharge
  - Industrial pollution (e.g., heavy metals, dioxin, etc.)
  - Erosion & sedimentation
- Algal blooms (e.g., red & brown tides)
- Conversion of relatively favorable land-uses (e.g., bottomland hardwood forest or row crops) to less favorable ones (e.g., loblolly pine plantations and cash crops, respectively)
- Poor agricultural practices (e.g., cattle degrading shorelines, lack of buffers)
- Coastal Marsh erosion from sea level rise subsidence
- Habitat degradation/competition for resources from greater snow goose, resident Canada Goose

2. *Oil spills*
3. *Overuse of water-resources by municipalities*
4. *Disease (botulism, avian cholera)*
5. *Sand mining*
6. *Offshore wind farm development*
7. *Fisheries by-catch and gill nets*
8. *Overfishing*
9. *Aquaculture (direct loss or exclusion of habitats and water quality issues)*
10. *Mallard releases*

Priority Non-habitat Conservation Actions

- Increase the coordination and planning by which various conservation funding programs (e.g., Farm Bill, state open-space or agricultural preservation) and agencies (USDA, EPA, NOAA, U.S. Army Corps or Engineers) can be directed towards protecting or buffering high-quality wetlands and upland nesting habitat.
    - Atlantic Coast Joint Venture to include additional funding agencies at Management Board level (USDA, EPA, NOAA, U.S. Army Corps or Engineers)
    - ACJV, state and other partners to use results of BCR planning to guide conservation funding to highest priority actions and areas
- Reduce impacts of greater snow goose on coastal marshes
    - USFWS to complete EIS
    - States to work with Flyway Council
    - Conservation order to reduce populations
- Identify and protect offshore habitat needs
    - Review of existing offshore bird use data
    - Fill in gaps through additional areas (primarily shoal areas)
    - Consider marine sanctuary designation
    - USFWS, USGS, coastal state contributions
- Effect improved wetland protection laws and zoning that is compatible with avian habitat conservation through public outreach and partnerships with municipal governments and local conservation organizations.
- Reduce human intrusion into sensitive habitats through fencing, posting, wardens, and public outreach.
- Develop and improve oil spill response and contingency planning and capabilities. Seek policies that reduce oil spill likelihood (e.g., vessel mandates).
- Predator exclusion and control in some high-quality habitats that experience little productivity due to exotic predator species (e.g., feral pets and rats).
- Effect improved wetland protection laws and zoning that is compatible with avian habitat conservation through public outreach and partnerships with municipal governments and local conservation organizations.
- Seek to mitigate fishery activities detrimental to waterfowl

Priority Habitat Conservation Actions

All habitats

- **Fee or easement acquisition of priority high-quality habitats** including nesting, migratory stopover, and wintering areas, and the upstream headwaters and adjacent buffer habitats throughout the watershed that are central to their integrity.
- **Enhance/restore degraded wetlands and adjacent upland habitats (including buffers).**
- **Manage to improve nesting and wintering habitat quality at multiple scales.**
    - For example, at an individual site improve habitat quality by controlling water levels and vegetation, reducing erosion and runoff to the area, and conserving or improving nesting or roosting habitats or buffer habitats (e.g., their width and vegetative composition) adjacent to wetlands.
    - At the larger scale, protect or improve water quality throughout the watershed, and increase the number, size, and connectivity of habitat patches (nesting, roosting, stopover, wintering, etc.) in the landscape.
- **Control Invasive Plants**
- **Direct mitigation to highest priority areas**

Coastal

- Reestablish SAV (Submerged Aquatic Vegetation) beds in areas where they formerly occurred and where water quality has improved since their disappearance.
- When maintaining or constructing new buildings, railroads, and highways adjacent to rivers, lakes, wetlands, or the coast, maintain or improve hydrologic connections, e.g., restore tidal flow in estuarine systems.
- Erosion control for coastal marshes

Priority Research and Monitoring Needs

Research

4. Late winter-spring ecology and physiology "spring bottleneck hypothesis"
5. Migration and wintering area carrying capacity by habitat type (impoundment, salt marsh, benthic, mud flat, etc.)
6. Continue research and biological control of phragmites

Monitoring

4. *Establish Visibility Correction Factors for eastern surveys*
5. *Continue and improve Mid-Winter Waterfowl Survey*
6. *Continue Sea Duck Survey.*

LANDBIRD BREAKOUT SESSION RESULTS

Species List

The species list developed by Partners in Flight was used as the basis for discussion. The following points came out of the discussion:

- There is a need to include high priority non-breeding species (e.g., Rusty Blackbird) within the species priority lists, eventually using same rules as are used for breeding species.
- Nelson's Sharp-tailed Sparrow (Rule 5) needs to be added to the list.
- Rule 9 species should be removed from the priority species list for the BCR.
- Rule 8 species (Gray Catbird) should be maintained on the list because they represent high responsibility for the BCR (not a larger area, like Rule 9).
- The following subspecies have been propose to add
    - Coastal Plain Swamp Sparrow: entire breeding pop is within BCR30
    - Ipswich Sparrow: wintering pop is in BCR30
    - Black-throated Green Warbler?
- The highest priority species in the PIF list are included on state lists for CWCS, with a few exceptions.

Population Objectives:

The group discussed whether the benchmark population objectives for early-successional species were artificially high and/or whether baseline data from the 1970s was too high. It was decided that priority should be given to sustainable, natural habitats, e.g. natural disturbance regimes.

Discussions on particular species resulted in the following;

- Consensus that Saltmarsh Sharp-tailed Sparrow and Seaside Sparrow populations should be increased.

- Consensus to increase population objectives for Blue-winged Warbler and Prairie Warbler: Consensus.
- Wood Thrush: Consensus to increase.
- Chimney Swift: Consensus to increase.

Highest Priority Landbirds: Threats and Limiting Factors

Saltmarshes

Habitat Threats/Limiting Factors

Saltmarsh Sharp-tailed Sparrow:

18. Habitat loss,
19. marsh management (unknown effects of mosquito control, marsh burning, open marsh water management, ditch plugging, etc.),
20. coastal development,
21. unprotected buffers,
22. possible mercury deposition resulting in elevated mercury levels in the blood,
23. invasive species,
24. possible increased predation in high marsh buffers,
25. possible effects of adult mosquito control (food limitation),
26. area sensitivity.

Seaside Sparrow: See Saltmarsh Sharp-tailed Sparrow.

Non-habitat issues to be addressed in next 2-3 yrs:

7. research impacts of mosquito control and pesticides,
8. mercury deposition,
9. food availability and food habits,
10. niche separation between sympatric species,
11. predator control,
12. better (regional) monitoring,
13. research impacts of marsh management techniques,
14. research techniques to increase productivity and survival.

Who: Tom Hodgman mentioned an existing group, will follow up; Dave Curson (MD), Bob Allen, Mike Wilson.

Early-successional habitats

Habitat Threats/Limiting Factors

Blue-winged Warbler:

1. Loss of breeding habitat (sprawl, succession, etc.),
2. loss of natural disturbance processes,
3. deer herbivory,
4. habitat quality (longevity),
5. exotic insects (e.g., Viburnum leaf beetle),
6. nest predation.

Prairie Warbler: See Blue-winged Warbler, area sensitivity, nest parasitism.

Whip-Poor-Will:

1. Forest fragmentation,
2. area sensitivity,

3. lack of knowledge,
4. human disturbance,
5. habitat change and
6. competition with Chuck-Wills-Widow.

Non-habitat issues to be addressed in next 2-3 yrs:

1. deer overabundance, public outreach regarding deer and fire,
2. Whip-Poor-Will monitoring,
3. Farm Bill policy working?,
4. collaborate with game managers and look for common ground,
5. research comparing natural and managed habitat suitability (breeding densities, demographics),
6. possible food limitation (large moths) due to biological control targeting Gypsy moths.

