

3: Affected Environment

INTRODUCTION This chapter describes the existing natural, cultural, socioeconomic, and physical conditions at Fire Island National Seashore (the Seashore) and its environs. It provides basic information about existing conditions to be used as context for comparing the potential impacts of the alternatives proposed in the Fire Island National Seashore General Management Plan/Environmental Impact Statement (GMP/EIS). Relevant resource topics were selected based on agency and public concerns, regulatory and planning requirements, and known resource issues. Resources relevant to the park and the GMP/EIS are discussed below. Impacts associated with each of these topics are analyzed in “Chapter 4: Environmental Consequences” of the draft GMP/EIS.

The natural resources at Fire Island National Seashore are unique to its barrier island environment. Many of these resources are in a constant state of flux, due to the dynamic nature of the barrier island. Other resources are influenced by regional conditions. The desire to protect these resources from future development was one of the primary factors in the establishment of Fire Island National Seashore. The Seashore also was established to provide the public with access to these resources.

Fire Island has a rich cultural heritage with some communities and institutions (e.g., U.S. Life Saving Service) having their roots on the island in the mid-19th century. Prior to its inception as a resort area in the 1880s, Fire Island had been put to agricultural and industrial use for generations. Fire Island represents a cultural landscape that has been shaped both by human intervention and the forces of nature.

Below is a descriptive summary of the existing environmental conditions.



CLIMATE CHANGE

Climate change refers to changes in the earth’s atmospheric, hydrologic, and oceanic system that can alter the landscape, natural resources, cultural sites, facilities, and the visitor experience of the Seashore. These changes, including warmer global air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level, provide evidence that the earth’s climate system is warming.

In 2011, the New York State Energy Research and Development Authority (NYSERDA) released a report prepared by Columbia University, the City University of New York, and Cornell University entitled *Responding to Climate Change in New York State: the ClimAID Integrated Assessment of Effective Climate Change in New York State*,⁹ www.nyserderda.ny.gov/climaid. The in-depth technical report provides a state-level assessment describing historical trends, contemporary observations of conditions, as well as future projections related to climate change as they pertain to a wide range of areas including but not limited to the coastal zone, water resources, ecosystems, agriculture, transportation, and public health. The report also made recommendations for adapting to the changing conditions resulting from climate change, summarizing trends and projecting conditions in a number of areas including the coastal zone and

⁹ Rosensweig, C., W. Solecki, A. DeGaetano, M. O’Grady, S. Hassol, P. Grabhorn (eds). 2011. Responding to Climate Change in New York State: The ClimAID Integrated Assessment for Effective Climate Change Adaptation. Synthesis Report. New York State Energy Research and Development Authority (NYSERDA). Albany, NY.



ecosystems that are particularly relevant to the Seashore. Their assessment of key climate impacts for coastal zones and ecosystems appear as follows:

Coastal Zones – Key Climate Impacts

High water levels, strong winds, and heavy precipitation resulting from severe coastal storms already cause billions of dollars in damages and disrupt transportation and power distribution systems. Sea-level rise will lead to more frequent and extensive coastal flooding. Warming ocean waters raise sea level through thermal expansion and have the potential to strengthen the most powerful storms.

- Barrier islands are being dramatically altered by strong coastal storms as ocean waters overwash dunes, create new inlets, and erode beaches.
- Sea-level rise will greatly amplify risks to coastal populations and will lead to permanent inundation of low-lying areas, more frequent flooding by storm surges, and increased beach erosion.
- Loss of coastal wetlands reduces species diversity, including fish and shellfish populations.
- Some marine species, such as lobsters, are moving north out of New York State, while other species, such as the blue claw crab, are increasing in warmer waters.

- Saltwater could reach farther up the Hudson River and into estuaries, contaminating water supplies. Tides and storm surges may propagate farther, increasing flood risk both near and far from the coast.
- Sea-level rise may become the dominant stressor acting on vulnerable salt marshes.

Ecosystems – Key Climate Impacts

- Within the next several decades, New York State is likely to see widespread shifts in species composition in the state's forests and other natural landscapes, with the loss of spruce-fir forests, alpine tundra, and boreal plant communities.
- Climate change will favor the expansion of some invasive species into New York, such as kudzu, an aggressive weed, and the hemlock woolly adelgid, an insect pest. Some habitat and food generalists (such as white-tailed deer) may also benefit.
- A longer growing season and the potential fertilization effect of increasing carbon dioxide could increase the productivity of some hardwood tree species, provided growth is not limited by other factors such as drought or nutrient deficiency.
- Carbon dioxide fertilization tends to preferentially increase the growth rate of fast-growing species, which are often weeds and other invasives.

- Lakes, streams, inland wetlands, and associated aquatic species will be highly vulnerable to changes in the timing, supply, and intensity of rainfall and snowmelt, groundwater recharge, and duration of ice cover.
- Increasing water temperature will negatively affect brook trout and other native coldwater fish.

The authors prepared a summary report that provides a general synthesis of highlights from the larger technical report that resulted from this effort. The *Synthesis Report* has been included in its totality in Appendix B of this plan to provide a more complete picture of the state of climate change in New York State, including key impacts and suggested adaptation strategies. The complete *Technical Report* is available at www.nysesda.ny.gov/climaid.

NATURAL RESOURCES

Coastal Processes

At the peak of the Wisconsin glaciation more than 20,000 years before present, much of New York State was covered by the Laurentide ice sheet. As the climate warmed (21,000 to 8,000 years before present), the ice sheet melted and retreated, releasing rock, sand, and mud. The present-day Long Island landscape consists of glacial features such as moraines, kettle lakes, and outwash plains formed during this time. The melting ice sheet also released water, causing sea level to rise. A chain of narrow barrier islands along Long Island's south shore is made up of outwash sediment from the last glaciation shaped by waves and currents over time (NPS, 2005c).

Fire Island is a 32-mile-long barrier island bounded on the west by Fire Island Inlet and on the east by Moriches Inlet. The Great South Bay, Narrow Bay, and Moriches Bay separate Fire Island from mainland Long Island. These bays are relatively shallow, with an average depth of 6.5 feet (Wilson et al., 1991) and are characterized by brackish water with an average salinity of 25.9 parts per thousand (Tanski et al., 2001). The width of Fire Island ranges from approximately 600 feet to over 3,200 feet. From ocean to bay, the undulating landscape includes a variety of coastal features including beach face, beach berm, foredune or primary dune, secondary dune, ridge and swale habitat, maritime forest, and salt marsh.

Wind, waves, tides, and currents are constantly moving sediment to, from, and along the shoreline of Fire Island. The energy of crashing waves forms a current in

the surf zone termed longshore transport or littoral drift that moves particles along the shore. Wind and waves also transport sediment across the shore, between the offshore bar, beach face, berm, dunes, bay shoreline, and bay. Sediment transport processes are influenced by many factors, including wind and wave energy, sediment supply, and human activity. Consequently, the Fire Island landscape varies across time.

A sediment budget describes the sources, sinks, and movement of sediment within a defined system. Imbalances in the system cause the shape and position of the shoreline to change. A sediment surplus allows for growth. For example, the Fire Island Inlet migrated approximately five miles westward between 1825 and 1941, when it was stabilized by the US Army Corps of Engineers (USACE) (Kassner and Black, 1983). When the amount of sediment lost is greater than the amount gained, shoreline erosion occurs.

The net movement of material from east to west along Fire Island within the longshore sediment transport system is well documented; however, the amount of sediment and the way it moves within the system is not as clear. Numerous estimates of the sediment budget for Fire Island show an imbalance in this system, with less material passing Moriches Inlet on the east end of the island than is accumulating at Democrat Point on the west end (Schwab et al., 2013). Physical barriers, such as jetties and groins, interrupt longshore flows and result in the deposition of material on the updrift side of the impediment. Naturally occurring and stabilized inlets also serve as sediment sinks, where sediment is deposited in flood- and ebb-tidal deltas. Beach nourishment is believed to offset some of the losses within the system, but it is unlikely that beach nourishment alone compensates for the deficit in the Fire Island sediment budget (Schwab et al., 2013).

The most recent science indicates that offshore sources make an important contribution to the sediment budget for Fire Island. Offshore ridges are believed to supply sand to the central and western segments of the island west of Watch Hill and may account for the sediment budget imbalance (Hapke et al., 2010 and Schwab et al., 2013). East of Watch Hill, this supply is not readily available, and shoreline retreat predominates (Schwab et al., 2013). To better understand the details of the Fire Island sediment budget, offshore sand supply is the subject of ongoing research.

Cross-shore sediment transport also influences the shape and position of the barrier island (Hapke et al., 2008). Hurricanes and nor'easters also play an important role in transporting sand across the island. Storm waves reach the upper beach and landward portions of the island, either overwashing or eroding sediment from these areas. Sand moved across the island raises the elevation of the island's interior and bay side. Sand moved offshore during these events will gradually return through wind and wave action to build up the beach and dunes. Storms can also cause breaches or openings in the barrier island that allow water and sediment to move between the ocean and the bay. Cross-island processes provide essential sources of sediment that allow barrier islands to keep pace with sea-level rise.

Cross-shore sediment transport includes eolian (wind-blown) transport of fine sand, essential to the natural development of dunes. Dune formation and evolution is largely related to the conditions of the shoreline. If the beach is stable, sand continues to accumulate, increasing the width and height of the dune. If the shoreline is eroding, the foredune is intermittently scaped and lowered, sand is transported over the crest, and the dune ridge shifts inland. If the shore is accreting, the foredune may widen or a new foredune will develop, resulting in primary and secondary dune ridges separated by an interdune or swale area.

Dunes provide some amount of protection from wind and storm waves to landward features; however, even large, well-developed dunes can be flattened or overtopped during severe storms. Dunes naturally redevelop after storms as sand accumulates at the foot of the dunes and pioneer species, such as American beachgrass (*Ammophila breviligulata*), take root and stabilize the sand; but this takes time. Human activity, such as development, erosion control strategies, and recreation can alter the natural transport of sand and extent of vegetation cover, thereby affecting the natural formation and evolution of dunes.

Like the ocean shoreline, the formation and evolution of the bay shoreline on Fire Island is governed by the wind, waves, and tides. Despite the Great South Bay's low wave energy and tidal range, there is a general trend of erosion on the bay shoreline (Nordstrom and Jackson, 2005). Inlets, overwash, and dune migration move sand across the island from ocean to bay. Dune building and stabilization on the island's southern shoreline therefore limit the delivery of sediment to the bay shoreline (Nordstrom and Jackson, 2005). The result is bay

shoreline loss -- averaging approximately 1 foot per year (Nordstrom and Jackson, 2005), with losses as high as 10.8 feet recorded in a single year (Nordstrom et al., 2009).

How and where bay side sediment is moved is not as clear as the east-west transport of sediment on the ocean side. Longshore sediment transport does take place, albeit more slowly and in localized cells separated by shoreline features and bulkheading (Nordstrom and Jackson, 2005). Not only is the transport system sand-starved, but it is interrupted by shoreline hardening, with nearly 18% of the island's bay side bulkheaded (Nordstrom et al., 2009). Rather than absorbing wave energy like a natural "soft" shoreline, hard structures like bulkheads can reflect wave energy and increase erosion. Shoreline hardening also changes the amount of sand available to the system by keeping upland sediment from contributing to the sediment budget. Navigational channels have been created through the shallow flats of the bay to provide access to existing marinas and docks along the bay shoreline. Material dredged from the bay has historically been placed upland, thus removing sediment from the system.

► FLOODPLAINS

Executive Order 11988, "Floodplain Management," provides for the protection of floodplain values, while NPS Director's Order (DO) 77-2: Floodplain Management, provides the NPS with requirements for implementing the Executive Order. Floodplains are fluvial lands adjacent to freshwater streams and rivers that receive floodwaters once the water has overtopped the bank of the main channel. This is typically the result of a higher- than- normal influx of upstream water supplies (water moving from higher elevations to lower elevations). Floodplains are important resources in the storage and filtering of these floodwaters. Construction within a floodplain can result in direct long-term impacts such as decreased flood storage volumes, restriction of natural flow patterns, and exacerbation of catastrophic flooding in downstream areas.

