

Estuarine Communities

Mid-Atlantic Coastal Plain

These include salt marsh, brackish marsh, salt flat, sand flat, mud flats, algal mats, salt scrub, estuarine island communities, and sounds along coastal North Carolina. Marsh habitats usually develop on the mainland side of the barrier islands after sand is deposited during storm events. They also develop on the mainland side of the sounds and in the lower reaches of our rivers as sea-level rise, salt intrusion or storms kill forested or shrub-scrub habitats.

Salt marsh communities are often strongly dominated by saltmarsh cordgrass and these areas occur throughout the coastal part of the state, while brackish marsh is dominated by black needlerush and are found throughout the estuarine parts of North Carolina (Schafale and Weakley 1990). Vegetation may include salt meadow cordgrass, glasswort, saw grass, marsh elder, and wax myrtle, as determined by the salinity level of the water.

Sand flats and mud flats are often created and maintained near one of our 20 inlets as flood tide or ebb tide deltas. These are very dynamic systems and can appear and disappear with each storm event, although most persist for 10-20 years at a time barring major dredging activities. Salt flats and algal mats are either found as shoals within the sounds or on very low stretches of the barrier beaches. These sites are particularly important for foraging shorebirds.

Salt marsh and brackish marsh habitats are important habitat year-round for a variety of rails, bitterns, wading birds and marsh sparrows, several of which are species of conservation concern according to Partners in Flight (Hunter *et al.* 2000, Pashley *et al.* 2000, Rich *et al.* 2004 and Johns 2004). Waterfowl impoundments created within brackish marshes provide valuable habitat for waterfowl, wading and shorebirds, and furbearers. Estuarine communities also provide important habitat for high priority birds during some stage of their life cycle such as piping plover, Wilson's plover, American oystercatcher, black skimmer, gull-billed tern, bald eagle, peregrine falcon and wood stork. Endangered or threatened sea turtles use these areas and diamond-backed terrapins key in on these habitats. In all these are some of the most important habitats for large numbers and types of immediate coastal wildlife that are federally or state listed, or are experiencing precipitous population declines.

Estuarine islands can be either natural or created by dredged material. These sites are particularly important for nesting terns, skimmers, pelicans, wading birds, and American oystercatchers. Dredged material islands are not only usually devoid of mammalian predators, but usually have the added advantage of being high enough in elevation that ground nesting birds do not lose their nests during high tides. Table 1 provides a list of priority species associated with this habitat for which there is conservation concern.

Other fully aquatic taxa (fish, mussels, crayfish, and snails) are referenced in the river basins descriptions. See the Roanoke, Tar-Pamlico, Neuse, Cape Fear, Lumber, White Oak, Chowan, and Pasquotank River basin sections or Chapter 5B of the Wildlife Action Plan for more detailed

information on aquatic species and habitats, by basin. A focused discussion of coastal and estuarine habitats as they relate to marine species can be found in the Wildlife Action Plan, Chapter 5C (Marine Systems).

Table 1. Priority species associated with estuarine communities.

Group	Scientific name	Common name	State status* (Federal status)
Birds	<i>Ammodramus caudacutus</i>	Saltmarsh Sharp-tailed Sparrow	
	<i>Ammodramus nelsoni</i>	Nelson's Sharp-tailed Sparrow	
	<i>Asio flammeus</i>	Short-eared Owl	
	<i>Botaurus lentiginosus</i>	American Bittern	SR
	<i>Calidris alba</i>	Sanderling	
	<i>Calidris canutus</i>	Red Knot	
	<i>Charadrius melodus</i>	Piping Plover	T (T)
	<i>Charadrius wilsonia</i>	Wilson's Plover	SR
	<i>Circus cyaneus</i>	Northern Harrier	SR
	<i>Cistothorus platensis</i>	Sedge Wren	
	<i>Coturnicops noveboracensis</i>	Yellow Rail	SR
	<i>Egretta caerulea</i>	Little Blue Heron	SC
	<i>Egretta thula</i>	Snowy Egret	SC
	<i>Egretta tricolor</i>	Tricolored Heron	SC
	<i>Falco peregrinus</i>	Peregrine Falcon	E
	<i>Haematopus palliatus</i>	American Oystercatcher	SR
	<i>Haliaeetus leucocephalus</i>	Bald Eagle	T (T)
	<i>Himantopus mexicanus</i>	Black-necked Stilt	SR
	<i>Ixobrychus exilis</i>	Least Bittern	
	<i>Laterallus jamaicensis</i>	Black Rail	SR
	<i>Mycteria americana</i>	Wood Stork	E (E)
	<i>Nyctanassa violacea</i>	Yellow-crowned Night-heron	
	<i>Pelecanus occidentalis</i>	Brown Pelican	SR
	<i>Plegadis falcinellus</i>	Glossy Ibis	SC
	<i>Porzana carolina</i>	Sora	
	<i>Rallus elegans</i>	King Rail	
	<i>Rallus limicola</i>	Virginia Rail	
	<i>Rynchops niger</i>	Black Skimmer	SC
	<i>Sterna antillarum</i>	Least Tern	SC
	<i>Sterna caspia</i>	Caspian Tern	SR
	<i>Sterna hirundo</i>	Common Tern	SC
	<i>Sterna nilotica</i>	Gull-billed Tern	T