Deciduous Forest

Habitat Threats/Limiting Factors

Wood Thrush:

1. Forest fragmentation,
2. habitat quality (loss of shrub layer, due to deer?),
3. need for appropriate post-fledging habitat (habitat mosaic, including shrubby areas and openings),
4. acid precipitation,
5. possible effects due to invasive plant species,
6. need for additional life cycle information.

Non-habitat issues to be addressed in next 2-3 yrs:
deer overabundance, research limiting factors, Policy regarding sprawl (e.g., Smart Growth, open space protection, etc.).

Additional species: Threats and Limiting Factors
Chimney Swift: Loss of nest sites in urban areas, possibly pesticides
N. Flicker
B. Oriole
Whip-Poor-Will

Other non-habitat projects: migration stopover habitat mapping and research (e.g. expand use of radar and other techniques to entire BCR).

Issues Forwarded to Habitat Breakouts from Landbird Breakout

All Habitat: Habitat patch map analysis

Saltmarsh

- Habitat loss / coastal development
- marsh management (unknown effects of mosquito control, marsh burning, open marsh water management, ditch plugging, etc.)
- unprotected buffers
- invasive species

Deciduous Forest

- Forest fragmentation
- habitat quality (loss of shrub layer)

- need appropriate post-fledging habitat (habitat mosaic, including shrubby areas and openings)
- invasive plant species

Early-successional/Shrubland

- Loss of breeding habitat (sprawl, succession, etc.)
- loss of natural disturbance processes
- habitat quality (longevity)
- exotic insects (e.g., Viburnum leaf beetle)
- work on using Farm Bill options to improve/increase successional habitat

SHOREBIRD BREAKOUT SESSION RESULTS

Priority Species List

1. Applied process from BCR 14.
2. Upland Sandpiper: Listed as Moderate Priority: either exception or new rule: high BCR concern and low BCR responsibility invokes medium priority at BCR level.
   Sanderling: recent ISS analysis, decline ns, status unclear. Leave as highest priority with note.
3. Red necked phalarope: regional status changed to high priority; high BCR responsibility questionable. Change regional concern to high and BCR responsibility to low/medium. Continental concern being reviewed by working group, final decision will follow.
4. State lists: Recommend to group that species designated as high and highest priority be added to state SWG plans unless they do not occur in state.

Resulting Species List

SPECIES	NATIONAL STATUS	BCR DIST. [1]	REGIONAL STATUS[2]	BCR Resp. [3]	BCR Priority
American Oystercatcher	High Concern	B,m,W	Highly Imperiled	High	Highest
American Woodcock	High Concern	M,W,B	Highly Imperiled	High	Highest
Eskimo Curlew	Highly Imperiled	M	Highly Imperiled	High	Highest
Piping Plover	Highly Imperiled	m,B	Highly Imperiled	High	Highest
Red Knot	High Concern	M	Highly Imperiled	High	Highest
Ruddy Turnstone	High Concern	M,w	High Concern	High	Highest
Sanderling	High Concern	M,w	High Concern	High	Highest
Whimbrel	High Concern	M	Highly Imperiled	High	Highest
American Golden-Plover	High Concern	M	High Concern	Moderate	High
Black-bellied Plover	Moderate Concern	M,w	Moderate Concern	High	High
Buff-breasted Sandpiper	High Concern	M	High Concern	Moderate	High
Dunlin	Moderate Concern	M,W	Moderate Concern	High	High
Greater Yellowlegs	Moderate Concern	M	High Concern	Moderate	High
Hudsonian Godwit	High Concern	M	High Concern	Moderate	High
Marbled Godwit	High Concern	M	High Concern	Moderate	High
Purple Sandpiper	Low Concern	W	Moderate Concern	High	High
Red-necked Phalarope	Moderate Concern	M	High Concern	Low/Mod.	High
Semipalmated Sandpiper	Moderate Concern	M	High Concern	High	High
Short-billed Dowitcher	Moderate Concern	M	Moderate Concern	High	High
Solitary Sandpiper	Moderate Concern	M	Moderate Concern	High	High
White-rumped Sandpiper	Low Concern	M	Moderate Concern	High	High

Willet	Moderate Concern	M,B,w	High Concern	High	High
Wilson's Phalarope	High Concern	M	Moderate Concern	Moderate	High
Wilson's Plover	High Concern	b	High Concern	Moderate	High
American Avocet	Moderate Concern	M	Moderate Concern	Low	Medium
Spotted Sandpiper	Moderate Concern	M,B	Moderate Concern	Moderate	Medium
Least Sandpiper	Moderate Concern	M	Moderate Concern	Moderate	Medium
Common Snipe	Moderate Concern	M,w,B	Moderate Concern	Moderate	Medium
Red Phalarope	Moderate Concern	M	Moderate Concern	Moderate	Medium
Killdeer	Moderate Concern	m,w,B	Low Concern	Moderate	Medium
Western Sandpiper	Moderate Concern	M	Low Concern	Moderate	Medium
Semipalmated Plover	Low Concern	M	Low Concern	High	Medium
Lesser Yellowlegs	Low Concern	M	Low Concern	Moderate	Medium
Upland Sandpiper	Low Concern	m,b	High Concern	Low	Medium

[1]Distribution Codes listed in national plan: B=Breeding; M=Migration; W=Wintering
B,M,W =high concentrations, region extremely important to the species relative to other regions
B,M,W = common or locally abundant, region important to the species
b,m,w =uncommon to fairly common, region with low abundance relative to other regions
[2]Regional conservation status as listed in regional plan.
[3]BCR Responsibility, based on proportion of continental population in BCR 30.
Note: Here it is tentatively based on the Distribution Codes used in the Continental Plan, shown above; we should document any/all changes or exceptions to this… The Bold-caps and Capitalized codes are interpreted as High and Moderate BCR responsibility, respectively. The lower case codes are interpreted as Low BCR responsibility.

Population Objectives

1. For migrants, BCR population objectives challenging.
2. Preference for directional goals, reversing declines.
3. Objectives will be provided where appropriate, in some cases directional goals, in other cases population goals. Working group needed to address these.

Focus Areas - were reviewed and revised (see resulting map).

Threats and Limiting Factors
*Beachfront development/ recreation/ disturbance, seawalls
*Predation
Impoundment management
Sea-level rise
Stopover habitat in Latin America
Horseshoe crab populations
Oil-spill, effects of past, threats of future
Lack of knowledge of roost sites
Water quality issues
Shoreline erosion/dune stabilization
Arctic breeding habitat/global warming
Upland species/habitat issues
Aquaculture
Wind power
Habitat loss, migration, winter and breeding

Conservation Actions

HABITAT ACTIONS

Actions	Assignment
Identify, restore, enhance, and protect breeding habitats of highest and high priority species	
Identify, restore, enhance, and protect nonbreeding habitats of highest and high priority species	
Develop BMP and adaptive management for impoundments	
LIP program for high priority species	
Implement predator control at sites used by high priority species	

NON-HABITAT ACTIONS

RANK 1 Coastal development zoning	State lead with help from local, ngo, fed
RANK 2 Management actions (outreach, wardening, etc.) to reduce disturbance	State, federal, local
RANK 3 Oil spill response plans	State, federal

RESEARCH AND MONITORING

RANK 1(13) Fully implement PRISM surveys, and aerial survey for inaccessible coastal habitats	States, federal, ngo
RANK 2 (11) Analysis of threats to key sites	State SWG plans, IBA,
RANK 3 (6) Targeted monitoring for high priority species	States, working groups

Woodcock recommendations to be added.

WATERBIRD BREAKOUT SESSION RESULTS

Species List – The Waterbird Initiative species list of priority BCR 30 species was used as the basis for discussion.