A flood zone is an area defined for management purposes that is subject to the risk of flooding by any natural means, whether by water cresting the banks of channels (fluvial floodplain) or by tidal storm surges. Tidal storm surges occur when water is pushed up by high winds and low atmospheric pressure to higher-than-normal elevations during coastal storms and hurricanes.

On Long Island, the NPS headquarters office, Patchogue Ferry Terminal, and maintenance area are adjacent to the Patchogue River. While most of the Village of Patchogue is outside the 100- and 500-year flood zones, Long Island is classified as Zone X by the Federal Emergency Management Agency (FEMA). Zone X is defined as areas of 100- and 500-year flood zones with flood depths of less than one foot or with drainage areas less than 1 square mile. Lands that border the edge of the river, like the headquarters, the ferry terminal, and portions of the maintenance area, fall within the area classified as Zone AE. The Zone AE areas include the 100-year flood zone. FEMA has defined the 100-year flood zone based on a flood elevation of 6 feet National Geodetic Vertical Datum of 1929 (NGVD29) (FEMA 1998a). At the William Floyd Estate, most of the property is landward of the 100- and 500-year flood zones. The portions of the property along the marsh shoreline are classified as Zone X by FEMA (FEMA 1998b).

All Fire Island properties fall within flood zone designations as defined by FEMA as Zone AE or Zone VE. The 100-year flood zone elevation within Zone AE areas on Fire Island ranges from 7-9 feet NGVD29. Zone VE is also within the 100-year flood zone, but has an established elevation associated with additional hazard caused by wave run-up. The Zone VE elevation at Fire Island, as determined by FEMA, is 10-12 feet NGVD29. Areas on Fire Island excluded from these zones include sections of high dunes on the bay side that reach elevations exceeding 20 feet.



Within the past 70 years, at least nine major storms have struck the vicinity of Long Island, including the Hurricane of 1938 (“Long Island Express” with a 14-foot storm surge), Ash Wednesday Storm of 1962 (9-foot storm surge), the Halloween Storm of 1991 lasting 3 days (5-foot storm surge), the March 1993 storm, and most recently the October 2012 storm named Hurricane Sandy (though not a hurricane when it hit Long Island) with a storm surge in excess of 7 feet. Overwashes, channel incision, dune/scarp erosion, breaching, shoreline accretion, and damage to buildings and infrastructure are all documented outcomes from such storms.

Water Resources

► MARINE RESOURCES

The Fire Island National Seashore boundary, which extends 26 miles from the eastern boundary of Robert Moses State Park eastward to the midpoint of Moriches Inlet, encompasses both terrestrial and marine environments off the southern coast of Long Island. The park totals 19,353 acres, of which approximately 14,600 acres are submerged lands associated with Great South Bay and the Atlantic Ocean (NPS 2009b). The southern boundary of the park extends approximately 1,000 feet into the Atlantic Ocean, the equivalent of approximately 3,212 acres, and the boundary north of the barrier island extends into Great South Bay at varying distances ranging from approximately 2,000 to 4,000 feet. The majority of the offshore area is characterized as a sandy bottom environment typical of coastal zones. Due to the high energy and dynamic nature of the surf zone on the Atlantic Ocean side of the island, this area has low faunal diversity, transient benthic macrofauna, and a relatively low fish diversity (NPS 2009b).

Surface waters that provide habitat for freshwater fish are limited at Fire Island National Seashore. There are no known data on the presence or status of freshwater fish within ponds in the Seashore.

Seventy-two species of marine fish have been documented in or near park waters, within the Great South Bay and Atlantic Ocean. The Great South Bay habitat complex supports regionally significant populations of marine and estuarine fish and a commercial and recreational fishery of regional importance (USFWS 1997). There is little information on finfish species specific to the Seashore; therefore, much of what is currently known must be inferred from reports of recreational and commercial landings of harvested fish within Great South Bay or New York State (Trocki 2008).

Some species are present only transiently as older juveniles and adults such as hickory shad (*Alosa mediocris*), American shad (*Alosa sapidissima*), blueback herring (*Alosa aestivalis*), alewife (*Alosa pseudoharengus*), smooth dogfish (*Mustelis canis*), menhaden (*Brevoortia tyrannus*), and striped mullet (*Mugil cephalus*) (Schaefer 1967). However, other species including striped bass (*Morone saxatilis*), weakfish (*Cynoscion regalis*), and American eel (*Anguilla rostrata*), rely on waters surrounding the Seashore for both nursery grounds and adult habitat. Other species that likely rely more heavily on habitat within the Seashore include summer flounder (*Paralichthys dentatus*), winter flounder (*Pseudopleuronectes americanus*), bluefish (*Pomatomus salatrix*), tautog (*Tautog onitis*), and black seabass (*Centropristis striata*) (Trocki 2008).

Another important component of the finfish community within the Seashore are the forage fish that provide food for piscivores (both larger fish and waterbirds) and are sometimes harvested for use as bait. These include Atlantic silversides (*Menidia menidia*), bay anchovy (*Anchoa mitchilli*), killifish species (*Family Cyprinodontidae*), and northern pipefish (*Syngnathus fuscus*) found in salt marshes and near shore habitats, where they are a major food source for crabs, wading birds, and larger predator fish such as the summer flounder (Trocki 2008).

Recent ocean-side surveys to test the efficacy of ocean sampling gear found that striped bass (*Morone saxatilis*) and hickory shad (*Alosa mediocris*) were most common in June, while sea robin (*Prionotus carolinus*), striped bass, and pipefish were the most common species in August. The American sand lance (*Amoodytes americanus*) is a major component of the winter fish assemblage on both sides of Fire Island and provides forage for many wintering piscivores (Conover 2005).

Also recorded within the boundaries of the Seashore are 19 species of marine mammals, including whales, porpoises and dolphins, and seals. The harbor seal (*Phoca vitulina*) is regularly observed during the winter at both Fire Island Inlet and Moriches Inlet. The fin whale (*Balaenoptera physalus*), humpback whale (*Megaptera novaeangliae*), and northern right whale (*Eubalaena glacialis*) are also seen within the offshore waters of Fire Island.

The Seashore includes approximately 7,413 acres of submerged lands in the shallow bays north of Fire Island. These lands are mostly within Great South Bay, but a small segment is in Moriches Bay to the east. The bayside

waters are shallow (3-10 feet) and typically have a sandy bottom. Salinity within the bays ranges from 25 to 30 parts per thousand. Large areas of the shallow bay bottom are colonized with submerged aquatic vegetation (SAV) such as eelgrass (*Zostera marina*), which is more concentrated along the southern shore of the bay. However, eelgrass densities have varied greatly over time. A 1981 aerial survey provided in Carpenter et al. (1991) indicated that approximately one third of the bay was colonized with SAV. More recent impacts from periods of brown tide and reduced water clarity and quality have likely had an impact on SAV distribution, but this has not been quantified (NPS 2005a). However, existing SAV beds within the bays provide valuable habitat for scallops, shrimp, crabs, and various juvenile fish.

Unvegetated areas of Great South Bay have historically been associated with hard clam (*Merceneria merceneria*) habitat. Clam densities are variable, ranging from a highs of 1.25 clams per square foot to lows averaging 0.2 clams per square foot. Clams are found in greater concentrations in sediments with a higher fraction of coarse-grained materials, especially shell fragments (Maher and Cerrato 2000). The Town of Brookhaven clam census data suggests the overall clam population is in decline, a decades-long trend. Other mollusks reported within Great South Bay include oysters (*Crassostrea virginicus*), softshell clams (*Mya arenaria*), and the blue mussel (*Mytilus edulis*). Shellfish are an important component of the overall aquatic ecosystem due to their ability as filter feeders to absorb and sequester nutrients, as well as remove suspended solids from the water column.

Crustaceans represent an important component of the aquatic ecosystem at Fire Island both as predators and prey. Crustaceans reported within Great South Bay and adjacent bays include the blue crab (*Callinectes sapidus*), Jonah crab (*Cancer borealis*), rock crab (*Cancer irroratus*), lady crab (*Ovalipes ocellatus*), fiddler crab (*Uca pugnax*), green crab (*Carcinus maenas*), spider crab (*Libinia emarginata*), and mud crab (*Neopanope texana*) (NPS 2005d). Although never a primary target for commercial harvest in the Great South Bay, commercial landings for the blue crab peaked between 1993 and 1996. Since the 1990s, commercial harvest of the blue crab has been declining; however, the blue crab and rock crab populations within the bay are still high enough

to allow for recreational crabbing. A variety of finfish are identified in the National Marine Fisheries Service database as present within Great South Bay commercial landings. However, only a few species show up regularly in the record, including weakfish (*Cynoscion regalis*) and bluefish (*Pomatomus saltatrix*) (NPS 2005d). Recreational fishing within the bays is very prevalent and provides major economic benefits to the area.

► FRESHWATER RESOURCES

Fire Island National Seashore comprises multiple properties in different ecological settings. Several Seashore properties occur near the south shore on the mainland of Long Island (the William Floyd Estate, the Seashore headquarters, and maintenance area), while the majority of the Seashore is contained on the barrier island of Fire Island and adjacent oceanic and estuarine waters. Historic land uses, coastal dynamics, and recent legislative initiatives have played an integral role in the formation, presence and condition of these properties. Ground and surface water resources comprise a small portion of this ecosystem, and are most sensitive to the dynamic settings shaped by wave and wind action, storms, and human activities.

Groundwater

Fire Island National Seashore is underlain by a series of unconfined and confined groundwater aquifers recharged by precipitation. Within the southern reaches of Long Island, the Upper Glacial aquifer is an unconfined shallow aquifer and is the closest to the ground surface. This aquifer is characterized by newly formed, coarse sandy, highly permeable soils. In contrast, to the north the Upper Glacial aquifer on Long Island is underlain by glacial till formed during the last ice age. The water table on Fire Island is a thin (approximately 25-40 feet thick) freshwater lens and is immediately above the saline portion of the Upper Glacial Aquifer (McCormick and Associates 1975, Collier et al. 2005). The flow pattern of this freshwater lens is controlled primarily by the combined effect of wave action and tidal pumping. The combination of these processes elevates the water table near the ocean shore, resulting in lateral, gravitational movement away from the ocean towards the bay side. As a result, the groundwater along the shoreline seeps into the saline waters of the bay and ocean (Schubert 2007).

The depth of the water table on Fire Island is dependent on several factors, including the elevations (height) of dune formations and back dune swales. Other factors include precipitation inputs and community



wastewater recharging the lens, tidal fluctuations, and the degree of back bay seepage. In areas of low elevations, the water table may be exposed above the ground surface, creating freshwater surface waters where wind-blown erosion has formed depressional blow-outs in the landscape. Relative to sea level, the freshwater lens is generally at an elevation between 6 and 12 feet on Fire Island (Schubert 2007, USGS 2009).

Beneath the Upper Glacial Aquifer are several confined aquifer layers. The Gardiners Clay confinement layer occurs approximately 500 to 600 feet below grade. Below Gardiners Clay is approximately 1,000 feet of the Magothy aquifer followed by two other confining layers, the Raritan Clay formation and the Lloyds Sands aquifer, found from approximately 1,700 to 1,900 feet below grade to bedrock. The Magothy aquifer is the primary source of public water supply for Long Island (NYDEC 2009), while the Lloyds Sands aquifer supplies water to Jones Beach, Captree Island, and Robert Moses State Park (NPS 1992).

Potential contamination of the shallow groundwater aquifer presents the greatest threat to the health of the Fire Island ecosystem. Underground septic and cesspool systems are the most common method of wastewater treatment for the residential communities and the estimated 2.2 million annual visitors to the Seashore. Continued reliance on antiquated or otherwise substandard systems poses a serious threat to water quality through the release of contaminants such as nutrients, pathogens, and organic compounds.

These localized contaminants are laterally transferred to the ocean and back bay estuaries. Simulations of groundwater discharge from the shallow aquifer indicate that nearly 80 percent of the total discharge enters the back-barrier estuaries; the rest discharges to the ocean or below the seabed as subsea outflow (Schubert 2010). Shallow well monitoring across Fire Island has shown that in some locations total nitrogen (TN) concentrations were at least 10 times higher in groundwater down-gradient from at least two communities and the Watch Hill leach field compared to undeveloped areas of Fire Island. The high contribution of excess nitrogen "...could affect terrestrial and aquatic (freshwater and brackish) habitats and species that are adapted to the low nutrient concentrations generally found within and down gradient from undeveloped areas. (Schubert 2010)."