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Group	Scientific name	Common name	State status* (Federal status)
Mammals	<i>Cryptotis parva</i>	Least Shrew	
	<i>Sylvilagus palustris</i>	Marsh Rabbit	
	<i>Trichechus manatus</i>	Manatee	E (E)
Reptiles	<i>Caretta caretta</i>	Loggerhead Sea Turtle	T (T)
	<i>Chelonia mydas</i>	Green Sea Turtle	T (T)
	<i>Eretmochelys imbricata imbricata</i>	Atlantic Hawksbill Sea Turtle	E (E)
	<i>Lampropeltis getula getula</i>	Eastern Kingsnake	
	<i>Lampropeltis getula sticticeps</i>	Outer Banks Kingsnake	SC
	<i>Lepidochelys kempii</i>	Kemp's Ridley Sea Turtle	E (E)
	<i>Malaclemys terrapin</i>	Diamond-backed Terrapin	SC
	<i>Nerodia sipedon williamengelsi</i>	Carolina Watersnake	SC
	<i>Thamnophis sauritus sauritus</i>	Common Ribbonsnake	
<p>*Abbreviations E Endangered T Threatened SC Special Concern SR Significantly Rare</p>			

Location And Condition Of Habitat

The condition of all these habitats is poor or threatened due to development, fragmentation, wetland ditching and filling, dredging, or a lack of fire, as well as increased human recreational activity. Losses, drastic alteration or disturbance of these habitat types (especially marsh habitats) could have serious consequences for nutrient cycling and for reproduction of marine and estuarine organisms (Schafale and Weakley 1990). Map 1 depicts locations of estuarine habitats in the Mid-Atlantic Coastal Plain ecoregion.

Problems Affecting Species And Habitats

Water quality impacts (pesticide use related to mosquito control, developmental secondary impacts) and water flow impacts (through ditching, canals, etc.) have greatly affected this habitat. Dredging and dredge material placement can also affect these sites through draining of marshes or filling of wetland types. Dredged material placement has been used very effectively in some areas to create marsh or upland bird nesting areas within the estuaries. However, it has become increasingly difficult to direct dredged material to bird nesting islands

that need it because of a lack of US Army Corps of Engineer funding for dredging projects and because coastal towns are now competing for the sand for beach nourishment projects. Other beach stabilization projects (e.g. inlet channel relocation and efforts to restrict channel movement) reduce availability of microhabitats such as mud and algal flats around inlets. Development has also taken much of this habitat type and disturbance by humans and their pets is becoming a growing problem, as well as predation by non-native predators on nesting birds. A lack of fire is particularly troublesome in the marsh sites.

Another suite of threats can be found in and on the water. Negative fisheries interactions include diamond-backed terrapins drowning in crab pots and gillnets; trawls and hook and line fisheries impacting endangered sea turtles; red-throated loons and other diving birds getting caught and drowning in gillnets. Recreational boaters may accidentally strike turtles, manatees and birds. There are also now potential impacts related to offshore wind power turbines on both birds and bats (major activity zones for both).

Species And Habitat Conservation Actions and Priorities For Implementation

Many of our brackish marshes, especially on the mainland side of Pamlico Sound, are in private ownership, as are a number of heronries (e.g., Rawls Island, Gull Island). Land acquisition and protection are the primary actions needed. Atlantic Coast Joint Ventures and the North Carolina Coastal Land Trust are partners for these efforts. Coordination with regulatory agencies should be continued and expanded to encourage and enforce wetlands regulations and to enforce the Migratory Bird Treaty Act and the Endangered Species Act. Acquisition targets should include brackish marsh impoundments, which will then require continued management for maintenance. In addition, efforts need to be made to thwart loss of estuarine islands to theft or erosion.