There was concern about the following species being priority species within the BCR:
Cattle Egret, Double-crested Cormorant, Laughing Gull, Herring Gull, Great Black-backed Gull, Great Blue Heron, Greg Egret, and Glossy Ibis. There was discussion and a decision to pull these species "aside" for further discussion before listing them as "consensus" BCR 30 priority species.

There was discussion about the need to include Sora. In Massachusetts, Soras have become a large issue. There is insignificant information about the species at this time to make well-informed decisions about the populations. Soras were conditionally added as a priority species within the BCR.

The list of priority species within the BCR on which there was consensus is as follows:

Species/Population Common Name	Scientific Name	BCR 30 use
Red-throated Loon	*Gavia stellata*	w
Horned Grebe	*Podiceps auritus*	w/m
Cory's Shearwater	*Calonectris diomedea*	p
Greater Shearwater	*Puffinus gravis*	p
Audubon's Shearwater	*Puffinus lherminieri*	p
Northern Gannet	*Morus bassanus*	p
American Bittern	*Botaurus lentiginosus*	b/w
Least Bittern	*Ixobrychus exilis*	b
Snowy Egret	*Egretta thula*	b/w
Little Blue Heron	*Egretta caerulea*	b/w
Tricolored Heron	*Egretta tricolor*	b
Black-crowned Night Heron	*Nycticorax nycticorax*	b/w
Yellow-crowned Night Heron	*Nyctanassa violacea*	b/m
Black Rail	*Laterallus jamicensis*	b
Clapper Rail	*Rallus longirostris*	b
King Rail	*Rallus elegans*	b/w
Sora	*Porzana carolina*	b/m
Royal Tern	*Sterna maxima*	b
Roseate Tern	*Sterna dougallii*	b/m
Common Tern	*Sterna hirundo*	b
Forster's Tern	*Sterna forsteri*	b/w
Least Tern	*Sterna antillarum*	b
Bridled Tern	*Sterna anaethetus*	p
Black Skimmer	*Rynchops niger*	b
Razorbill	*Alca torda*	p

Threats and Limiting Factors
The Waterbird Initiative has listed threats and limiting factors by species. Sea level rise was one threat that the group identified as missing and reached consensus on adding to the list.

Population and Habitat Objectives
We should use them where we have the information and we should work collaboratively. Doesn't necessarily have to be a population objective but can directional goals, such as double the numbers, or triple the numbers.

Waterbird Breakout Projects

Focal Species were selected by High Continental Concern and BCR 30 Focal Species

Offshore

1) Comprehensive Offshore Bird Monitoring Program – composed of three parts:
   a. Determine trends based on spatial and temporal habitat use by birds offshore.
   b. Analyze existing ship and aerial data sets for Atlantic and develop GIS database.
   c. Develop survey area priorities, species, and techniques to fill in data gaps.

Focal Species: Red-Throated Loon, Bridled Tern, Audubon's Shearwater, Greater Shearwater, seaducks

Partners: NOAA, USGS, Coastal States, FWS, ASMFC

2) Bycatch/Gear Interactions. Conduct data collection and monitoring of species affected and relative numbers through a dedicated observer program, or through existing observer programs.

Focal species: Red-Throated Loon, Bridled Tern, Audubon's Shearwater, Greater Shearwater, seaducks

Partners: USGS, Coastal States, FWS, ASMFC

Beach-Nesting

1. Predator Control – Establish programs of selective predator management. Explore USDA for funding predator control program ongoing. Explore non-lethal techniques to avoid controversy.

   Focal Species: Least, gull-billed, roseate, and gull-billed terns, and black skimmer.

   Partners: USDA, States, FWS, TNC, Delta Waterfowl, National Audubon, and other NGOs.

2. Habitat Management. Includes beach renourishment, beach protection, use of dredge spoil material.
3. Comprehensive Colonial Waterbird Monitoring Program. Standardized, sampled program for wading birds and seabirds. Inventories every 10 years and sampled surveys every 1-3 years.
4. Disturbance

Marsh

1. Comprehensive marsh monitoring. There is a need for a targeted monitoring program that follows a standardized regional approach and includes using remote acoustical techniques.
2. Management of shallow water impoundments.
3. Wetland restoration
4. Evaluation of wetland restoration programs

Research Priorities

1. Research on the effects of invasive species and how they affect habitat availability to marshbirds.
2. Understand the spatial and temporal effects of sea level rise on saltmarsh habitats
3. Understand habitat/species relationships during all life stages. How can we best predict where species will be found?
4. Assessment and impact of contaminants. Conduct pilot studies to determine where mercury levels are high and then use this info to target studies on impacts.

HABITAT BREAKOUT SESSIONS

Workshop attendees divided into habitat groups focused on coastal habitats (estuaries, bays, salt marsh, marine, beaches, mud flats), freshwater wetland habitats (palustrine forested, palustrine emergent, palustrine shrub-scrub), forest habitats (deciduous, mixed, pine, other), and grasslands/early successional habitats (agricultural grasslands, shrublands, barrens, other). Groups reviewed existing information including habitat maps and habitat information available for the BCR. Groups discussed (1) major threats

and stressors to the habitat, (2) the priority species that would benefit from appropriately managed habitats, (3) the habitat conservation priorities identified during the species breakout sessions and potential overlaps between species groups, (4) habitat and population goals for priority species using specific habitats, (5) the priority habitat management actions needed to accomplish bird conservation, (6) the capability of the BCR for meeting habitat objectives on and off conserved lands, and (7) habitat modeling efforts needed to support decisions on where and how to manage priority habitats, and (8) the contributions of each state, refuge and other landowner towards meeting habitat goals. Groups identified geographic areas within the BCR that could make significant contributions to habitat goals, listed the greatest threats/stressors to habitat types within the BCR, and identified priority habitat conservation and management actions needed for addressing these threats. Groups developed lists of the highest priority habitat conservation actions to be initiated within the BCR over the next few years.

COASTAL HABITATS

Threats to coastal habitats were discussed. The group developed the following list:

- Invasives/Predators (control)
- Human Disturbance
- Saltmarsh die-off and degradation – via herbivory, altered hydrologic regimes, sea level rise, disease, erosion
- Loss of SAV
- Interspecific competition (gulls and shorebirds)
- Coastal Zoning/Development
- Oil Spills – inability to respond quickly and efficiently
- Fisheries impacts
- Nutrient loading

The group discussed the priority needs within habitat subgroups and developed the following list of priority Conservation Actions:

Estuarine Emergent Wetlands

<table>
<tr><td colspan="2">Program/Project Name: Identification and Protection of Saltmarshes for High priority Species</td><td>Submitted by:
Lamar Gore</td></tr>
<tr><td colspan="3">Implementation Priority: High</td></tr>
<tr><td colspan="3">Rationale: Systematically identify the range of threatened and vulnerable coastal marshes on the Atlantic Coast to promote the protection of high priority species.</td></tr>
<tr><td colspan="2">Objectives:
• Identify marsh and buffer habitats.
• Assess the threats, vulnerability and protection status of marsh and buffers.
• Assess those marshes that support high priority species.
• Determine and apply best protection strategies (e.g., acquisition, easements, zoning, planning and outreach)</td><td>Deliverables:
• Prioritized list of marshes and buffers that support high priority species.
• Prioritized list of protection strategies.
• Outreach/education products.</td></tr>
<tr><td colspan="2">Location: Saltmarshes extending from RI – VA.</td><td>Target Species: American black duck, Atlantic brant, saltmarsh sharp-tailed</td></tr>
</table>

	sparrow**,** seaside sparrow, black rail, clapper rail, short-billed dowitcher,
Timeline:	**Lead Organization:** Multi-state working groups.
Activity: Management and outreach	
Partner Organizations: IBA programs, TNC	
Costs: Unk.	
Current Support:	
Unfunded:	
Potential Sources:	

