

Key Site 84: Pamlico Sound, North Carolina

Location: 35°22'26"N, 75°51'20"W

Size: 5598 km²

Description: Pamlico Sound in North Carolina is the largest lagoon on the East Coast of North America. It is part of a larger, interconnected network of lagoon estuaries, known as the Albemarle-Pamlico Sound, the second largest in the United States. Ten major rivers, and creeks too numerous to count, drain into Pamlico Sound. The sound is separated from the Atlantic Ocean by a series of sandy barrier islands known as the Outer Banks. The sound is known for its wide expanse of shallow water, generally ranging from 1.5 to 2 m, and for its susceptibility to wind-driven tidal fluctuations. The shallow, warm waters make this area an important recreational destination in the summer and a popular fishing location. There are hundreds of kilometers of sandy beaches where wave action from the Atlantic Ocean constantly redefines the coast. This area is often impacted by hurricane activity but tends to be resilient to major ecosystem changes. Temperatures range from a mean high of 53°F to a mean low of 38°F in the winter and a mean high of 86°F to a mean low of 74°F in the summer.

Precision and Correction of Abundance

Estimates Presented: Abundance estimates are from two sources: first, the Atlantic Coast Wintering Sea Duck Survey (ACWSDS), conducted between January 31 and February 13 in 2009 to 2011 (see Silverman et al. 2012 for methods; also see Methods in this atlas); second, abundance data from the Mid-Winter Waterfowl Survey (MWS), including shoreline areas outside the area covered by the ACWSDS were considered when estimating density of sea ducks. Abundance estimates presented for this key habitat site have not been adjusted to account for incomplete detection or other biases. Abundance estimates should, therefore, be treated as minimum estimates.

Biological Value: Pamlico Sound is a biodiversity hotspot for fish and marine invertebrates (Cooksey et al. 2010). Because the system is mostly enclosed by barrier islands, small amounts of saltwater push in through several inlets, resulting in relatively low salinity levels. The average freshwater residence



time is approximately one year in the sound proper, and this promotes effective use and cycling of nutrients, allowing the system to support high rates of primary and secondary production and serve as a vitally important fisheries nursery. There are several diverse habitats such as areas of hard bottom and rocky outcrops as well as soft sand bottoms with submerged aquatic vegetation. The extensive eelgrass and shoal grass beds provide habitat for blue mussels, American oysters, blue crab, and many other bivalve and crustacean species (Taylor et al. 1996, Neves et al. 1997, Paerl et al. 2010). Mollusks and crustaceans make up the majority of the diet of scoters (*Melanitta* spp.) (Cottam 1939). On the Atlantic coast during winter, scoters tend to concentrate at the mouths of estuaries (Stott and Olson 1973), possibly because these places offer a greater diversity of food items. Pamlico Sound is a vital area for wintering Surf Scoter (*M. perspicillata*) and Black Scoter (*M. americana*); most winter at sea near estuaries, bays, and open coastline, all characterized by shallow water and a sandy or gravelly bottom with

accompanying shellfish beds (Stott and Olson 1973, Sanger and Jones 1984). Silverman et al. (2012; see Methods section in this atlas) reported a minimum of 59,000 sea ducks in the area of the sound covered by the ACWSDS, including more than 26,000 scoters. An additional 42,000 sea ducks, on average (mainly Bufflehead [*Bucephala albeola*], mergansers [*Mergus* spp.], and scoters) were counted during the MWS in areas outside the ACWSDS area from 2011 to 2015 (D. Howell, North Carolina Wildlife Resources Commission unpublished data).

Sensitivities: The hydrologic characteristics that make the sound such a biodiverse aquatic system also make it very sensitive to over-enrichment and eutrophication (Paerl et al. 2010). The large human population on the coast increases opportunities for pollution, disturbances from recreational activities (e.g., boating), and residential and commercial development. Most of Pamlico Sound is classified as Nutrient Sensitive Waters (North Carolina Department of Water Quality 2006). Agricultural activities inland contribute to nutrient inputs that reduce water quality, may cause algal blooms, and can kill off fish and bivalve communities in the sound (Summerson and Peterson 1990, Uhler et al. 1993, Paerl et al. 2010). The area is also susceptible to the destruction of hurricanes, which makes it very sensitive to the increasing occurrence of such events due to climate change (Paerl et al. 2010).

Potential Conflicts: The area surrounding Pamlico Sound is home to millions of residents and thousands more tourists during the summer months. Recreational activities such as boating cause disturbance to wildlife and habitat. Conflicts between local industry and the North Carolina Recreational Water Quality Program can arise when discharge rates are decreased due to decreasing water quality (North Carolina Department of Water Quality 2006).

Status: Pamlico Sound is an estuarine system, and therefore protections of the watershed inland may be most critical to the sustainability of the sound. Shoreline between the Pamlico and Neuse Rivers is a matrix of state game lands and private lands. There are several national wildlife refuges (e.g., Alligator River, Cedar Island, Swanquarter, and Mattamuskeet), national forests (e.g., Croatan), and national seashores (e.g., Cape Lookout and Cape Hatteras), which provide some protection to uplands

impacting waters that eventually run into the sound. However, there are currently no designated marine protected areas in Pamlico Sound, and regulation only extends to fishing industries and restrictions in recreational activities during times of poor water quality. There are several American oyster restoration reefs and limitations on shellfish harvest in eelgrass beds.

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