Freshwater Wetlands

Approximately 112 acres of dunal wetlands occur on Fire Island, representing approximately 2 percent of the terrestrial habitat. According to the National Vegetation Classification System (NVCS) (Grossman et al. 1998), the following freshwater systems occur on Fire Island: Highbush Blueberry Swamp Shrub, Northern Interdunal Cranberry Swale, and Reedgrass Marsh (Klopper et al. 2002). A fluctuating, high groundwater table is the primary source of hydrology driving the formation and functions of these systems.

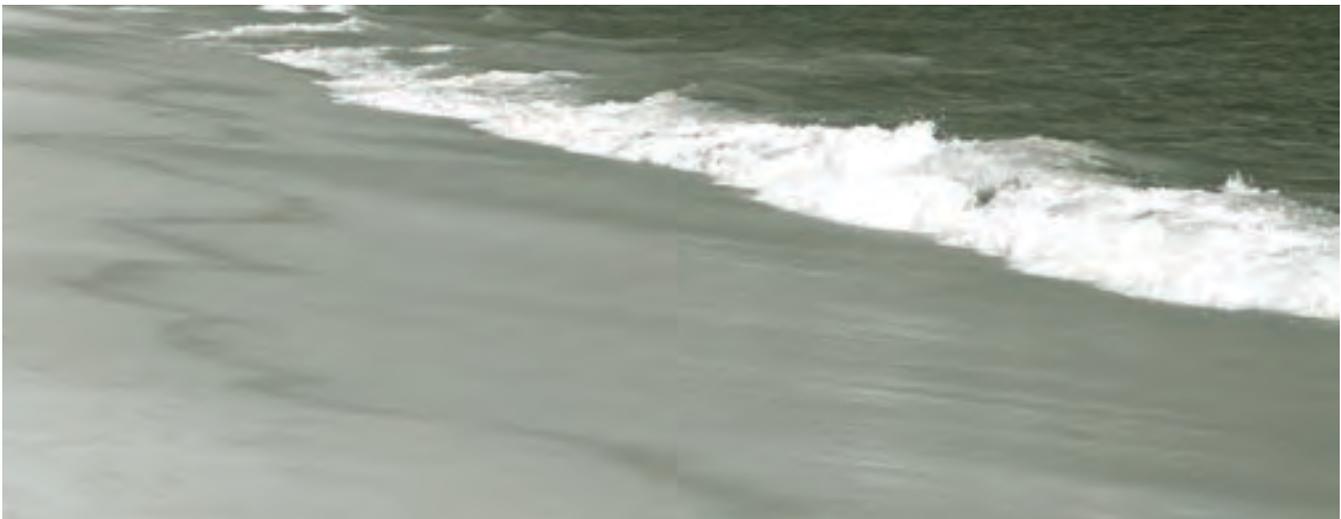
The Highbush Blueberry Swamp Shrub is the most common freshwater wetland within the Seashore (Klopper et al. 2002). This type of shrub wetland is found on both Fire Island and within the Floyd Estate and is characterized by highbush blueberry (*Vaccinium corymbosum*), swamp azalea (*Rhododendron viscosum*),

and sweet pepperbush (*Clethra alnifolia*) mixed with several herbaceous species such as flat sedges (*Cyperus spp.*), beakrush (*Rhynchospora capitellata*), marsh rush (*Juncus canadensis*), round-leaf sundew (*Drosera rotundifolia*), bladderwort (*Utricularia subulata*), and slender yellow-eyed grass (*Xyris torta*).

The Northern Interdunal Cranberry Swale wetlands occur as small, pond-like bodies of shallow water dominated by a partially submerged layer of cranberry (*Vaccinium macrocarpon*) and are found mostly in the Fire Island Wilderness.

The Reedgrass Marsh wetland occurs as a small patchwork of concentrated *Phragmites australis* and is found primarily in and around most wetland areas on both the Floyd Estate and Fire Island. *Phragmites australis*, a non-native, invasive plant, is becoming more widespread across the park. Cattail marshes occur in small patches across Fire Island.

The Red Maple-Blackgum Swamp association is the only forested wetland within the Seashore, and is found on both the William Floyd Estate and Fire Island (Klopper et al. 2002, NPS 2009b). On Fire Island, it occurs in low elevations adjacent to small drainages, and at the William Floyd Estate it occurs adjacent to the tidal creeks. On Fire Island, Red Maple-Blackgum Swamp is found behind the secondary dune. Dominant plants include red maple (*Acer rubrum*), blackgum (*Nyssa sylvatica*), swamp azalea, sweet pepperbush, cinnamon fern (*Osmunda cinnamomea*), marshpepper smartweed (*Persicaria hydropiper*), Virginia bugleweed (*Lycopus virginicus*), swamp dock (*Rumex verticillatus*), and marsh St. John's-wort (*Triadenum virginicum*).



Freshwater Ponds

A few freshwater ponds are located throughout the Seashore. These ponds are fishless with relatively good water quality; therefore, they are particularly important breeding areas for the few herpetological species on Fire Island and the many odonate (dragonflies and damselflies) species found in the area (Caldecutt 1997, Briggs et al. 2010). Ponds within the Seashore occur as interdunal swales and depressions formed from an exposed, fluctuating high water table and are characterized by Northern Interdunal Cranberry Swale vegetation. The largest pond within the Seashore, approximately 2 acres in size and more than 3 feet deep at the epicenter, is just west of the community of Kismet. This pond maintains permanent surface water; provides the highest-quality breeding habitat by freshwater aquatic species on Fire Island; and was the only pond found by Briggs et al. (2010) to be used for breeding Needham's skimmers (*Libellula needhami*), a New York State-listed odonate.

Another freshwater pond of significance occurs at the western boundary of Fire Island Pines, near the Carrington house, and is associated with a large cranberry wetland. Caldecutt (1997) noted the presence of the common snapping turtle (*Chelydra serpentina*) at this pond, and believed spotted turtles (*Clemmys guttata*) may also use the pond, although none were detected. Other smaller ponds on Fire Island are within private communities and federal lands in Atlantique Beach, Point O'Woods, Watch Hill, and on the bay side of the Fire Island Wilderness. These systems may only be 0.1 acre in size when full of water, and the non-native invasive common reed grass (*Phragmites australis*) has been found along the pond edges. At the William Floyd Estate, several man-made ponds one freshwater, the others brackish are just landward of the tidal marsh. These systems were created decades ago for waterfowl hunting by members of the Floyd family. The man-made ponds are one acre or less in size and are fed by the exposed groundwater aquifer and direct rainfall.

Vegetation

In 2002, a detailed inventory of the vegetation within Fire Island was completed, based on the National Vegetation Classification System (NVCS) (Klopfer et al. 2002) (Table 3-1). The most common upland vegetative community type is the Northern Beach Grass Dune and Maritime Deciduous Scrub Forest (each 15 percent of the total). Northern Dune Shrubland is the third most common type (11 percent). The rarest vegetative community at Fire Island National Seashore is the Maritime Post Oak Forest found on the William Floyd Estate.

American beachgrass (*Ammophila breviligulata*) is the dominant plant species on the foredunes of Fire Island. Beach plum (*Prunus maritima*), bayberry (*Myrica pennsylvanica*), seaside goldenrod (*Solidago sempervirens*), and poison ivy (*Toxicodendron radicans*) are commonly found on the leeward side of the primary dunes.

Maritime forests on barrier islands are generally formed near the back bay, where significant secondary dune structures covered with vegetation provide protection from oceanic salt spray and erosional forces. The Sunken Forest, located just west of Sailors Haven, exemplifies a rare, well-formed, old-growth maritime holly forest – one of only two such forests known in the world.¹⁰ American holly (*Ilex opaca*) up to 300 years old dominates the community (Trocki 2008). Other species include blackgum (*Nyssa sylvatica*), sassafras (*Sassafras albidum*), red maple (*Acer rubrum*), black cherry (*Prunus serotina*), and pitch pine (*Pinus rigida*). Serviceberry (*Amelanchier canadensis*) and highbush blueberry (*Vaccinium corymbosum*) are the common shrubs while poison ivy (*Toxicodendron radicans*) and greenbriar (*Smilax spp.*) are common ground and climbing vine species. A series of studies concluded that since 1967 heavy deer browse has altered the understory composition of the forest. In 1967 sarsaparilla (*Aralia nudicaulus*), Canada mayflower (*Maianthemum canadense*), Starry False Solomon's seal (*Similacina stellate*), bracken fern (*Pteridium aquilinum*), Herb Robert (*Geranium robertianum*), and starflower (*Trientalis borealis*) were frequently associated with the herb layer (Art 1976, 1987, 1992). Several understory species documented in early vegetation surveys are thought to have been nearly extirpated from the area by deer browse.

¹⁰ The other old-growth maritime holly forest occurs at Sandy Hook in New Jersey, a unit of Gateway National Recreation Area.

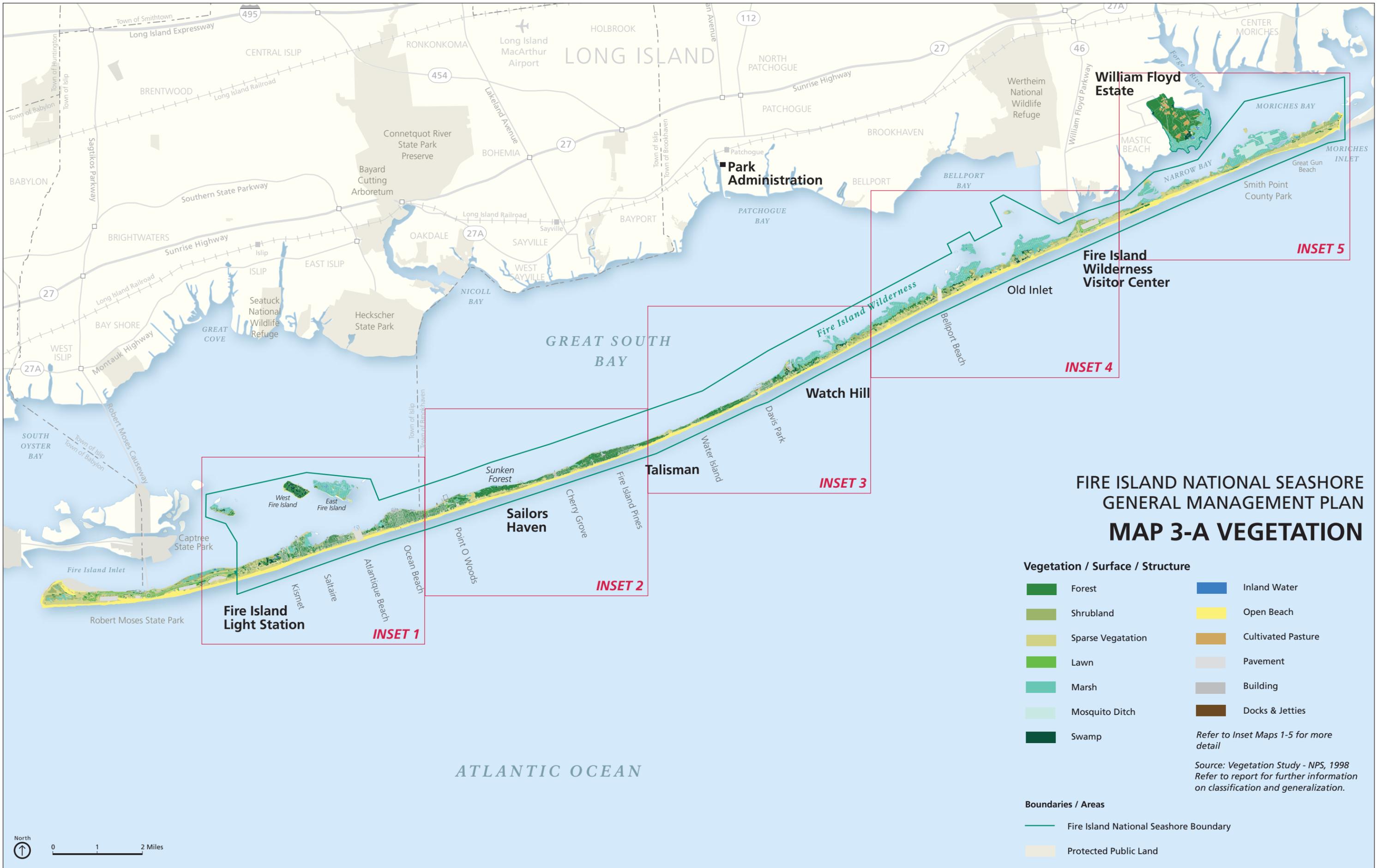
Tidal marshes, the most abundant cover type in the park at 26 percent, occur along the back bay shoreline of Fire Island as broad depositional bands from historic storm overwash events (Klopfer et al. 2002). Smooth cordgrass (*Spartina alterniflora*) is the primary low-tide species, with salt meadow grass (*Spartina patens*) and spike grass (*Disticlis spicata*) found in the upper marsh. Sections of marsh along the back bay shoreline have been disturbed or disrupted due to dredging and erosion forces caused by bulkhead and marina construction.