Program/Project Name: Saltmarsh Restoration	**Submitted by:** Breese, Carson, Hodgman, Larson, Bottitta, Villanueva
Implementation Priority: High	
Rationale: Restore hydrological conditions of saltmarshes that support highest and high breeding and nonbreeding priority species. Specifically: 1. Restore high marsh habitats lost to impoundments, tidal restrictions, invasive species, and filling for the benefit of black rails and other high priority saltmarsh species. 2. Restore semi permanent and permanent open water habitat and tidal flats lost to ditching and tidal restriction for the benefit of shorebirds, waterbirds, and waterfowl.	
Objectives: • Restore semi-permanent and permanent open water habitats and flats within altered marshes for the benefit of black ducks and shorebirds. • Restore tidal flow to high quality high marsh habitat. • Invasive species management.	**Deliverables:** • Increase breeding habitats for high priority species. • Increase habitat for breeding, migrating, and wintering waterfowl and waterbirds (acres).
Location: Saltmarshes extending from RI – VA.	**Target Species:** American black duck, saltmarsh sharp-tailed sparrow**,** seaside sparrow, black rail, clapper rail, short-billed dowitcher, and other saltmarsh species.
Timeline:	**Lead Organization:** Multi-state working groups.
Activity: Restoration	
Partner Organizations: State fish and wildlife agencies, USFWS, Ducks Unlimited	
Costs: Unk.	
Current Support:	
Unfunded:	
Potential Sources:	

Program/Project Name: Coastal Marsh Restoration	**Submitted by:** T. Villanueva
Implementation Priority:	
Rationale: Tremendous acreage of coastal marsh vegetation and associated substrate are lost to	

<table>
<tr><td colspan="2">variety of causes such as erosion, excessive herbivory by over abundant species (i.e., resident Canada geese, snow geese, and invasive nutria), land subsidence, sudden marsh die-off, and sea level rise. The loss of saltmarsh can have negative impacts on numerous species of waterfowl, waterbirds, shorebirds, and landbirds. Moreover, impacted marshes can lead to the erosion of adjacent marsh areas.</td></tr>
<tr><td>Objectives:
Identify areas of significant saltmarsh loss.
Restore coastal marsh vegetation and associated substrate to provide habitat for high priority marsh birds, landbirds, waterfowl, shorebirds, and waterbirds throughout the annual cycle. Methods used will include placement of compatible dredge material to elevate substrate and replace lost shoreline.</td><td>Deliverables:
GIS mapping, project design and acres of marsh restored that will provide breeding and nonbreeding habitat for high priority marsh birds, landbirds, waterfowl, shorebirds, and waterbirds.</td></tr>
<tr><td>Location: Impacted saltmarshes throughout BCR30.</td><td>Target Species: American black duck, saltmarsh sharp-tailed sparrow, seaside sparrow, black rail, clapper rail, migratory Canada goose, ruddy turnstone, dunlin, marsh wren, coastal swamp sparrow and other saltmarsh species.</td></tr>
<tr><td>Timeline: Ongoing and continuous with periodic maintenance.</td><td rowspan="2">Lead Organization: USFWS, US ACOE</td></tr>
<tr><td>Activity: Restoration</td></tr>
<tr><td colspan="2">Partner Organizations: Ducks Unlimited, state fish and wildlife agencies.</td></tr>
<tr><td colspan="2">Costs: Millions</td></tr>
<tr><td colspan="2">Current Support: Shipping channel dredging projects or projects involving the removal (mining?) of excess deposited materials from other areas.</td></tr>
<tr><td colspan="2">Unfunded:</td></tr>
<tr><td colspan="2">Potential Sources: NAWCA, SWG, ACOE, state coastal engineering agencies.</td></tr>
</table>

Estuaries and Bays

<table>
<tr><td>Program/Project Name: SAV (Zostera) Restoration (in Virginia's Coastal Bays)</td><td>Submitted by:
B. Truitt</td></tr>
<tr><td colspan="2">Implementation Priority: High</td></tr>
<tr><td colspan="2">Rationale: SAVs (Zostera) disappeared from Virginia's coastal bays in the early 1930's and never recovered after the hurricane of 1933. Recently, a method has been developed to restore SAV beds through seed harvesting, curing and planting. Over 75 acres were restored by 2002. In 2003, large volumes of seed (over 100 million seeds/per acre) were harvested by machine, deployed via bags, and planted in five 5-acre plots. If this method proves successful, SAV restoration can be ramped up in all coastal bays throughout Zostera's range.</td></tr>
<tr><td>Objectives:
Restore SAV meadows using the seed transplant method to provide important ecosystem services.
To inventory and monitor recovery of restored SAV beds.</td><td>Deliverables:
A comprehensive report that will describe methods, results and management implications/recommendations.
Long term monitoring program of restored SAV beds.</td></tr>
</table>

Location: Coastal Bays in Virginia from Wallops Island south, Chesapeake Bay, and other BCR30 states where applicable.	**Target Species:** Atlantic brant, sea ducks, canvasbacks, and redheads.
Timeline: 3 years	**Lead Organization:** Virginia Institute of Marine Science
Activity: Restoration	
Partner Organizations: TNC, VA Marine Resources Commission, VA Dept. of Environmental Quality – Coastal Program, Campbell Foundation.	
Costs: TBD – approximately 100k/year start up cost.	
Current Support:	
Unfunded:	
Potential Sources: US Army Corp of Engineers and VA Dept. of Environmental Quality – Coastal Program (NOAA).	

Barrier, nearshore, and offshore islands, unconsolidated beaches, mudflats, saltflats and rocky islands

Program/Project Name: Enhancement of colonial waterbird and shorebird productivity through selective predator control	**Submitted by:** M. Lowney and S. Williams
Implementation Priority: High	
Rationale: While many unconsolidated beaches, rocky islands, and barrier islands have been protected and human disturbance managed, the nesting target species continue to decline. These declines are due to introduction or colonization of these habitats by predators. Many predators are not native to BCR30 such as the Norway rat, red fox, opossum, and coyote. Over abundant predators include raccoons, laughing gulls, herring gulls, great black-backed gulls, American crows and fish crows. Black-crowned night herons and great horned owls may need to be selectively controlled at a limited number of locations. Some highest and high priority species (state and/or federally listed species or species of special concern) within BCR30 have declined upwards of 80% since 1966. The breeding range of some high priority species has been reduced as a result of avian or mammalian depredation.	
Objectives: • Increase fledging rates and population sizes of priority species in BCR30. • Develop decision model on when to implement avian or mammalian predator management. • Prevent abandonment of breeding habitats on protected lands.	**Deliverables:** • Annual removal of mammalian and avian predators. • Monitoring of fledging rates and breeding population sizes to document efficacy of predator management. • Documentation of predation events to quantify damage.
Location: Saltmarsh habitats from ME to VA	**Target Species:** Piping plovers, Wilson's plovers, roseate terns, gull-billed terns, royal terns, sandwich terns, least terns, black skimmers, American oystercatchers, guillemots (?)
Timeline:	**Lead Organization:** USFWS, USDA-

Activity: Management and monitoring	Wildlife Services, state fish and wildlife agencies, TNC
Partner Organizations: USFWS, USDA-Wildlife Services, state fish and wildlife agencies, TNC, National Audubon, NASA (VA), ACOE (VA), US Navy (VA), colleges and universities, some birding NGO's, Delta Waterfowl.	
Costs: 1 million/year	
Current Support:	
Unfunded:	
Potential Sources: SWG, TNC, ACOE	

