

AFFECTED ENVIRONMENT**CHAPTER 3**

This chapter presents a brief description of the physical and biological environment affected by the *North Cape* oil spill, as required by NEPA (40 U.S.C. Section 4321, *et seq.*). The physical environment includes the offshore waters of Block Island Sound and associated coastal salt pond and salt marsh habitat. The biological environment includes a wide variety of fish, shellfish, birds and other organisms. The federally-recognized threatened piping plover is one example of a particularly sensitive species residing in the southern Rhode Island region. Black ducks, loons and eiders also are of special interest to state and federal wildlife managers. The area affected by the spill includes Trustom Pond and Ninigret National Wildlife Refuges (NWRs), two nationally-designated natural areas. The NWRs have been created to preserve the natural floral and faunal diversity of the salt pond region, with particular attention given to the protection of vulnerable migratory bird resources.

The natural resources of Block Island Sound are of significant economic and cultural importance. Travel and tourism is the second largest employer in the state of Rhode Island, employing over 26,000 workers in 1995. Total sales receipts within the state reached \$1.6 billion in 1995 (Tyrrell and McNair 1996). Commercial fish landings within the state totaled over 57 million kilograms in 1995 worth an estimated \$70 million as reported in the National Marine Fisheries Service annual landings data (NMFS 1997). Recreational anglers spend an additional \$100 million a year on fishing equipment alone within the state (Williams and Corey 1994). These activities depend on a healthy offshore and coastal ecosystem in the Block Island Sound region.

3.1 PHYSICAL ENVIRONMENT

The state of Rhode Island is located along the southern coast of New England. The state's 420 miles of coastline are influenced heavily by ocean climatic patterns. As a result of the moderating influence of the ocean, Rhode Island typically experiences mild summers and temperate winters. Temperatures in January average 31°F on Block Island (U.S. DOC 1992). The shoreline landscape is influenced by the high frequency of hurricanes which strike, on average, once every seven years (Olsen and Lee 1985).

Coastal and offshore habitats are valuable commercial and recreational resources to the state (Olsen and Seavey 1983). Oil from the *North Cape* spill spread over a considerable section

of these resources in south-central Rhode Island. The barge struck Nebraska Shoal off Moonstone Beach (41°21.8N, 71°34.8W), about 3 miles west of Point Judith and about 12 miles north of Block Island. The shoreline in the area of the spill is comprised of mixed sand and gravel beaches, sand beaches, man-made structures and exposed rocky shore. The high wind and wave action at the time of the spill mixed the oil throughout the water column and into contact with the bottom sediment layer.

A band of coastal lagoons (salt ponds) and salt marsh lies along the southern Rhode Island coastline. The eight salt ponds located within the spill area are pictured in Exhibit 3-1 and described in Exhibit 3-2. The barge grounded immediately south of Trustom and Cards Ponds. Point Judith and Potter Ponds to the east and Ninigret and Green Hill Ponds to the west are within the region of the observed oil sheen. Quonochontaug and Winnapaug Ponds lie farther west of the spill, but also were impacted.

Local salt ponds can be grouped into three categories depending on whether they are directly breached to offshore waters, indirectly breached or unbreached for the majority of the year. Prior to 1800, all of these ponds were seasonally open to ocean waters; however, in the late 1800s, a permanent breachway was constructed in Point Judith Pond. Permanent breaching of Ninigret Pond followed in 1952. Ocean and pond water is exchanged through these two breachways at a rate of approximately five percent per day (Olsen and Lee 1985). Potter and Green Hill Ponds are indirectly linked to offshore waters through permanent openings in Point Judith and Ninigret Ponds, respectively. Only Cards and Trustom Ponds remain closed to the ocean for much of the year. As a consequence of this isolation from ocean water and tides, the water in Cards and Trustom Ponds is more brackish and less saline than the other salt ponds. The salinity differences between the ponds is presented in Exhibit 3-2. Cards and Trustom Ponds also differ from the other ponds in total area and average depth. An ice covering is not unusual on the shallower, lower salinity ponds during the winter months.

The physical environment of southern Rhode Island is impacted by human development. Surrounding the salt marsh and coastal preserves are the towns of Charlestown, South Kingstown and Narragansett. These communities contribute to the pollution of some of the area's ponds through fertilizer, pet fecal matter and individual sewage disposal systems (ISDS) contamination of surface and ground waters. These contaminants have caused bacterial contamination and elevated concentrations of nitrogen in some salt pond waters. High nitrogen levels have led to increased risk of eutrophication, decreased eelgrass bed area, increased sediment anoxia and other detrimental effects on fish and wildlife habitats (Olsen and Lee 1985, Short *et al.* 1996). Storm-water runoff containing gasoline and fuel oils also has been identified as a potential threat to the salt pond ecosystem (Olsen and Lee 1985). The port of Galilee, situated at the entry to Point Judith Pond, supports a fleet of commercial fishing vessels. Fishing has eroded once-abundant harvests of fish and shellfish in the salt ponds, as has habitat destruction caused by such activities as breachway management, dredge and fill operations, and damming of brooks and rivers (Crawford 1984, Lee *et al.* 1985, Nixon 1982, Olsen and Lee 1993).