Vegetative communities at the Floyd Estate are primarily the result of historic land uses such as farming, cultural plantings, and land-clearing operations. The property contains salt marsh habitat with salt

bush (*Baccharis halimifolia*) and marsh elder (*Iva frutescens*) along the upper marsh fringe, similar to those communities found on Fire Island. Several open fields still remain, but others were allowed to revert to deciduous forests, the most recent of which are largely comprised of black locust (*Robinia pseudoacacia*), black cherry, red maple, pitch pine, blackgum in the overstory and greenbrier (*Smilax rotundifolia*), highbush blueberry, and red cedar in the understory. Older, more mature forest stands are characterized by white oak (*Quercus alba*), and hickory (*Carya cordiformis*). Table 3-1 provides a summary of the vegetative community types in the Seashore and their respective percent coverage (Klopfer et al. 2002).

To make the vegetation map easier to read in this format, the vegetation/habitat classifications described in the Klopfer 2002 Vegetation study were combined to create broader categories. These include:

<p>Swamp</p> <ul style="list-style-type: none"> Highbush Blueberry Shrub Swamp Acidic Red Maple Basin Swamp 	<p>Forest</p> <ul style="list-style-type: none"> Maritime Deciduous Scrub Forest Coastal Oak-Heath Forest Japanese Black Pine Forest Maritime Holly Forest Pitch Pine-Oak Forest Pitch Pine Dune Woodland Old Field Red-Cedar Forest Maritime Post Oak Forest
<p>Sparse Vegetation</p> <ul style="list-style-type: none"> Northern Beach Grass Dune Beach Heather Dune Interdune Beachgrass-Beach Heather Mosaic Brackish Meadow Brackish Interdunal Swale Overwash Dune Grassland Northern Interdunal Cranberry Swale 	<p>Marsh</p> <ul style="list-style-type: none"> Low Salt Marsh High Salt Marsh Reedgrass Marsh
<p>Shrubland</p> <ul style="list-style-type: none"> Maritime Vine Dune Northern Dune Shrubland Northern Salt Shrub Northern Sandplain Grassland 	<p>Pavement</p> <ul style="list-style-type: none"> Paved Road Pavement/ Parking Area
	<p>Cultivated Pasture</p>



FIRE ISLAND NATIONAL SEASHORE GENERAL MANAGEMENT PLAN MAP 3-A VEGETATION

Vegetation / Surface / Structure

 Forest	 Inland Water
 Shrubland	 Open Beach
 Sparse Vegetation	 Cultivated Pasture
 Lawn	 Pavement
 Marsh	 Building
 Mosquito Ditch	 Docks & Jetties
 Swamp	

Refer to Inset Maps 1-5 for more detail
Source: Vegetation Study - NPS, 1998
Refer to report for further information on classification and generalization.

Boundaries / Areas

 Fire Island National Seashore Boundary
 Protected Public Land





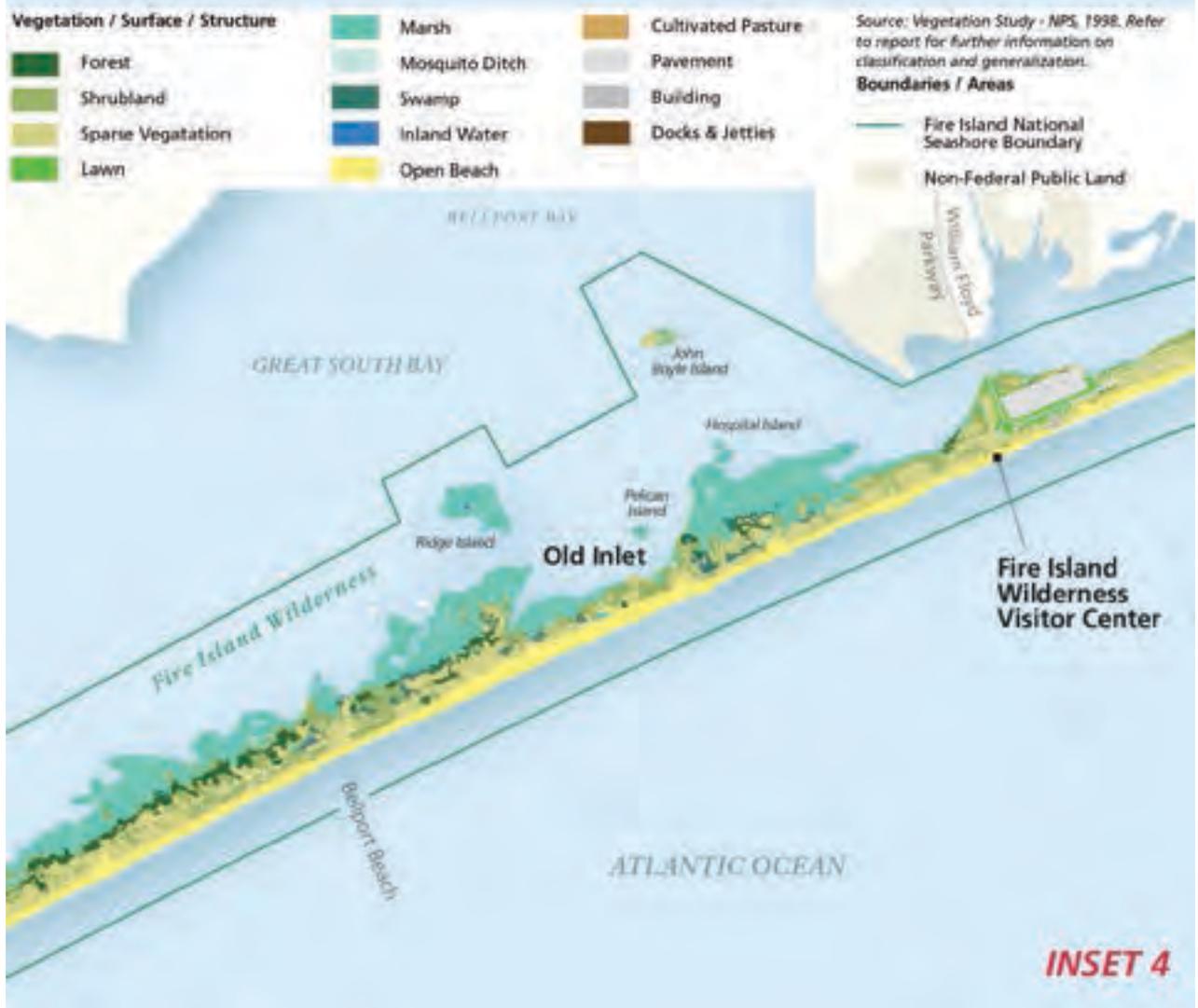
INSET 1



INSET 2



INSET 3



INSET 4



INSET 5

Vegetation / Surface / Structure

- Forest
- Shrubland
- Sparse Vegetation
- Lawn

- Marsh
- Mosquito Ditch
- Swamp
- Inland Water
- Open Beach

- Cultivated Pasture
- Pavement
- Building
- Docks & Jetties

Source: Vegetation Study - NPS, 1998. Refer to report for further information on classification and generalization.

Boundaries / Areas

- Fire Island National Seashore Boundary
- Non-Federal Public Land



North
0 1 2 Miles

TABLE 3-1. VEGETATIVE COMMUNITY TYPES AT FIRE ISLAND NATIONAL SEASHORE		
Vegetation Type Area	Acres of Vegetation	Percent of Total Area (%)
Sparse Vegetation		22.4%
Northern Beach Grass Dune	617.8	14.9
Beach Heather Dune	184.1	4.5
Interdune Beachgrass – Beach Heather Mosaic	94.6	2.3
Brackish Meadow	13.6	0.3
Brackish Interdunal Swale	10.1	0.2
Overwash Dune Grassland	9.6	0.2
Northern Interdunal Cranberry Swale	8.2	0.2
Forest		29.2%
Maritime Deciduous Scrub Forest	604.9	14.8
Coastal Oak Health Forest	239.9	5.9
Japanese Black Pine Forest	189.3	4.6
Maritime Holly Forest	64.2	1.6
Pitch Pine – Oak Forest	45.5	1.1
Pitch Pine – Dune Woodland	37.1	0.9
Old Field Red Cedar Forest	7.2	0.2
Maritime Post Oak Forest	0.7	< 0.1
Shrubland		11.3%
Northern Dune Shrubland	450.2	11.0
Maritime Vine Dune	8.4	0.2
Northern Sandplain Grassland	4.0	0.1
Marsh		29.2%
Low Salt Marsh	432.4	10.6
High Salt Marsh	419.8	10.3
Reedgrass Marsh	338.0	8.3
Swamp		2.2%
Highbush Blueberry Shrub Swamp	78.8	1.9
Acidic Red Maple Basin Swamp Forest	12.8	0.3
Cultivated Pasture	47.0	1.2%

Six species of rare plants have been found at Fire Island National Seashore. These species are associated with upland and wetland vegetative community types. A list of these species, their preferred habitats, and listing/ranking is provided in Table 3-2.

► SPECIAL STATUS SPECIES

The NPS surveys state and federally listed plants within Fire Island annually, as feasible. As identified in Table 3-2, the 2012 survey included documentation of 26 seabeach amaranth plants and 50 seabeach knotweed (*Polygonum*

glaucum) plants. Both populations have been in decline since 2003 (Trocki 2008). Data accumulated since 2008 indicate that the populations of these species have fluctuated around an average since 2006.

Listed Plant	Federal Listing	State Listing	Global Rank	State Rank	Habitat Preference and Location on FIIS
Seabeach amaranth (<i>Amaranthus pumilus</i>)	T	E	G2	S2	Unvegetated, lower foredunes and beaches.
Seabeach knotweed (<i>Polygonum glaucum</i>)	-	R	G3	S3	Sandy beaches and dunes.
Swamp sunflower (<i>Helianthus angustifolius</i>)	-	T	G5	S2	Freshwater wetlands. Four small populations discovered in maritime freshwater interdunal swale habitat.
Slender marsh pink (<i>Sabatia campanulata</i>)	-	E	G5	S1	Freshwater marsh and interdunal swales. Single population of plants discovered on Fire Island in maritime freshwater interdunal swale habitat.
Rough rush-grass (<i>Sporobolus clandestinus</i>)	-	E	G5	S1	Drier swales of maritime dunes found near the Fire Island Lighthouse.
Dark-green sedge (<i>Carex vanusta</i>)	-	E	G4	S1	Wet meadows, salt marshes, swamps or other wetland habitats near the coast. Single location in New York State along the upper salt marsh at the William Floyd Estate.
Marsh straw sedge (<i>Carex hormathodes</i>)	-	T	G4 G5	S2	Dry or wet coastal forests; population discovered at the William Floyd Estate.
Golden dock (<i>Rumex fueginus</i>)	-	E	G4 G5	S1	Coastal wetlands near Point o' Woods
Narrow-leaf sea- blite (<i>Suaeda linearis</i>)	-	E	G5	S1	Fire Island Wilderness and Watch Hill saltmarsh
Spring ladies'-tresses (<i>Spiranthes vernalis</i>)	-				Northern interdunal cranberry swale; 2 populations found near Fire Island Lighthouse
Listings E: Endangered; T: Threatened; R: Rare					
Ranks S1: Critically imperiled/especially vulnerable to extinction; G2/S2: Imperiled due to rarity/vulnerable to extinction; G3/S3: Uncommon or local; G4: Apparently secure; G5: Demonstrably secure					

The New York Natural Heritage Program cites 15 rare ecological community types in Fire Island National Seashore. These systems are related to coastal and barrier island ecosystems, and although they are relatively

common on Fire Island, they are not found in other parts of New York State. Table 3-3 provides a summary of these rare community types (Klopfer et al. 2002, Trocki 2008).