Program/Project Name: Human Disturbance Management	**Submitted by:** Boettcher, Adams, Pover, and Haglan
Implementation Priority: High	
Rationale: North and mid-Atlantic beaches and islands support the majority of federally and state listed Atlantic coast breeding populations of piping plovers and roseate terns along with a number of highest and high priority species. These habitats are experiencing rapid increases in development and recreational use. This disturbance can result in the abandonment of breeding and nonbreeding habitats by high priority species. Efforts to reduce human disturbance is has been shown to increase breeding productivity and use of beach and island habitats throughout the annual cycle.	
Objectives: • Collaborate with partners to minimize human disturbance on high priority sites. • Identify and map high priority breeding and nonbreeding sites. • Develop, implement and enforce policies and regulations designed to reduce/eliminate impacts caused by human disturbance. • Increase public awareness on the importance and need to protect avian resources through outreach efforts.	**Deliverables:** • Site management plans and regulations to reduce/ eliminate human disturbance impacts. • Outreach programs and materials to educate users/stakeholders. • Produce GIS maps and databases of high priority sites for use by and managers and law enforcement. • Post, protect, and patrol high priority breeding and nonbreeding sites during appropriate seasons.
Location: Beaches and islands and their saltmarsh habitats from Maine to Virginia.	**Target Species:** Piping plovers, Wilson's plovers, American oystercatchers, roseate terns, black skimmers, gull-billed terns and other colonial seabirds.
Timeline: Ongoing and continuous	**Lead Organization:** State wildlife agencies and USFWS.
Activity: Policy development, management, education and law enforcement.	
Partner Organizations: National Park Service, local municipalities, NGOs and other landowners.	
Costs: 500k/year	
Current Support: 150k/year	
Unfunded: 350k/year	
Potential Sources: SWG, USACOE, USFWS and other federal agencies, state agencies, local	

municipalities.

FOREST HABITATS

The group began by defining what was to be included for discussion under forest habitats. The group agreed to include:

- Forested wetlands
- Pine Barrens - although they may be dealt with by Early-successional group also.
- General (i.e., deciduous, mixed, coniferous) as well as some specific types/conditions relevant to individual priority spp.

The group then reviewed the list of priority habitat conservation actions that developed out of the species breakout sessions the previous day.

1. Priority Spp. in forest habitats: WOTH, WEWA, KEWA, BAWW, NOFL, SCTA, etc. (**fill in all**)

2. Major issues & threats of forested habitats coming out of species breakout sessions:
   - **Habitat loss** (due to development, conversion)
     - Loss/degradation of upland buffers for forested wetlands (waterbird colonies)
     - Conversion of mixed and deciduous forest to loblolly pine plantations
   - **Landscape configuration**, fragmentation, parcelization (including development)
   - **Habitat quality** as well as quantity (e.g., structure condition)
     - Forest diseases & insect issues (e.g., hemlock adelgid, gypsy moths)
     - Deer overabundance
     - Invasive plants
     - Silvicultural practices (public & private lands), in particular a lack thereof
     - Natural disturbance regimes (e.g., fire suppression)
   - **Deer** overabundance
   - Considering whole life cycle, not just breeding habitat (e.g., post-breeding, stopover, etc.)
   - **Invasive** species
   - Atmospheric deposition/pollution

Colonial Waterbird Issues

- Loss of upland buffers around colonies, forested wetland patch size reduction
- Proximity of forested wetlands and aquatic feeding habitats
- Drawdown of aquifers (e.g., due to development) reduce wetland quality/quantity

Stopover Habitat Issues

Patch size less of an issue, surrounding landscape context more important. Even isolated small forest patches may have relatively high value as stopover habitat for adult or juvenile migrants. More small woodlots in proximity to other patches would be even more valuable. This contrasts with conventional wisdom about characteristics of high-quality habitats for breeding populations.

Priority Management Actions/Projects

- Improve/increase active *management of forests* to provide higher quality habitat (e.g., greater structure) on public and private lands, e.g., through LIP, Farm Bill (?), other landowner incentives. For example, more frequent thinnings/TSI would benefit many species (e.g., WEWA, BAWW), especially on pine plantations.

    - Promote uneven-aged management (i.e., stands with high vertical structural diversity)
    - Promote thinning to open canopies and promote understory development
    - Outreach to public and agencies that relates forest ecology and management to wildlife habitat quality (i.e., forest management is not bad for birds…). For example, **regional workshop(s)** to promote forest management for bird conservation. Produce **regional guidelines for forest management & priority birds,** showing benefits of forest management to all-bird conservation (e.g., game and non-game species)
    - Engage USDA Forest Service and NRCS staff as partners in outreach and conservation
    - Encourage **directing SWG and LIP funding to forest management** on public and private lands, especially in coordinated, spatially explicit way (e.g., within focus areas or high quality landscapes)
    - Develop a Farm Bill program for priority forest birds (e.g., similar to CRP Practice CP33, for Upland Bird habitat)
- *Reduce deer over-abundance* to levels more compatible with sustaining bird populations
    - Partnerships & **outreach** to public, agencies, NGOs that links deer over-abundance with decreased ecosystem integrity (e.g., promote **community-based deer management**, urban hunts, targeted hunts in high quality habitats, etc.)
    - Work with hunting interests to promote local and statewide management of **deer populations at lower levels** that allow for more natural forest structure (e.g., **quality deer management**)
    - Produce a **document** that links lower deer populations to bird/ecosystem conservation (e.g., describe relationship of deer densities with habitat structure & forest regeneration)
    - Include deer management (e.g., lower populations) issues & projects in **CWCS** process (e.g., hunter access projects)
- *Reduce habitat loss and fragmentation* due to development/sprawl
    - Outreach to public about easements, smart growth
    - Identify high priority landscapes and sites
- *Reduce/control invasive* understory species
- Maintain large blocks, encourage reforestation in key areas
- Encourage some forests to achieve old-growth status, where appropriate.

Priority Research/Monitoring/Mapping/Modeling Projects

- *Identify largest and highest quality forest habitat patches in BCR* as targets for coordinated efforts acquisition, easements and management (e.g., TNC landscape analyses, NJ Landscape Project, MA Biomap, ME Beginning with Habitat, etc.). Determine which landscapes are most appropriate for which priority species/habitats (e.g., where to focus on forest vs. grassland bird spp.).

How can we better integrate these different efforts into a unified or coordinated analysis or tool that guides conservation of priority bird species and habitats? We can help determine which landscapes have the best conditions and/or opportunities for conservation, management/enhancement, restoration by extending the William and Mary approach to the entire BCR but will need consensus on the approach, data types to use, acceptable error rates, and the funds to make it happen. This could be funded through a SWG multi-state grant (if this exists and is favorable). More data layers will be necessary to do this comprehensively. One approach is to first identify the largest & best tracts (in terms of fragmentation parameters), and later work to identify more refined (e.g., species-specific) maps & models. Outreach to other entities/agencies is an important aspect of these efforts.

FRESHWATER WETLAND HABITATS

The group first discussed the major threats and stressors.