Education and outreach efforts directed at the public, land-use planners, and regulatory agencies such as the NC Department of Transportation and US Army Corps of Engineers are needed to emphasize the ephemeral nature of sand and mud flats so that these habitats will not be destroyed as they are recreated by storms. Other educational needs include increased public awareness concerning potential impacts of boats and recreational fisheries, including ghost fishing line, hooks and by-catch on wildlife (e.g., sea turtles, diamondback terrapin). Building setback distances should be considered and buffer zones and living sills/marsh should be encouraged. Estuarine bulkheads can destroy adjacent inter-tidal sand or mud flats and marsh and should be discouraged. The Coastal Habitat Protection Plan (CHPP) (Street *et al.* 2004) has good details about the negative aspects of bulkheads and we should work to help promote the suggestions/guidelines within the CHPP.

Continued coordination is needed with waterbird working groups such as the North Carolina Waterbird Committee, the Piping Plover Recovery Team, The American Oystercatcher Working Group and the Royal Tern Working Group. Future recommendations from the North American Waterbird Conservation Plan should be implemented (Kushlan *et al.* 2002). Promotion of and support for oyster restoration programs (e.g., NC Coastal Federation), which would in-turn

enhance food sources and ecosystem functioning in estuarine systems, should also be encouraged.

Priority Research, Survey, And Monitoring

Surveys are needed to document the distribution, relative abundance and status of many wildlife species associated with these habitats. Priorities for conducting surveys need to focus on species believed to be declining, at risk or mainly dependent on these communities. Secondary priority for surveys should be for species for which current distribution information is already available or for species that are considered common. Many bird species associated with these community types have experienced significant declines according to inventory and survey data.

- **Surveys**

- Determine the breeding and wintering status and distribution of the saltmarsh sharp-tailed sparrow, Nelson's sharp-tailed sparrow (DiQuinzio *et al.* 2001, Hodgman *et al.* 2002) and the seaside sparrow in North Carolina.
- Determine the status and distribution of sedge wren, northern harrier and short-eared owl.
- Conduct secretive marshbird surveys for the black rail, American bittern, least bittern, yellow rail and other marsh birds (birds not adequately surveyed by BBS) (Legare *et al.* 1999).
- Continue surveys for Wilson's plover and American oystercatcher to assess state-wide trends in abundance and distribution.
- Determine the status and distribution of priority mammals (e.g., manatee, marsh rabbit).
- Determine the status and distribution of the diamond-backed terrapin and Carolina watersnake.

- **Monitoring**

- Continue ongoing all-season piping plover monitoring, as well as other ongoing shorebird and colonial waterbird monitoring.
- Establish long-term monitoring for all marsh birds (Gibbs and Melvin 1997, Benoit and Askins 2002, Bogner and Baldassarre 2002, Conway *et al.* 2004).
- Establish long-term monitoring for passerine birds using marsh habitat; establish bird banding stations at all times of the year in marsh habitats.
- Continue long-term sea turtle nesting and stranding monitoring; strandings need to be monitored to a greater extent in estuary sites.
- Establish long-term monitoring for diamond-backed terrapins (post survey work).

- **Research**

- Genetics*

- Conduct systematics studies to differentiate between the two subspecies of least shrew.
 - Explore the genetic relationships among “kingsnake” species.

- Diet, Nutrition*

- Research the nutrition needs of plovers and oystercatchers and the diet niches of terns, skimmers, herons and egrets.

- Habitat use/demographics*

- Study marsh bird habitat needs and life histories, especially the black rail (Benoit and Askins 2002 and Conway *et al.* 2004).
 - Conduct shorebird foraging studies, wading bird foraging studies, and expanded colonial waterbird research (possible partnerships with Atlantic Coastal Joint Ventures, South Atlantic Migratory Bird Initiative).
 - Conduct marsh food productivity/food web research related to shorebirds, rails and wading birds.
 - Explore population dynamics related to controlled burns in marshes.
 - Examine the reproductive success of beach nesting birds on dredge material islands as compared to success on beaches.
 - Explore the use of field readable bands on royal terns and American oystercatchers to attain survivorship information.
 - Conduct studies to examine two-egg clutches in royal terns.
 - Determine the cause of sharp nesting population declines in snowy egrets.

- Predator effects*

- Study estuarine predator communities and effects on nesting birds.

- Management practices*

- Identify causal factors in sea turtle strandings and fishery related mortality issues (using telemetry).
 - Conduct diamond-backed terrapin research to better identify causal factors and minimize fisheries related mortality.
 - Study the effectiveness of burning marshes, especially brackish marshes, to retard growth of shrubs and stimulate growth of grasses, sedges, and rushes.
 - Study the effectiveness of vegetation control measures on dredge material islands for birds that require early successional nesting habitat.
 - Determine limiting factors for oystercatchers, plovers, black skimmers, gull-billed, royal, least and common terns and implement management to halt population declines.

- Explore techniques for restoration of estuarine communities.
- Investigate the past, current and potential future impacts of nutria on estuarine wetlands (especially brackish-fresh water marshes).

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