Community Type	Global Rank	State Rank	Location on FIIS
Maritime Beach	G5	S3/S4	Unstable sand shores above mean high tide
Maritime Dunes	G4	S3	Comprises a variety of dunal communities to include others listed below. Majority of maritime dunes are occupied by beach grasses such as <i>Ammophila breviligulata</i> .
Beach Heather Dune	G2/G3	S1	Stabilized backdunes on Fire Island.
Maritime Heathland	G3	S1	Stabilized backdunes on Fire Island
Overwash Dune Grassland	G2/G3	No listing	Overwash areas within the wilderness
Northern Sandplain Grassland	G2	No listing	Interior portion of the wilderness and an area southwest of cemetery at WFE.
Maritime Grassland	G2/G3	S1	Part of Maritime Dunes complex found along the seashore of Fire Island
Maritime Deciduous Scrub Forest	G2/G3	No listing	Scrub community influenced by salt spray found behind the primary dunes on Fire Island
Salt Scrub Community	G5	S4	Landward edges of salt marshes on the bay side of Fire Island
High Salt Marsh	G5	S3/S4	Found between Low Marsh and high tide on the bay side of Fire Island and at the WFE
Salt Panne	G5	S3	Small, shallow depressions within the high salt marsh.
Pitch Pine Dune Woodland	G2/G3	S1	Sand dunes adjacent to shrubland or salt marsh on Fire Island.
Maritime Post Oak Forest	G3	S2	Sandy banks off of Moriches Bay on the WFE
Maritime Holly Forest	G1/G2	S1	Secondary dunes on the bay side near Sailors Haven Visitors Center on Fire Island, also known as "Sunken Forest"
Northern Interdunal Cranberry Swales	G2	No listing	Characterized as a Maritime Dune Wetland found in small seasonally flooded depressions and swales behind the primary dunes on Fire Island.
Maritime Freshwater Interdunal Swales	G3/G4	S2	Low-lying depressions behind the foredunes on Fire Island.
Ranks S1: Critically imperiled/especially vulnerable to extinction; G2/S2: Imperiled due to rarity/vulnerable to extinction; G3/S3: Uncommon or local; G4: Apparently secure; G5 Demonstrably secure			

► NON-NATIVE INVASIVE PLANTS

Non-native invasive species are common throughout the Fire Island communities and on federal lands within Fire Island National Seashore. The abundance and spread of non-native invasive species are generally associated with human-related disturbances and escaped horticultural plantings with the capacity to tolerate dry, sandy conditions and salt spray. Historically, human-induced alterations on the William Floyd Estate (timbering, agriculture, horticulture) have made this property particularly vulnerable to the spread of non-native invasive plants. An invasive species inventory was performed at the Seashore in 2002 (Schwager 2002), followed by continued survey work undertaken as part of an Integrated Pest Management Plan. Based on the 2002 survey, invasive species common to the Seashore are predominantly non-native and include autumn olive (*Eleagnus umbellata*), spotted knapweed (*Centaurea maculosa*), Japanese honeysuckle (*Lonicera japonica*), bamboo spp. (*Phyllostachys sp.*), Japanese knotweed (*Polygonum cuspidatum*), multiflora rose (*Rosa multiflora*), Oriental bittersweet (*Celastrus orbiculatus*), garlic mustard (*Alliaria petiolata*), Japanese barberry (*Berberis thunbergii*), and mugwort (*Artemisia vulgaris*). Three of the most widespread invasive plants are present in such abundance and density to have been given their own vegetative association classification by Klopfer et al. et al. (2002). These include common reed (*Phragmites australis*), Japanese black pine (*Pinus thunbergii*), and black locust (*Robinia pseudoacacia*). The reedgrass marsh habitat type is prolific across the park, making it the sixth most common habitat type (Klopfer et al. 2002). The plant species identified in these surveys are listed in Table 3-4. Of this list, black locust is the only native species that likely originated from the Appalachians and/or mid-west (Klopfer et al. 2002).

TABLE 3-4: INVASIVE PLANT SPECIES AT FIRE ISLAND NATIONAL SEASHORE (2007)

Common Name	Scientific Name
Autumn olive	<i>Eleagnus umbellata</i>
Black locust	<i>Robinia pseudoacacia</i>
Chinese lespedeza	<i>Lespedeza cuneata</i>
Chinese/ Japanese wisteria	<i>Wisteria spp.</i>
Common mullein	<i>Verbascum thapsus</i>
Common reed	<i>Phragmites australis</i>
Garlic mustard	<i>Alliaria petiolata</i>
Japanese barberry	<i>Berberis thunbergii</i>
Japanese black pine	<i>Pinus thunbergiana</i>
Japanese honeysuckle	<i>Lonicera japonica</i>
Japanese knotweed	<i>Polygonum cuspidatum</i>
Mugwort	<i>Artemisia vulgaris</i>
Multiflora rose	<i>Rosa multiflora</i>
Norway maple	<i>Acer platanoides</i>
Oriental bittersweet	<i>Celastrus orbiculatus</i>
Spotted knotweed	<i>Centaurea maculosa</i>

► FIRE MANAGEMENT

Historical occurrences and frequency of wildland fires within the Seashore are not well documented, and biological influences caused by fire are relatively unknown. The combination of volatile plant biomass, dense vegetative communities, coastal winds, droughty soils, areas of densely populated wood structures, and the general lack of road access make fire suppression on Fire Island difficult. Since 1974 fires on federal lands have been recorded by Seashore staff. In general, fires in the Seashore have been small brush fires that have been easily contained. On average, one of these fires occurs within the Seashore annually, all of which have been of anthropogenic origin.

NPS Directors Order (DO-18) “Wildlife Fire Management” provides guidance related to wildland fire. Specifically, DO-18 (NPS 2002d) requires that all parks with vegetation capable of sustaining fire develop a fire management plan (FMP). Pursuant to NPS policies, in 2010, the Seashore updated its FMP. The FMP considers overall park management objectives, the beneficial use of prescribed fire, the suppression of wildfire, fuel hazards,

and restoration. The potential influence of climate change on wildland fire at Fire Island National Seashore has not been evaluated.

Wildlife and Wildlife Habitat

Fire Island National Seashore encompasses a mosaic of habitats fragmented among intensively developed areas of the Fire Island. The ocean, bay, beaches, dunes, estuaries, tidal mudflats, scrub, and forested areas found on Fire Island and at the William Floyd Estate provide habitat for diverse populations of marine and terrestrial wildlife species. These species, as well as special-status species and species that require special management at the Seashore are described later in this section.

The Seashore is one of the few national parks that allows public hunting. Hunting is permitted on Fire Island only with a permit issued by Seashore staff for a fee. No hunting is allowed at the William Floyd Estate. Hunting and fishing seasons and limits are established and regulated by the New York Department of Environmental Conservation (NY DEC). NPS park rangers have the policing authority to enforce state hunting and fishing laws within the Seashore. In 2011, a total of 65 hunting permits were issued, and 78 permits were issued in 2012. The majority of these permits were issued for the East District of the Fire Island associated with water fowl hunting near the wilderness.

Hunting, fishing, and shellfishing are important recreational pastimes in the local area and at the Seashore. “Party” boats, charter boats, and private vessels provide recreational fishing on the Great South Bay near Fire Island National Seashore (NPS 2009b). Surf and jetty fishing is the most common form of fishing on the ocean side of Fire Island. Although a recreational marine fishing license is not required by the State of New York to surf fish and fish in the Great South Bay, NYS requires that anglers register with the no-fee recreational marine fishing registry and be aware of fishing seasons and catch limits established by the State. Anglers are encouraged to voluntarily report their catch in the State’s on-line angler logbook. No fishing is allowed within NPS-maintained marinas or designated lifeguard beach swimming areas.

NYS receives minimal data from those permitted to recreationally hunt and/or fish within the Seashore, and no data are available on the overall effects to local fish and game populations. In the absence of relevant information, it is unclear whether summer time recreational fishing

poses a serious threat to the fisheries resources within the Seashore. Some populations, like winter flounder, are known to be in long-term decline (NPS 2009b).

Although commercial fishing is not specifically provided for at Fire Island National Seashore, shellfish populations in and around the Seashore appear to have been notably affected by commercial fishing. The Great South Bay was once a premier harvesting center for commercial shellfish. Important commercial shellfish species included hard clams, oysters (*Crassostrea virginica*), bay scallops (*Argopecten irradians*), and blue crabs (*Callinectes sapidus*) (NPS 2009b). Today, the shellfish harvest has dramatically declined, possibly due to a combination of overharvesting and a decline in water quality. This decline appears to have started in the late 1940s and early 1950s, although an exact timeframe has not been determined. For instance, hard clam harvest in the Great South Bay was estimated to exceed 11 million pounds in 1947. This harvest declined to less than 2.2 million pounds in 1954, and by 2003, the harvest was estimated at 88,000 pounds. The estimated harvest originating from Seashore waters is unknown.

The Nature Conservancy (TNC) is the principal sponsor supporting ongoing shellfish restoration within a portion of Great South Bay. TNC currently owns approximately 21 square miles of bay bottomland between the Long Island shoreline near Sayville south to Fire Island from Ocean Beach to Talisman. Approximately one-sixth of the TNC property falls within the Seashore boundary. No public shellfishing is permitted within the TNC property.

► MAMMALS

Nineteen species of marine mammals have been recorded within the boundaries of the Seashore. Identified species include whales, porpoises, dolphins, and seals. The harbor seal (*Phoca vitulina*) is a regular winter visitor at both the Fire Island and Moriches Inlets. Three species of endangered whales have been reported in the waters offshore of Fire Island: fin whale (*Balaenoptera physalus*), humpback whale (*Megaptera novaeangliae*), and northern right whale (*Eubalaena glacialis*) (Trocki 2008).

In 1974, 17 species of terrestrial mammals were recorded at Fire Island National Seashore. Published reports documenting species ranges (Whitaker and Hamilton 1998) reviewed in combination with the Seashore’s species list from the 1970s identified 28 species of mammals likely to occur within Fire Island National Seashore. Species common to the Seashore,

including the William Floyd Estate, include white-tailed deer (*Odocoileus virginianus*), eastern cottontail rabbit (*Sylvilagus floridanus*), red fox (*Vulpes vulpes*), white-footed mouse (*Peromyscus leucopus*), meadow vole (*Microtus pennsylvanicus*), raccoon (*Procyon lotor*), Norway rat (*Rattus norvegicus*), eastern gray squirrel (*Sciurus carolinensis*), muskrat (*Ondatra zibethicus*), shrew (*Sorex cinereus*, *Blarina brevicauda*), weasel (*Mustela spp.*), mink (*Neovison vison*), and a variety of bats (*Myotis spp.*, *Lasiurus spp.*, and others). A separate discussion on white-tailed deer is provided below.

► REPTILES AND AMPHIBIANS

In 2002 and 2003, reptiles and amphibians were surveyed on Fire Island in various habitat types. A total of 12 species were identified: 2 migrant and 10 residents. The resident species represented 90% of species that were believed to occur on Fire Island based on historical records. The resident species consisted of three anurans: Fowler's toad (*Bufo fowleri*), southern leopard frog (*Rana sphenoccephala*), and the American bullfrog (*Rana catesbiana*), a recent arrival; five turtles: snapping turtle (*Chelydra serpentina*), Eastern mud turtle (*Kinosternons subrubrum*), Eastern box turtle (*Terrapene c. Carolina*), spotted turtle (*Clemmys guttata*), and Northern diamond-backed terrapin (*Malaclemys t. terrapin*); and three snakes: Northern black racer (Coluber constrictor), Eastern garter snake (*Thamnophis s. sirtalis*), and Eastern hog-nosed snake (*Heterodon platirhinos*). The mud turtle is listed as endangered by New York State, and the box turtle, spotted turtle, and hognose snake are of Special Concern (NYDEC 2000). The most common species on Fire Island are the Northern black racer, Fowler's toad, and box turtle.