Exhibit 3-1

THE SALT PONDS OF SOUTHERN RHODE ISLAND

Exhibit 3-2				
CHARACTERISTICS OF RHODE ISLAND'S SOUTH SHORE PONDS (FROM LEE 1980)				
Pond Names	Area (acres)	Average Depth (meters)	Breachway	Average Salinity (ppt)
Point Judith (Saugatucket Estuary)	1,530	1.8	Permanent to Block Island Sound	30
Potter	329	0.6	Permanent to Point Judith Pond	28
Cards	43	0.4	Intermittent to Block Island Sound	10
Trustom	160	0.4	Intermittent to Block Island Sound	4
Green Hill	431	0.8	Permanent to Ninigret Pond	24
Ninigret (Charlestown)	1,711	1.2	Permanent to Block Island Sound	28
Quonochontaug	732	1.8	Permanent to Block Island Sound	31
Winnapaug (Brightmans)	446	1.5	Permanent to Block Island Sound	30

3.2 BIOLOGICAL ENVIRONMENT

The offshore waters of Block Island Sound are home to a diversity of fish species including cod, cunner, flounder, skates, tautog and herring. Marine mammals are represented in the Block Island ecosystem by harbor seal communities on Point Judith, Newton Rock and possibly other remote rocky areas. Lobsters, surf clams, starfish, and crabs dominate the marine benthic community. Mussels, sea urchins and sea cucumbers also are resident benthic megafauna. These species are allied with an abundant and diverse benthic microfauna population in the offshore environment.

Moonstone Beach, the site of the grounding, is part of the Trustom Pond NWR, a highly productive brackish pond and wetland system. Cordgrasses (*Spartina* spp.) dominate the salt marsh environment in the salt ponds of Rhode Island, but are accompanied by other plant species such as seaside gerardia and salt marsh bulrush (NAWMP 1988). The marsh vegetation plays an essential role in the coastal ecosystem by generating primary production, trapping sediment, fixing nitrogen and providing habitat to fish, shellfish and other benthos.

Rhode Island's salt ponds are a critical part of the coastal ecosystem, serving as essential spawning, nursery and growth areas for coastal fish and shellfish, including the commercially and recreationally important winter flounder (Baczinski *et al.* 1979, Crawford and Carey 1985, Ganz *et al.* 1992, Crawford 1990). Other commercially and recreationally important species include striped bass, bluefish, quahogs, scallops, oysters and lobsters. Like most estuaries, the ponds are also important links between terrestrial and marine environments, converting terrestrial nutrients into marine biological production; in the shallow, well-lit waters of the salt ponds, benthic activity

is an important component of this process (Nixon 1982, Nowicki and Nixon 1985). Silversides, striped killifish, mummichogs, sheepshead minnows, polychaetes and amphipods are important components of the complex food web of the salt ponds.

The salt pond and offshore habitats of the Block Island Sound coastal ecosystem also provide valuable habitat for a host of resident and migratory bird species. During the winter months, marine waters support seabird and waterfowl populations including loons and grebes, sea ducks (e.g., eiders and scoters), and diving ducks (e.g., goldeneye, bufflehead and scaup). Winter diving ducks and dabbling ducks such as scaup, American black duck and mallard also inhabit the area's salt ponds. Over 200 species of migratory birds use Block Island Sound resources during the spring and autumn months. Several species of birds (e.g., black ducks and loons) are of special importance to wildlife managers because their populations are declining and/or their ranges are retracting. Loons are recognized as a species of management concern by the USFWS, and are highly sensitive to human disturbance and have low nesting and hatching success in habitats encroached upon by human development (Crowley *et al.* 1996). They are listed by the state of Vermont as an endangered species and as a threatened species by the state of New Hampshire. Black duck populations have been declining over the past 100 years due to habitat degradation (Kirby 1988).

3.3 ENDANGERED AND THREATENED SPECIES

The Endangered Species Act of 1973 instructs federal agencies to carry out programs for the conservation of endangered and threatened species and to conserve the ecosystems upon which these species depend. The Rhode Island Natural Heritage Program also lists species that are of special concern to the state. Appendix B provides a list of federal and state recognized endangered or threatened species reported to reside in or migrate through the state of Rhode Island.