Major Threats & Stressors:

- Loss & alteration of habitat
- Groundwater depletion
- Incompatible uses
    - Mosquito control
    - Sedimentation/nutrients
    - Agriculture / development, etc.
    - Disturbance

Priority species that would benefit from conservation actions within freshwater wetland habitats:

- AP/NAP Canada Goose
- American Black Duck
- Yellow Rail
- Woodcock
- Mallard
- American Bittern
- Marsh Wren
- Greater Yellowlegs
- Snowy Egret
- Little Blue Heron
- Solitary Sandpiper
- Prothonotary Warbler

Priority Conservation Actions:

- Protect, restore, and/or enhance wetlands and adjacent uplands
- Management of Impoundments
- Control of invasive species

The most critical information needs within freshwater wetlands are:

- A BCR map of previously converted cropland areas
- Identification of largest unprotected wetland complexes
- Determine ownership of wetland areas
- Integrate wetland trend data for BCR (i.e., Koneff & Royle)
- Determine carrying capacity for various bird groups using freshwater wetlands
    - Seasonal variability
    - Effects on water quality & downstream habitats (e.g., SAV)
- Identify areas of groundwater depletion and its effects on wetland ecology/sustainability
- Map invasive species (current & historical)

Priority Habitat Projects

Forested

1. Protect largest (acquire/easement) remaining natural tracts
2. restoration of riparian bottomland forest: seasonal habitat /water quality
3. restore degraded/drained wetland forests

Emergent Marsh

1. Protect largest remaining tracts
2. restoration of prior converted & other degraded wetlands (encourage private land programs, PFW, WRP, etc.); scale: landscape/watershed within focus areas
3. Control invasive species (plants & animals)

Shrub-scrub

1. protect largest existing tracts
2. control invasive species
3. manage and monitor beaver populations to encourage wetland development (increase human tolerance to beaver activities)

Top three priority freshwater wetland projects:

1. Protection of largest wetland habitat tracts
2. Restore degraded and prior converted wetlands
3. Control of invasive species

EARLY SUCCESSIONAL AND GRASSLAND HABITAT BREAKOUT

The group first discussed whether there was a need to break up into habitat sub-groups. It was decided to begin discussing the issues as one group and to split the group into sub-habitats later, if needed.

There was discussion about savannahs, open pinelands on outwash sands, seasonally flooded shrub-scrub (constantly -flooded shrub-scrub are covered in wetland habitat group) and how to cover these particular habitat types.

The group discussed whether any birds were missing from the priority species lists developed in the species breakout groups. It was noted that woodcock and upland sandpipers were listed in the shorebirds category instead of landbirds category. Birds that were not on the list and were noted to be relatively rare in BCR 30, are Henslow's sparrow and golden-winged warbler (both ranked as moderates). Given that Henslow's sparrow is a subspecies with a large portion of its population in BCR 30, it should be considered a high priority for the BCR. Golden-winged populations are of high-continental concern but low BCR responsibility, so this species should remain as a species of moderate concern within the BCR.

The group made a decision to concentrate discussions about actions within habitats on those actions that would have the most effect on the high and highest ranked birds. These birds are the shrub/scrub species. Grassland birds are of moderate concern within the BCR. The group began by reviewing the actions that resulted from the species breakout groups and came up with the following list::

- Loss of breeding habitat (sprawl, succession, etc.)
- Loss of natural disturbance processes and the ability to manage with prescribed fire
- Loss of habitat quality (longevity)
- Exotic species
- Use of Farm Bill to improve/increase successional habitat.

The group then discussed the major threats/stressors to the habitats:

- loss of breeding habitat
- loss of economic viability of agricultural activity

- loss of migration and wintering habitat, also loss of early-successional habitats important to the post-fledging needs of other birds
- loss of natural disturbance processes
- habitat quality (loss of high quality natural habitat maintained by process not equally compensated by habitats created by fragmentation/managed disturbance)?
- incompatible agricultural and ROW management activities (timing of mowing and grazing, herbicide applications)
- exotic invasives, including plants, insects, and disease,

There was further discussion about the role of the Farm Bill in early successional habitats. Do farm bill or other agency encouragement/traditional practices lead to planting of low (wildlife habitat) quality plants? There is a lack of active management by agencies for this type of habitat. There is some indication that it is of interest on National Wildlife Refuges.

To discuss the priority conservation actions, the group divided them into the following categories: analysis, mechanisms, actions in different habitat types, management and research. The list that resulted is in the table below:

	ACTIONS	ASSIGNMENTS
8	Accurate identification of types of early successional habitats (requires current high resolution photos) and identify neighboring parcels for collaborative action	state-level partnerships
11	Spatial analysis to inform decisions of appropriate landscape/region at state and BCR level to create/maintain early successional habitat matrix (identify areas of interior forest where they exist and will have priority, and identify other areas amenable for conversion to early successional habitat)	state-level partnerships
1	Create and/or maintain early successional habitat where identified as appropriate.	all (Joint Venture)
4	Incorporate wildlife benefits into existing state farmland preservation and forest stewardship programs for private landowners	state agencies
4	Sandplain/pine barrens/xeric ridges protection and restoration – acquisition and/or prevent from conversion to loblolly pine plantations	TNC Anderson could collate this across the BCR and provide maps acquisition by Joint Venture
2	Maritime shrub scrub and interdune forest acquisition and restoration(also impt. for migration), includes scrubby islands	acquisition by Joint Venture TNC Anderson provide maps
4	Define optimal management regimes for shrubland mosaic management	graduate students, northeastern working group university partnerships
5	Maximize production of grassland birds on currently PIF partner owned and managed grasslands and airports.	Joint Venture
3	Develop and implement incentives to create/maintain early successional habitats	Joint Venture

	through state and federal programs (modify current legislation - farm bill programs, forest stewardship programs, current use programs, pay for mow program, cooperatives, agricultural preservation, LIP)	

GEOGRAPHIC AREA BREAKOUT

The final breakout session of the workshop focused on priority bird conservation needs by geographic area. The geographic areas were New England/NY, Delaware Bay/NJ Coast, and the Delmarva/Chesapeake Bay. Breakout groups reviewed (1) information on species and habitat information from the previous two breakouts sessions with respect to the geographic area, (2) maps and resources for the geographic area, and (3) priority habitat, non-habitat, and monitoring and research actions for the geographic area, as defined by the previous breakout sessions. Groups developed lists of priority conservation actions for the geographic areas, discussed potential contributions/responsibilities of partners within the geographic areas towards accomplishing priority actions and came up with lists of projects to be included in state and refuge plans.

New England/New York

Priority actions for the region

- Colonial waterbird surveys, greater regional coordination and standardization

- Ditto (i.e., coordinate, standardize) for sampling saltmarsh birds (e.g., SSTS, rails); complete inventory done in New England and extend beyond. Establish monitoring. Possibly add rail species to this effort

- Emphasize maritime woodland/shrub for early-successional birds and stopover habitat. Possibly coordinate conservation planning and acquisition of priority habitats. What habitats are important for landbird stopover? Forested wetlands, pine barren strips??

- Use/expand radar and/or other methods (e.g., as in Mid-Atlantic) to better understand migrant use of habitats, validate long-standing assumptions and those drawn from southern part of BCR 30. Deal with notable gaps in NEXRAD coverage. Link to long-term banding data at some coastal sites (e.g., Manomet, Appledore Is.).

- Outreach in New England on issues such as beach bird disturbance, deer overpopulation, private forest management to benefit birds, sprawl/smart growth

- Smart growth, sprawl, open-space, and zoning in S. NY are biggest issues. Work with local land trusts, municipalities and other managers to coordinate work at landscape level, focus on priorities, etc.

- Possibly add in a few priority species from New England Physiographic plan (e.g., RBGR, BBCU, PUFI) that are not well distributed in lower part of BCR 30 and thus did not make the BCR priority species list. These could be denoted as listed only for northern subregion of BCR
- Group should ensure that SWG funding in New England be directed towards priority projects and not to ongoing base funding for state wildlife agencies. Some states have grassroots lobbying efforts to ensure that states fully match federal conservation funds and simultaneously support existing programs

- State support for implementation of PRISM shorebird monitoring (e.g., state coordinators responsible for volunteers/staffing)

- BMP and coordination for coastal migrant shorebird habitat (e.g., manage disturbance by ORV, etc.)

- Off-shore bird surveys mapping of high use areas (coordinated bird monitoring) needed to better understand potential impacts of wind development, oil spills, etc. Possible coordination of winter surveys of all seabirds, waterbirds, waterfowl, etc. Coordinate with Seaduck JV and others for regional effort

- Reach consensus and identify/map key large forest blocks for protection, conservation, and management for landbirds, as well as for other habitats (e.g., grasslands). Forest birds should be the priority in forested habitats, but we should pro-actively determine where best to do work on other species (e.g., grassland birds) and habitats.