The two migrant species, the loggerhead sea turtle (*Caretta caretta*) (NY and federally Threatened), and leatherback sea turtle (*Dermochelys coriacea*) (NY and federally Endangered), were found washed up dead on the beach. Five species of sea turtles have been documented within the waters off of Long Island during the warm summer months although none have been found to nest on local beaches. These species include the loggerhead sea turtle (*Caretta caretta*), green sea turtle (*Chelonia mydas*), leatherback sea turtle, hawksbill sea turtle (*Eretmochelys imbricate*), and Kemp's Ridley sea turtle (*Lepidochelys kempii*). All five turtle species are designated on both federal and state lists as protected threatened and endangered species.

In 2002 a similar survey conducted at the William Floyd Estate found 11 reptiles and amphibians representing 46 percent of historically occurring species. This included two salamanders: the four-toed salamander (*Hemidactylium scutatum*) and the Eastern red-backed salamander (*Plethodon cinereus*); one anuran: spring peeper (*Pseudacris crucifer*); four turtles: snapping turtle, painted turtle (*Chrysemys picta*), Eastern box turtle, and Northern diamond-backed terrapin; and four snakes: Eastern garter snake, Northern brown snake (*Storeria dekayi*), Northern black racer, and Eastern milk snake (*Lampropeltis triangulum*). At the William Floyd Estate the Eastern box turtle is a State-listed species of Special Concern (NYDEC 2000). In addition, population trends are showing declines for many species that were once common, such as the Northern black racer and Eastern milk snake. The most common species at the William Floyd Estate are the Eastern box turtle and the Eastern garter snake.

► BIRDS

Habitats within the Fire Island National Seashore are important refuge for a wide variety of migratory and resident birds. A total of 333 avian species have been observed within the Seashore; 67 have been documented to breed within the Seashore (Mitra and Putnam 1999, Trocki 2008). The Seashore is within the Atlantic Flyway, a major North American migratory bird route that spans the northern habitats of the Arctic islands, coastal Greenland, and Canada to as far south as Jamaica and South America (Bird and Nature 2009). The Seashore



provides a resting and feeding area for migratory birds traveling this route.

Tidal marshes and mudflats provide habitat for thousands of migratory birds, such as dowitcher (*Limnodromus spp.*) and plovers (*Pluvialis spp.*, *Charadrius spp.*). Many species of sandpipers (*Calidris spp.*) occur, including sanderling (*Calidris spp.*), dunlin (*Calidris alpina*), and the severely declining red knot (*Calidris canutus*) (Trocki 2008). Birds that breed in or near Fire Island's saltmarshes include American Black Duck (*Anas rubripes*), clapper rail (*Rallus longirostris*), and willet (*Catoptrophorus semipalmatus*) (Mitra and Putnam 1999; Niedowski 2000). Seaside sparrow (*Ammodramus maritimus*) and sharp-tailed sparrow (*Ammodramus caudacutus*) nest directly in the saltmarsh. Red-winged blackbirds (*Agelaius phoeniceus*) commonly nest in the taller shrubs along the upper saltmarsh margin. Other birds often seen and heard in the saltmarsh include barn and tree swallows (*Hirundo rustica*, *Tachycineta bicolor*), gray catbird (*Dumetella carolinensis*), and common yellowthroat (*Geothlypis trichas*). In addition to those that nest in saltmarshes, numerous other birds utilize this habitat as a food source (e.g., cordgrass, insects, invertebrates, small fishes, etc.) such as glossy ibis (*Plegadis facinellus*), great egret (*Ardea alba*), green heron (*Butorides striatus*), laughing gull (*Larus atricilla*), snowy egret (*Egretta thula*), and terns (*Sterna spp.*).

Fire Island National Seashore also is a valuable habitat source for wintering and nesting waterfowl. During the winter, tidal creeks and the bay are frequently used by a wide variety of migrating diving ducks such as the greater scaup (*Aythya marila*) and common goldeneye (*Bucephala clangula*). The Seashore serves as wintering habitat for common loons (*Gavia immer*), red-breasted mergansers (*Mergus serrator*), black duck (*Anas rubripes*), bufflehead (*Bucephala albeola*), brant (*Branta bernicla*), and Canada geese (*Branta Canadensis*) as well as a variety of scoters (*Melanitta, spp.*) and cormorants (*Phalacrocorax spp.*).

Open-water ponds at the William Floyd Estate, created decades ago for waterfowl hunting, provide refuge for waterfowl during harsh winter weather. These areas are also used by geese (*Chen caerulescens*, *Branta canadensis*) and dabbling ducks such as the mallard (*Anas platyrhynchos*), black duck, American widgeon (*Anas Americana*), and green-winged teal (*Anas crecca*), some of which nest at the ponds.

Dense shrub thickets and forests within the back dunes and swales within the Seashore are home to several songbirds such as the song sparrow (*Melospiza melodia*), gray catbird, brown thrasher (*Toxostoma rufum*), mourning dove (*Zenaida macroura*), northern cardinal (*Cardinalis cardinalis*), northern mockingbird (*Mimus polyglottos*), redwing blackbird (*Agelaius phoeniceus*), and eastern towhee (*Pipilo erythrophthalmus*). White-throated sparrow (*Zonotrichia albicollis*) and yellow rumped warbler (*Dendroica coronate*) are occasionally found during the winter. (Trocki 2008).

Migrating and wintering birds of prey also are inhabitants of Fire Island National Seashore. The northern harrier (*Circus cyaneus*) and American osprey (*Pandion haliaetus*) may use marsh habitats on the island for nesting, while short-eared owls (*Asio flammeus*), long-eared owls (*Asio otus*), and snowy owls (*Nyctea scandiaca*) are occasional winter inhabitants. Other birds of prey using the park may include the red-tailed hawk (*Buteo jamaicensis*) and the bald eagle (*Haliaeetus leucocephalus*) (Trocki 2008). Fire Island is one of the best-known hawk migration areas on the Eastern seaboard. Peregrine falcons (*Falco peregrinus*), merlins (*Falco coumbarius*), Cooper's hawks (*Accipiter cooperii*), sharpshinned hawks (*Accipiter striatus*), harriers (*Circus spp.*), and short-eared owls (*Asio flammeus*) also winter on Fire Island.

► SPECIAL STATUS SPECIES

Fire Island National Seashore is used by an array of special-status species including birds, reptiles, insects, and marine animals (Trocki 2008). Listed species can be found in Table 3-5. Federal- and state-listed species include the Piping Plover (*Charadrius melodus*), the roseate tern (*Sterna dougallii*), the least tern (*Sterna antillarum*), and the common tern (*Sterna hirundo*). All four are shorebirds that rely on maritime beach and dunes for nesting between March and July. Birds have been found to nest at differing locations from year to year, but the Fire Island Wilderness and several of the bay islands appear to be the most popular nesting sites. Each year, nest sites on Fire Island are partitioned with posted signs and fencing to prohibit visitors from entering.

Seashore staff perform annual surveys of nesting piping plovers and least terns on Fire Island beaches, and annual surveys of other nesting colonial waterbirds throughout all Fire Island beaches and bay islands in cooperation with NYS DEC's Long Island Colonial Waterbird Survey. NPS began monitoring Piping Plover in 1993. From 1993 to 2012 there have been from one to 25 breeding pairs that have fledged from 0 to 25 chicks. In 2012, 12 nesting pairs of Piping Plover were recorded in the Seashore. Storm overwash, predation, and abandonment have all been factors in nest failures in the years since surveys began.

The eastern mud turtle (*Kinosternon subrubrum*), listed as State endangered, is one of the rarest turtle species in New York, which is the northern extent of its range. Only five populations are known to exist on Long

Island (NYNHP, Trocki 2008). Eastern mud turtles have been observed within Watch Hill and the wilderness area on Fire Island.

Two state-listed bird species within Fire Island National Seashore are classified as species of special concern and include the black skimmer (*Rynchops niger*) and the seaside sparrow (*Ammodramus maritimus*). The black skimmer is a colonial nesting water bird that has nested on Fire Island's bay islands and other beach habitats on Fire Island. It relies on the tidal creeks and estuaries for foraging. The seaside sparrow exclusively relies on the brackish marsh for nesting and foraging habitat found on the bay side of Fire Island, bay islands, and at the Floyd Estate.

Community or Species Name	Federal Listing	NY State Listing	Global Rank	State Rank
Northern Right Whale (<i>Eubalaena glacialis</i>)	E	E	G1	SNA
Fin Whale (<i>Balaenoptera physalus</i>)	E	E	G3G4	S1
Humpback Whale (<i>Megaptera novaeangliae</i>)	E	E	G4	SNA
Great Egret (<i>Ardea alba</i>)			G5	S2
Snowy Egret (<i>Egretta thula</i>)			G5	S2S3
Northern Harrier (<i>Circus cyaneus</i>)		T	G5	S3B/ S3N
American Osprey (<i>Pandion haliaetus</i>)		SC	G5	S4B
Piping Plover (<i>Charadrius melodus</i>)	T	E	G3	S3
Roseate Tern (<i>Sterna dougallii</i>)	E	E	G4	S1
Common Tern (<i>Sterna hirundo</i>)		T	G5	S3
Least Tern (<i>Sterna antillarum</i>)		T	G4	S3
Black Skimmer (<i>Rynchops niger</i>)		SC	G5	S2
Short-eared Owl (<i>Asio flammeus</i>)		E	G5	S2
Seaside Sparrow (<i>Ammodramus maritimus</i>)		SC	G4	S2S3
Loggerhead (<i>Caretta caretta</i>)	T	T	G3	S1N
Green Turtle (<i>Chelonia mydas</i>)	T	T	G3	S1N
Hawksbill Sea Turtle (<i>Eretmochelys imbricata</i>)	E	E	G3	SNA
Leatherback (<i>Demochelys coriacea</i>)	E	E	G2	S1N
Eastern Mud Turtle (<i>Kinosternon subrubrum</i>)		E	G5	S1
Federal / NYS Listing E: endangered; T: threatened; R: rare; SC: species of concern (NYS only)				
Global / State Ranks G5: demonstrably secure; G4/S4: apparently secure; G3/S3: uncommon or local; G2/S2: imperiled due to rarity / vulnerable to extinction; G1/S1: critically imperiled / especially vulnerable to extinction; SNA: a visitor to the state but not a regular occupant, or a species that is predicted to occur in NY but that has not been found; N: indicated migratory status of a migratory species when it is not breeding in NY. Source: Trocki 2008 and New York Natural Heritage Program 2007				

► MOSQUITOES

Fire Island National Seashore is rich with moist and wet habitats conducive to the breeding habits of approximately 25 species of mosquitoes. In the 1960s when the Seashore was first established, management objectives for Fire Island National Seashore dismissed pesticide control of mosquitoes as a nuisance species for fear of harming the local ecology. With the discovery of mosquito-borne diseases, such as West Nile Virus, Eastern Equine Encephalitis Virus, and Cache Valley Virus, Seashore staff recognized a greater need to monitor park mosquito populations, manage natural processes within the Seashore, and assist in the protection of visitor and resident health. In response, the NPS teamed with Suffolk County Vector Control to address mosquito-borne disease risks through the creation of a mosquito surveillance and management program first implemented in 1998. This program, still in effect, is implemented annually through the Seashore's Mosquito Action Plan and Surveillance Protocols (Protocols). The Seashore uses three levels of management actions to address mosquito-related health threats under different scenarios: 1. surveillance and education; 2. moderate disease risk; and 3. high disease risk. The NPS is collaborating with Suffolk County to develop protocols that define all aspects of mosquito control on all Seashore lands.

Surveillance is performed annually throughout various sections of the Seashore using carbon dioxide-baited light traps and gravid traps. These traps are designed to capture host-seeking and egg-bearing females to evaluate trends in mosquito population numbers and to measure the percentage of disease-carrying mosquitoes. The results of the surveillance program are then used to formulate the protocols. The Seashore summarizes the findings and actions taken to protect the visitors from mosquito-borne diseases in annual reports. Every year between 1998 and 2012 (except for the years 2007 and 2011) West Nile Virus was isolated from mosquitoes captured through the Seashore's mosquito surveillance program within the park boundaries. Additionally, the Cache Valley Virus was discovered in 2003 at Watch Hill.