The Block Island Sound ecosystem provides particularly valuable habitat for the piping plover, a bird included on the federal list of threatened species. The southern beaches of Rhode Island contain the largest piping plover nesting area in the state. In the summer of 1996, nine pairs of these migratory birds nested on Moonstone Beach near the site of the *North Cape* grounding, and five pairs nested on Ninigret Beach. Plovers typically arrive at Rhode Island beaches in mid-March or early April. By mid-April, they have established pairs and begin construction on their nests. The birds feed on invertebrates in intertidal pools, washover areas, mudflats, sandflats, wracklines and shorelines of coastal ponds, lagoons and salt marshes. Maximum foraging distance averages 200 meters. Special management activities at Trustom Pond enhance the nesting success of piping plovers during the spring and summer months.

Common loons rely on the Block Island Sound ecosystem for wintering habitat. Experts believe that loons wintering off the coast of Rhode Island breed in northern New England and/or southern Canada. Although Rhode Island is not a historical breeding location for loons, the state of Vermont has listed common loons as an endangered species; in New Hampshire they are listed

as a threatened species; and in Massachusetts, Connecticut and New York they are listed as a species of special concern. Loons are also a species of management concern to the U.S. Fish and Wildlife Service.

Numerous other endangered and threatened species are seasonal or occasional visitors to the offshore environment of Block Island Sound. Although these species are members of the ecosystem affected by the *North Cape* spill, available information indicates they were not directly impacted. Several species of sea turtles may be present from June through November. These include the threatened Atlantic loggerhead (*Caretta caretta*) and green sea turtle (*Chelonia mydas*), and the endangered Atlantic leatherback (*Dermochelys coriacea*) and Atlantic Kemp's ridley (*Lepidochelys kempfi*) (D. Beach, pers. comm. 1998, Gould and Gould 1992). The loggerhead, Kemp's ridley and green sea turtles are mostly juvenile and subadult individuals foraging in nearshore coastal waters. The Kemp's ridley appears to prefer estuarine areas where green crabs and mussels are found. Loggerheads feed on benthic organisms found in large bay systems and leatherbacks forage in the open waters in search of jellyfish. Several whale species (humpbacks, finback and right whales) transit Rhode Island and Block Island Sounds.

Management programs also exist to reduce disturbance to roseate terns at Trustom Pond. Roseate terns, federally-recognized as an endangered species, are frequently found resting and feeding around the Trustom and Cards Pond breachways. Migrating bald eagles and American peregrine falcons, federally-listed threatened and endangered species, respectively, also utilize the salt ponds of southern Rhode Island as an occasional stopover site.

3.4 NATIONAL WILDLIFE REFUGE LANDS

Trustom Pond and Ninigret NWRs are located on the south coast of Rhode Island in the Towns of South Kingstown and Charlestown, Rhode Island. They are two of over 500 NWRs in the United States comprising the National Wildlife Refuge System. Trustom Pond NWR was established in 1974 and encompasses 640 acres of diverse habitat. The approved land acquisition boundary includes another 360 acres that potentially can be protected as wildlife habitat. Ninigret NWR was established in 1970 and encompasses 407 acres.

These NWRs were acquired under the Migratory Bird Conservation Act of 1929. This act provides for the federal protection of all migratory birds and the acquisition of land and water for conservation of migratory bird resources. In addition to serving as important nesting and foraging habitat for resident and migrant waterfowl, shorebirds and songbirds, the NWRs provide valuable services to other flora and fauna of the region. Management objectives include maintaining a natural diversity and abundance of fauna and flora on refuge lands and preserving organisms and ecosystems represented on the refuge which are rare or threatened in the region. Trustom and Ninigret NWRs also provide wildlife-oriented outdoor recreation and education for the local community.

3.5 CULTURAL ENVIRONMENT AND HUMAN USE

The Rhode Island coast enjoys a rich history dating back thousands of years. Historic resources from prehistoric civilizations to the colonial and more recent industrial eras are protected by the Historical Preservation and Heritage Commission.

In addition to valuable cultural resources, Rhode Island waters offer considerable economic resources. Lobsters, quahogs and winter flounder comprise a sizable portion of the annual fish and shellfish catch. These species are harvested extensively in the Block Island Sound and associated salt pond communities (Olsen and Seavey 1983). The state's economy also is heavily dependent on summer tourism as a source of revenue. Travel and tourism is the second largest industry in the state, generating 26,655 jobs and \$1.6 billion in total sales in 1995 (Tyrrell and McNair 1996). The coastline along Block Island Sound harbors an extensive network of town and state beaches to accommodate these tourists. Recreational dive trips and charter boat fishing also contribute to the local economy. All of these human activities are dependent upon the condition of the coastal and offshore habitats.

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