- Provide technical assistance and guidance to agencies/entities that provide conservation funding/assistance such as Farm Bill, SWG, LIP, so that these can be focused on certain regions and areas and not spread widely and without direction. Outreach related to this is important too, so the message gets out to those on-the-ground managers, i.e., those actual operators of the chainsaws/bushogs, etc.

Other Issues:

- What about species that don't make the BCR 30 priority list? e.g., Black-billed Cuckoo, Purple Finch, Rose-breasted Grosbeak. Ensure that these conservation actions can be addressed with continuation of existing programs

- Adequate matching funds at state level

Threats and Limiting Factors (priorities are in bold?)

- Impoundment Management
- Sea-level rise
- Stopover habitat for migratory species
- horseshoe crab populations
- oil-spill threats, effects of current
- lack of knowledge of roost sites
- **beachfront development/recreation/disturbance/beach stabilization (seawalls, jetties…)**
- water quality issues
- shoreline erosion/dune stabilization
- arctic breeding habitat/global warming
- **predation**
- upland species/habitat issues
- aquaculture
- wind power
- habitat

Delaware Bay/New Jersey Coast

Priority actions for the region:

- Predator Control for beach nesting species
- Determine the impacts of disturbance and competition (including gulls) on beach-nesting species
- Calculate migration and wintering area carrying capacities for high priority bird species
- Pool available information on priority sites for all birds (e.g. TNC, IBA, etc.) as targets for protection through programs such as acquis, zoning, planning incentives, etc.
- Conduct a coordinated assessment of the causes of marsh loss, potential actions/solutions (Delaware Bay – Bombay Hook Refuge; NJ Coast – Forsythe Refuge)
- Identify and fill gaps in monitoring for high priority species (e.g., secretive marshbirds, saltmarsh sparrows, nightjars). (Monitoring programs must consider use of data, identify measures, and be thoughtfully designed)
- Control invasives, exotics, and overabundant species in habitats where they have the greatest impact on birds or where they impact priority species and species of concern.
- Develop a multi-agency contract with USDA (APHIS) for predator control for nesting birds (e.g. fox).
- Identify, protect, and restore forested patches

Delmarva Peninsula/Chesapeake Bay

Priority actions for the region

- Wetland restoration – to provide higher quality bird habitats and improved water quality for SAV.
- Predator management – combined all-bird, all-state programs with a focus on islands. For funds, make a request to congress via bird conservation partners (NGOs, States, etc.)
- Regional saltmarsh (all-bird) inventory and monitoring – target sparrows, rails, and other saltmarsh obligate breeders. Include a habitat assessment for Black Rails.
- Coordinated outreach/education program – the first step is to have an all-agency meeting (forestry, game management, dot, NRCS). Shrubland management would be one of the issues highlighted.
- Invasive phragmites reduction project – identify the distribution of native phragmites. Consider the use of a biological control.

Focus Areas for the geographic region

1. Pocomoke watershed – habitat acquisition project
2. coastal bays
3. western shore riparian forests
4. lower bay Virginia islands and adjacent mainland marshes

STATE MEETINGS

At the end of the workshop, partners convened by state, to discuss incorporating results from the workshop into state, refuge and other plans. The following came out of individual state meetings.

Connecticut/Rhode Island

- Complete radar stopover assessment and field verify

- address impact of invasive exotic plants on critical wildlife habitats and high priority species, especially shrubby and marsh coastal areas)
- inventory, map, id, etc., saltmarsh sparrow areas
- Kestrel decline – determine cause and how to reverse.

Programs discussed were SEANET, PRISM, and wintering owl habitat assessment.

Delaware

General

- USGS evaluates marsh loss. Develop a contact and seek funding
- Restore tidal marsh hydrology in altered systems.
- Pea Patch Island – ID important foraging areas (Kendel Sommers, contact)

FWS to:

1. provide information for a 3 year study on OMWM impacts
2. change decision process on selecting for ? OMWM
3. BCR 30 evaluation of OMWM and recommendations for applying

Bombay Hook – Erosion by shore edge (Kelly Island) – need to know if land subsidence is an issue throughout the state; DE will query state land managers to see if it's an issue.

- Kelly Island restoration for erosion/marsh loss, including shorebird roost and horseshoe crab spawning areas.
- Identify better techniques for reducing Snow Goose impacts to tidal marsh.

Secretive Marshbirds

- Black Rail and Sharp-tailed Sparrow population monitoring – statewide. This will include high marsh sampling areas.

Shorebirds

- Piping Plover - Improve productivity; predator control, beach acquisition.
- Shorebird stopover – monitoring/banding
- Horseshoe crab egg abundance/spawning survey

Forest Patches

- Identification of remaining sites almost completed by DE. Need to develop an acquisition program and enlarge areas through reforestation and corridor development.
- Use selective cutting practices instead of clear-cutting.

Grassland/Early Successional habitats

- Breeding – FWS to provide a preliminary report of the results of a grassland study to DE.
- Migration – DE is mapping grassland habitats to evaluate the amount of habitat in the state.

Maine

- Continue to investigate the impact of contaminants on avian salt marsh community
- Support PRISM and ISS survey efforts within the state. Data from RCHNWR will be shared with State and Manomet Center for Conservation Science.

- Continue to restore salt marshes, which are tidally restricted and evaluate the results of restoration projects. Whenever possible support critical review and investigation of saltmarsh restoration techniques and their effects on priority bird species
- Continue to monitor and research Saltmarsh Sharptailed Sparrows on State of Maine lands and on Rachel Carson NWR lands. Work with partners to expand monitoring and research for these high priority birds throughout the state.
- Continue to monitor and manage piping plovers, least terns and roseate terns.
- Support and promote the State of Maine's Beginning with Habitat program to identify, manage and protect high quality bird habitat within BCR30 and within other BCR regions within the state.

New Jersey

1. Develop a contract between USDA and state and federal agencies, and interested NGO's to conduct predator control on state, federal, and NGO lands.
2. Increase law enforcement action to stop human disturbance on coastal beaches for migratory shorebirds and beach nesting birds.
3. Expand the winter waterfowl surveys to include seabird counts for birds wintering in designated state waters (up to 3 miles offshore) and expand the seawatch program to include additional sites.
4. Lobby for additional money for refuge acquisition within Cape May, Forsythe, and Supawna national wildlife refuges.
5. Identify critical habitat patches to prioritize protection of areas used as stopover sites by migratory birds.
6. Identify large parcels of habitat (over 1,000 acres) that are appropriate for management as early successional communities for a guild of early-successional species using bobwhite quail as the key indicator species.
7. Identify and calculate carrying capacity on specific state and federal lands for wintering and migratory American black ducks and brant to establish and assess goals and objectives for determining population numbers as the basis for management actions.
8. Evaluate the effectiveness of management on state lands for high priority species.
9. Coordinate invasive/exotic species control between state and federal agencies and NGOs to more effectively/efficiently utilize manpower and funds, and develop a statewide invasive/exotic species control council to identify priority species and develop BMPs.
10. Complete the model for Delaware Bay that would predict the appropriate number of horseshoe crabs needed to support the spring shorebird migration.
11. Affect zoning and land use planning decisions through outreach to local environmental commissions, planning boards, and citizens groups.
12. Oppose the Governor's task force endorsement of TNR (trap, neuter, release) to control feral cat populations and create an awareness campaign, couched in terms of human and cat health, to promote support for the elimination (from the wild) of feral cats.
13. Create a rigorous risk assessment to evaluate the potential impact of wind power facilities (including on-shore, near-shore and off-shore) on migrating and resident bird populations (includes seabirds and landbirds). Creation of this risk assessment should include an actual pilot wind project in NJ for both data collection and model verification.