► TICKS

Fire Island is host to several tick species including the lone star tick (*Amblyomma americanum*), the American dog tick (*Dermacentor variabilis*), and the deer tick (*Ixodes scapularis*) (also known as the black-legged tick). Ticks occur in high numbers across the Seashore and are a particular concern as vectors of bacterial diseases to humans. Such diseases include anaplasmosis, ehrlichiosis, babesiosis, Rocky Mountain spotted fever, and Lyme disease (CDC 2010).

The tick most common at the Seashore is the lone star tick, which has been shown to carry ehrlichiosis and possibly other diseases. Deer ticks have been identified as carriers for Lyme disease, anaplasmosis, and babesiosis. Ticks become carriers for diseases from the hosts they feed on. For example, the deer tick acquires the Lyme disease pathogen, *Borrelia burgdorferi*, primarily from the white-footed mouse (*Peromyscus leucopus*) and other small mammals. White-tailed deer do not carry the Lyme disease pathogen but serve as an important host for all tick lifestages, especially the adult stage, helping to perpetuate the tick population.

In addition to hosts, the habitat and climatic conditions are important for tick survival. On Fire Island, deer ticks have been found in higher numbers within deciduous and coniferous wooded habitats where relative humidity is higher compared to open habitats (Ginsberg and Zhioua 1996). Lone star ticks are common in most habitat types and can tolerate more open habitats unlike deer ticks. In a study in 1996, *B. burgdorferi* was isolated from one-third of adult deer ticks collected from Fire Island (Ecohealth, Inc. 1998). Since then, other diseases like ehrlichiosis have also been documented. The threat of these diseases has affected levels of visitation, particularly at the William Floyd Estate.

CULTURAL RESOURCES

Cultural Landscapes

Since prehistory, Fire Island and southern Long Island have been the scene of human use and occupation. During the entire course of human use and occupation of Fire Island, the natural landscape has been altered or manipulated through natural events and human activity.

The present landform known as Fire Island represents a stabilized landform dating back no earlier than 8,000 B.P. (before present). By 8,000 years ago, known archaeologically as the Archaic era, Fire Island was characterized by much the same landscape as today. The inhabitants of the island were moving between it and Long Island, exploiting the resources of the bay, Fire Island, and the Atlantic Ocean, similar to the hunters and fisherman in the recent historic period.

The pattern of resource exploitation on both Fire Island and the bays, with its emphasis on fishing, hunting, and limited agriculture continued uninterrupted for the next 8,000 years. The Native Americans were effectively displaced by the English colonists during the Colonial period; other European groups vied for fishing grounds in the bay and further off-shore; shellfish harvesters sought clams and other shellfish in the tidal estuaries; and stockman grazed cattle on the marshes of Fire Island. As agricultural activity decreased throughout the Long Island area, the need for some of the agricultural products or by-products of Fire Island was reduced.

Beginning in the early 1800s, various structures including huts, a fish processing factory, homes, hotels, docks, boardwalks, and inns were erected on Fire Island. In 1827, a federal lighthouse was erected on the west end of Fire Island near the Fire Island Inlet. Later, the U.S. Life-Saving Service built station houses along the length of Fire Island to assist mariners. During the summer months, the family of the station crews would live in small cabins built on these reservations.

One of the first established communities on Fire Island was Point o' Woods, established by the Chautauqua Assembly circa 1898. Other communities were established in the late 1800s and early 1900s. The largest growth in communities and population followed World War II. The number of separate communities on Fire Island eventually stabilized with the current 17 communities. However, a number of other communities ceased to exist. Fire Island's landscape still bears the evidence of their existence.

Fire Island today hosts the Robert Moses State Park (initially named Fire Island State Park, established in 1908) and Fire Island National Seashore (established in 1964), which has within its boundary Smith Point County Park, three municipal beaches, and the 17 distinct pre-existing residential communities.

► FIRE ISLAND LIGHT STATION

The NPS completed the Cultural Landscapes Inventory (CLI) for the Fire Island Light Station in 2004. In 1981, the Light Station was listed in the National Register of Historic Places (NRHP). The 2004 CLI identified an expanded Light Station tract, comprising approximately 244 acres and 13 buildings, structures, and other character-defining features, including historic sand trails that contribute to the significance of the property as a cultural landscape eligible for listing on the National Register. The CLI also recommended that the tract be listed as a historic district, and that the period of significance for the cultural landscape be expanded to include the years 1826 through 1960. The NY State Historic Preservation Officer (SHPO) concurred with the CLI in 2005.

At this time, the NPS has completed an amendment to the National Register Nomination for the Light Station. The amendment was reviewed and the NY SHPO concurred with the determination of the NPS. The boundary increase for the Fire Island Light Station Historic District was listed in the NRHP on January 29, 2010.

From the construction of the first Lighthouse in 1826 through the decommissioning of the Light Station in 1973, the use of this site was continuously associated with and supportive of maritime navigation and communications. Other land use on the site varied over time, both before and during the maritime navigation period,



including agricultural use up to the mid-19th century, and commercial and recreational use from the mid-19th century until the late 1930s.

The Fire Island Light Station tract is bounded on the north by Great South Bay, on the east by the community of Kismet, on the south by the Atlantic Ocean, and on the west by Robert Moses State Park. This tract includes the Lighthouse Station proper and its associated structures and the U.S. Coast Guard Annex, part of the original Radio Compass Station. The landscape of the tract may be characterized as a combination of thicket, dune, and beach. Vegetation on the site is a mixture of trees, shrubs, and grasslands that are adapted to survive in the wind and salt spray of the local environment. A few clusters of low-growing trees are near the buildings on the site, while shrubs are more extensive, spreading along the thicket and dune zones, where they are interspersed with grasslands.

Historically, the tract's spatial organization and circulation were oriented to water access via the shoreline and the Great South Bay, where boat docking was feasible. These water transportation facilities were improved with piers in the mid- to late-19th century, when the tract included a popular hotel. Regarding other modes of circulation on the property, the use of boardwalks is documented as early as 1827, and more recent boardwalks continue to be used today. By 1895, a short rail line was constructed to facilitate material movement to the Light Station and Radio Compass Station from the shoreline and from piers along the bay. The rail line and piers were gradually supplanted in the 20th century by the Burma Road, which enabled automobile traffic to circulate on Fire Island. Other circulation is provided by historic and modern sand paths.

► WILLIAM FLOYD ESTATE

The NPS completed the CLI for the William Floyd Estate in 1998 and revised the inventory in 2006.

In 1980, the William Floyd Estate, comprising a 613-acre tract, including the 34.5-acre historic core encompassing the Old Mastic House, the Floyd Family cemetery and 12 agricultural buildings was listed in the NRHP. Also included in the nomination are the museum collections associated with the Estate. Based on the 2006 CLI inventory, the New York SHPO concurred with NPS findings that the period of significance for the property ended in 1975. Two additional resources, the windmill and the cistern/wells, were determined eligible for the NRHP in 1996.

The northern boundary of the William Floyd Estate runs parallel to and between 50 and 100 yards south of Washington Avenue. The property is additionally bounded by Home Creek on the east, Narrow Bay on the south, and Lawrence Creek on the west. This property includes the Old Mastic House and its associated structures and landscape features. In general, the landscape may be characterized as a series of mowed fields and woods, (historically maintained for the hunting of wildlife, though presently not used for this purpose), man-made ponds, freshwater creeks, and extensive saltmarsh. An open vista, or view, from the Old Mastic House to the bay has been maintained.

Historically, the Estate's spatial organization and circulation were oriented to water access via Home Creek, O'Dell's Creek (now known as Lawrence Creek), and Narrow Bay. From 1724 on, as the Estate developed as an agricultural plantation, internal circulation came to include a network of dirt roads and paths. Later, as carriages, trains, and automobiles became dominant modes of transportation, the Estate's circulation patterns were reoriented from water-based access to the external system of roads and highways that were emerging on Long Island. Important character-defining features were developed on the property, such as the Great Ditch, which was constructed to keep cattle from straying into the marshes. More aesthetic elements like the ornamental lawn, the rough-cut known as the Pightle, and the Vista to Narrow Bay, were set in an area closer to the main house where they might be enjoyed as amenities. Other features associated with the plantation, such as agricultural outbuildings and a system of trails, roads, and fences, were placed as required for use of the property. Features that began as functional elements but later acquired picturesque associations, such as the Lopped Tree Line that delineated fields, are sited where their original purpose dictated their location.

Historic Structures

There are 41 structures and features listed on the Seashore's List of Classified Structures (LCS): 26 are LCS records for the William Floyd Estate and 15 are for the Fire Island Light Station. The LCS is an evaluated inventory of all historic and prehistoric structures that have historical, architectural and/or engineering significance within the parks of the National Park System. At this time, the structures associated with the Carrington Estate are not included on the LCS. These structures will be included in the next LCS update.

► FIRE ISLAND LIGHT STATION

The most prominent of the tract's historic structures are the Fire Island Lighthouse and the Keepers Quarters, which were completed in 1858 and 1859, respectively. These structures are built on a 15-foot-tall bluestone terrace whose materials were salvaged from the original 1825-1826 lighthouse and keeper's house, which was demolished to build the current structures on the site.

The extant Lighthouse is a 164-foot conical tower constructed of brick with a hyperbolic curved profile and a cylindrical shape near its top. The upper portion features a granite cornice and an iron-railed projecting gallery. Since 1891, the tower has been painted with four alternating black and white bands, which were kept in the same configuration when the tower was coated in reinforced concrete in 1912. The Keepers Quarters is a two-story rough-coursed granite building whose roof is a combination of a gable and a hip roof.

There are 13 historic buildings or structures within two clusters (the Light Station and the Radio Compass Station) on the Light Station tract. Core buildings and structures for the Light Station cluster include the historic Lighthouse, Keepers Quarters, Terrace, and Boat House (1939). Missing from the Light Station cluster are the coal/oil house, wharf, storehouse, and power generation plant.

The Radio Compass Station cluster is primarily comprised of the historic Lighthouse Annex Building (1906). This two-story structure with a hip roof (which has been enlarged twice) was originally built as a one-story dwelling. In addition to the Lighthouse Annex Building, there are several contributing buildings and structures including the Lighthouse Annex Garage, Tool House, Oil House, Store House, and the remains of the wireless station's Engine House and Battery House Foundation. Several historic buildings and structures within the Radio Compass Station cluster have been lost, including the engine house, radio towers, and the Chief Officer's residence. Visible concrete foundations and guy wire remnants mark the site of two large radio towers that were demolished in 1937.

The Fresnel Lens Building, an exhibit space, was constructed just west of the Lighthouse in 2010. It was designed to be evocative of the historic power-generation plant referenced above. It houses the first-order Fresnel lens that was installed at the top of the lighthouse, but eventually replaced with more modern and efficient lighting.

► WILLIAM FLOYD ESTATE

Chief among the William Floyd Estate's historic structures is the Old Mastic House, which is a 25-room, two-story, white wood-frame structure built around 1724 with additions in the 18th, 19th, and 20th centuries. The house is an example of Georgian and Greek Revival architecture with Colonial Revival embellishments. The house has a fieldstone foundation and clapboarded walls, with shingles on the main block's exposed east wall.

North of Old Mastic House is a cluster of historic outbuildings that were used to manage the plantation, including the Caretaker's Workshop (circa 1920), Carriage House (1884), Wood Shed (19th Century, prior to 1911), Corn Crib (18th century), Ice House, Storage Crib (18th century), Old Shop (18th century), Barn (18th century), New Barn (1950s), Pump House (circa 1880), and Incinerator (circa 1940).

Southeast of the main house, Squirrel Lane leads along the forest edge to the Floyd Family cemetery. Surrounded by a white wooden fence, the 1-½-acre Floyd Family cemetery is L-shaped and has been the burial ground for 50 Floyd family members and two family servants. Adjacent to the Family cemetery are wooden cross markers for former slaves and servants of the family.