Virginia

1. Establish long-term state and federal support for statewide predator management programs designed to benefit breeding birds known to be affected by mammalian and avian predators. Only those predators for which there is sufficient evidence of significant impacts on avian breeding populations will be targeted.
    a. State wildlife agencies, National Wildlife Refuges and other state partners implement predator management programs on their own lands as needed.

    b. State wildlife agencies (through State Wildlife Grants) provide annual support for ongoing long-term predator management programs such as the one being implemented on Virginia's barrier islands that benefits beach nesting birds and diamondback terrapins.

    c. State wildlife agencies and state partners write letters to US representatives and senators requesting Congress to provide USDA's Wildlife Services with permanent funding to implement and maintain effective predator management programs where they are most needed.

    d. Establish long-term state (through State Wildlife Grants) and federal support for avian productivity monitoring programs designed to measure the efficacy of predator control efforts.

2. Establish long-term state (through State Wildlife Grants) and federal support for scientific studies that address questions related to effective predator management.

3. Conduct coordinated statewide tidal marsh bird surveys across all salinity zones that incorporate specific protocols for hard to detect species such as black rails and sparrows. All marsh surveys should include habitat assessment component to determine effects of changes in habitat over time on marsh bird abundance, density and distribution. National Wildlife Refuges can provide staff, logistical and technical support for surveys on their lands and College of William and Mary's Center for conservation Biology (CCB) can help identify priority survey sites.

4. Develop educational materials/workshops that promote land management techniques designed to benefit all birds across a variety of habitat types. Target audiences for these materials and workshops include state and federal land managers and large private landowners. Informed stakeholders such as farmers and public land managers should be involved with the development of these materials to instill a sense of ownership in this effort.

5. Develop more effective and permanent techniques of non-native phragmites control/eradication, including completing research currently ongoing at Cornell University that is seeking to develop a possible biological control program.

6. Develop a statewide native phragmites mapping program with state partners to help conserve and protect existing native phragmites stands.

7. Develop a state cost-share program for non-native phragmites control on private lands.

8. Develop a regional (multi-state) survey data repository for all bird groups. Atlantic Coast Joint Venture can help facilitate this process.

9. Develop a complete Virginia Breeding Bird Atlas and update it as needed.

DOTTING EXERCISE

Priority conservation actions/projects that developed out of the species and habitat breakout sessions were listed on flip chart sheets and posted on the walls. Priorities were grouped into conservation actions and research and monitoring activities and by species groups and habitat types. Participants were asked to "vote for" their top 3 research and monitoring and top 3 conservation actions by pasting a dot next to the activity. It was noted that the results of the exercise was not an indication of the most important activities because the number of "votes" could be skewed relative to the number of participants from a particular interest. However, the results do suggest the areas of overlap between species and habitats. The results of the exercise are in the following table.

Research/Monitoring or Conservation	SPECIES GROUP OR HABITAT GROUP	# DOTS
	Waterfowl	
C	Increase Coordination and planning by various funding programs for protecting and buffering wetland habitats.	3
C	Reduce impacts of greater Snow Goose on coastal marshes	2
C	Identify and protect offshore habitats (determine offshore habitat use and consider designated areas).	1
C	Effect improved wetland protection laws	0
C	Reduce human intrusion into sensitive habitats	
C	Improve oil spill response and contingency planning	0
C	Predator exclusion and control in high quality habitats	0
C	Mitigate fisheries activities detrimental to waterfowl	0
RM	Late winter-spring ecology and physiology "spring bottleneck hypothesis."	2
RM	Migration and wintering area carrying capacity by habitat type	4
RM	Continue research and biological control of phragmites	3
RM	Establish visibility correction factors for eastern surveys	0
RM	Continue and improve mid-winter waterfowl surveys	0
RM	Continue seaduck surveys	0
	Waterbirds	
C	Predator management	12 (23)[1]
C	Shallow water impoundment management	0
C	Manage human disturbance	0
RM	Offshore surveys	5
RM	Colonial waterbird survey	7
RM	Marshbird monitoring (black rails)	2
RM	Bycatch/gear interaction	0
RM	Sea level rise	1
RM	Nonbreeding habitat	0
RM	Contaminants Assessment	1
	Landbirds	
C	Public outreach regarding deer overabundance	5
C	Collaborate with game managers on incorporating needs of priority landbirds in to management	6
C	Policy work and public outreach on suburban/urban sprawl (Smart growth, open space protection, etc,)	14 (20)[2]
RM	Regional Monitoring Program for saltmarsh sparrow populations	11
RM	Regional research on saltmarsh sparrow food habits, food	1

	availability, and niche separation between species	
RM	Research impacts of mercury deposition and mosquito control/pesticides on saltmarsh sparrow	1
RM	Regional monitoring program for Whip-poor-will populations	1
RM	Research on limiting factors for priority forest birds	3
RM	Research on identifying important migratory stopover sites using radar and GIS methods	14
RM	Define optimal management regimes for shrubland mosaic management	2
Shorebirds		
C	Coastal development zoning	6 (20)[2]
C	Management actions to reduce disturbance	3
C	Oil spill response plans	1
RM	Implement PRISM surveys/aerial survey	8 (23)[1]
RM	Analysis of threats to key sites	0
RM	Targeted monitoring for high priority species	2
Coastal		
estuarine marsh	Identify and protect saltmarsh habitats for highest priority species	1
estuarine marsh	Enhance/restore saltmarsh	2
estuarine	Restore marsh hydrology	6
beaches	Predator control	8
beaches	Control disturbance	1
marine open water	Identify and protect offshore areas	3
estuaries and bays	SAV restoration/protection	1
rocky coast, islands	Predator control	3 (23)[1]
Freshwater wetlands		
	Protection of largest wetland tracts	1
	Restore degraded and prior converted wetlands	0
	Control invasive species (animals and plants)	6
	Restoration of riparian bottomland forest	0
	Manage and monitor beaver populations to encourage wetland development	0
	Map previously converted croplands in BCR	0
	Determine carrying capacity for various bird groups using freshwater wetlands	0
	Identify largest unprotected wetland complexes	2
Early successional/grassland habitats		
	Spatial analysis to inform decisions about appropriate landscape/regional scale to create/maintain early successional habitat matrix (id areas of interior forest which will have priority)	14 (26)[3]
	Maximize production of grassland birds on currently PIF-partner owned and managed grasslands and airports	0
	Incorporate wildlife benefits into existing state farmland preservation and forest stewardship programs for private landowners	1
	Sandplain/pine barrens/xeric ridges protection and restoration – prevent conversion to loblolly pine plantation	5
	Define optimal management regimes for shrubland mosaic management	0
	Develop and implement incentives to create/maintain early successional habitat through state and federal programs	0

	Maritime scrub/shrub and inter-dune forest acquisition and restoration	4
	Create and /or maintain early successional habitat where identified	0
Forests		
	Improve/increase active management of forests	4
	Outreach on forestry and habitat conservation, including regional guidelines for forest management.	1
	Identify largest and highest quality forest patches in BCR 30 to coordinate and direct funds and partner efforts. Integrate existing efforts (William and Mary TNC, NJ, MA, etc) in to unified analysis/tool	12 (26)[3]

[1]The number in parentheses includes 13 votes for predator control under waterbirds,11 votes under coastal habitats (beaches (8) and rocky islands (3)) that have been added together due to similarity.

[2] The number in parentheses includes 14 votes from the landbird category and 6 from the shorebird which have been added together due to similarity.

[3] The number in parentheses includes 14 votes for a spatial analysis for early successional habitats and 12 votes to id forest patches under Forests category which have been added together because they could be accomplished under one effort.