► CARRINGTON ESTATE

The Carrington Estate is located off the Burma Road on federal lands to the west of the residential community of Fire Island Pines. The estate was the property of Broadway producer Frank Carrington who hosted a number of stage, screen, and literary celebrities during his period of residence and consists of two structures. The main house was constructed in 1909 by Mr. Carrington's father and was sold to the National Park Service by Mr. Carrington in 1969. The adjoining cottage was originally part of a lifesaving station and was moved near the main house in 1947 for use as a guest house. The property was listed on the National Register of Historic Places in 2014. The NPS is currently collaborating with local historic preservation and conservation interests to rehabilitate the houses for future administrative use.

Archeological Resources

► TERRESTRIAL RESOURCES

Terrestrial archaeological resources are documented both within and adjacent to Fire Island National Seashore on Long Island and Fire Island. In general, the archaeological resources identified reflect the cultural sequence for southern New York. However, only historical archaeological resources have been formally recorded within the Seashore (Gray & Pape 2005). The reasons for the absence of prehistoric or early Contact Period Native American sites are unclear, but they may reflect the lack of systematic survey within the Seashore.

As of 2005, 14 archaeological sites had been inventoried within the park. Numerous “salvage” archeology projects have been conducted at the Fire Island Light Station and the Floyd Estate. These projects are associated with stabilization, preservation, and construction activities related to those resources. With the exception of probable archaeological loci associated with the Floyd Estate (ASMIS Site Number FIIS00001.00), all of the previously reported sites date to the 19th and 20th centuries. The Floyd Estate, dated between 1724 and 1976, contains various elements that likely have associated archaeological components. These include the main house and its associated support buildings.

Five of the sites (ASMIS Site Numbers FIIS00003.00, FIIS00004.00, FIIS00005.00, FIIS00006.00, and FIIS00014.00) represent remnants of U.S. Coast Guard stations or an element associated with the 1826 Fire Island Lighthouse. Two commercial property remains are also inventoried: Sites FIIS00010.00 (Razed Factory) and FIIS00013.00 (Casino Site). The so-called ‘Razed Factory’ originally functioned as a menhaden processing plant (Gray & Pape 2005:103-104). The Casino Site was the Saltaire Casino that began operation in 1911 and was dismantled sometime in the 1950s. The remaining six sites are middens, camp, or house remnants. The camp, Camp Cheerful, operated for two decades beginning in the 1920s as a recreational facility for disabled children. The archaeological remains identified to date are limited to surface artifacts.

► SUBMERGED RESOURCES

The Seashore includes off-shore components on both sides of Fire Island. There has been no systematic off-shore survey for submerged archaeological resources in the Seashore (Gray & Pape 2005:109-111). Following a review of sources, the Gray & Pape (2005) report noted

that from 1657 to 1985, 155 shipwrecks occurred between Fire Island Inlet and Moriches Inlet. As of their writing, none of the shipwrecks had been precisely mapped or systematically investigated.

Museum Collections

The museum collections for Fire Island National Seashore are housed at the William Floyd Estate in the Seashore’s Curatorial Storage Facility (constructed in 1996). The Seashore’s collections include over 25,000 historic objects, 40,000 archival objects, 24,000 archeological specimens and over 1,500 natural history specimens. Although the bulk of the collection is associated with Floyd Family, the collections include materials related to the Fire Island Light Station, the U.S. Life-Saving Service, the U.S. Coast Guard, various current and former Fire Island communities, local Long Island history, and the history and operation of the Seashore. The Curatorial Storage Facility was refurbished with new shelving in 2008. The facility, though small, is climate controlled with adequate lighting. It has limited space for conservation work and outside researchers.

OTIS PIKE FIRE ISLAND HIGH DUNE WILDERNESS

The Wilderness Act of 1964 established the National Wilderness Preservation System (NWPS), the system of all America’s wilderness, to “secure for the American people of present and future generations the benefits of an enduring resource of wilderness.” The purpose of the Act was to forever preserve the wildness of certain lands by restricting land-use activities. On December 20, 1980, Congress passed Public Law 95-585, which set aside 1,380 acres of the Fire Island National Seashore as wilderness in accordance with the Wilderness Act. The Otis Pike Fire Island High Dune Wilderness (Fire Island Wilderness) is the only federally designated wilderness in the state of New York and spans approximately eight miles along the barrier island between Smith Point County Park on the east and Watch Hill on the west. This wilderness is one of only a few barrier islands and oceanfront properties along the eastern seaboard designated as federal wilderness.

The wilderness exemplifies an undisturbed stretch of barrier island ecosystem characterized by relatively large primary dunes, interdunal swales of grasses and shrubs, freshwater wetlands, and tidal marshes, but does not include Fire Island beaches. A variety of mammals, reptiles, amphibians, insects, and birds inhabit the area.

The NPS prepared a Wilderness Management Plan in 1983 that outlined management goals and objectives, potential expansion areas, wilderness use, and permitted management activities (NPS 1983). Traditional day use of the wilderness is the primary form of visitor use, though hunting and overnight primitive camping is allowed via permits issued by the Seashore.

The Seashore limits camping permits in the following ways:

- A total of 36 people are permitted to camp on the beach or in the wilderness
- No more than 12 individuals in no larger than groups of 4 in the eastern zone
- No more than 24 individuals in no larger than groups of 8 in the western zone
- Camping on the beach is permitted annually from March 15 through Labor Day

Management activities conducted by Seashore staff on the wilderness are limited to the general maintenance and upkeep of existing boardwalks and signage for regulating visitors. Such uses are consistent with wilderness stewardship policies and practices. In accordance with the management plan, restrictions have been established to protect the wilderness from new roads, unauthorized dune crossings, motorized equipment, utility installations, and other human actions that could harm the natural integrity of the wilderness.

As detailed in the Visitor Use section of this chapter, the 1,800-square-foot Wilderness Visitors Center supports the NPS's seasonal programs, year-round, ranger-led tours and programs, wilderness camping, and recreational and permitted driving. It also provides restrooms, exhibits, unique views of the wilderness, and a venue for informal interpretive contacts.

ACCESS AND CIRCULATION

Fire Island National Seashore is parallel to the south side of central Long Island. Most of the Seashore's property is on Fire Island, although the William Floyd Estate, the Seashore's headquarters, primary maintenance facility, and the Patchogue-Watch Hill passenger ferry facility are located on Long Island.

There are no public roads on Fire Island, and most vehicular use is prohibited, particularly during summer months. Some residents and visitors access Fire Island by private boat, but most use the ferry system. Passenger

ferries provide access from Long Island to various destinations across Fire Island. Public ferries operate out of the towns of Bay Shore, Sayville, and Patchogue. All three ferry terminals can be accessed directly by car or indirectly by rail, bus, or taxi/shuttle. Those traveling to Fire Island by car can park at either the Robert Moses State Park or Smith Point County Park and enter the Seashore by foot. Public transit bus service is provided to Robert Moses State Park and to Smith Point County Park during the summer. A description of the summer service local bus service can be found at the Suffolk Transit website, www.sct-bus.org/index.html.

Access to the William Floyd Estate is via private automobile or by walking or bicycling from the adjacent neighborhoods.

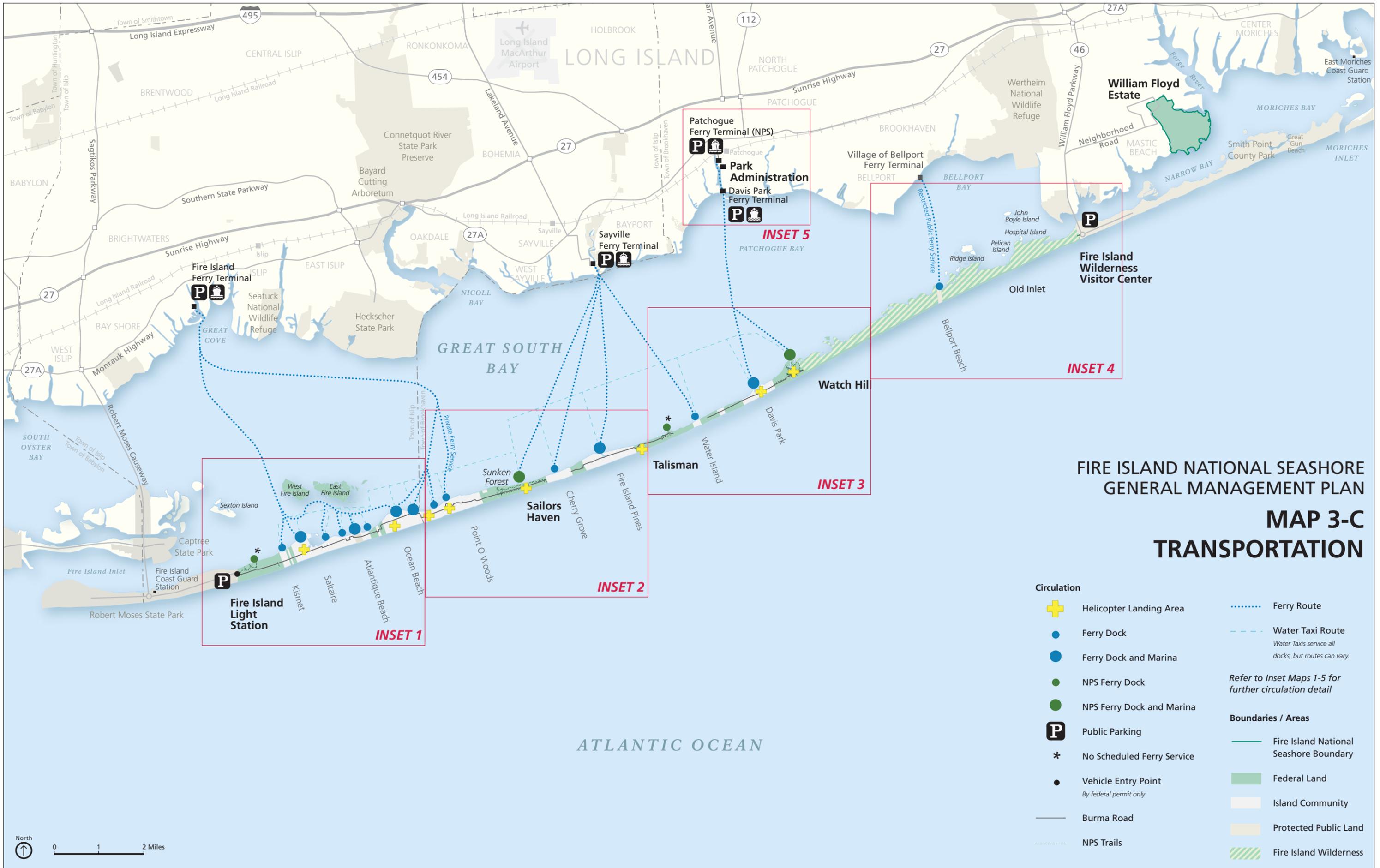
Access by Car

The state and county parks adjacent to Fire Island National Seashore are the closest access points by vehicle. On the west end of the island, the Robert Moses Causeway provides access to the Robert Moses State Park. On the east end of the island, the William Floyd Parkway provides access to the Smith Point County Park.

The Robert Moses Causeway is a major Long Island roadway that provides connectivity between Fire Island and the western portion of Long Island, New York City, and New England via five highway connections including State Route 27A (Montauk Highway), State Route 27 (Sunrise Highway), the Southern State Parkway, Interstate 495 (LI Expressway), and the Northern State Parkway – the latter two linking via the Sagtikos State Parkway. Based on 2002 traffic count data, the roadway carries approximately 15,600 vehicles per day¹¹.

The Robert Moses State Park comprises the western six miles of Fire Island and abuts the Seashore's western boundary at the Fire Island Light Station area. Many visitors walk to the lighthouse from the state park's Field 5 parking lot annually. There were approximately 109,000 visitors to the Fire Island Light Station in 2012 (NPS Public Use Statistics). Robert Moses State Park provides 8,200 parking spaces among four parking lots, including the 2,460-space lot adjacent to Fire Island National Seashore. All four parking fields fill up at times during the summer months.

11 The distinction between parkways and expressways is important, as parkways allow only passenger vehicles (no trucks), while expressways permit all types of vehicles. Additionally, the causeway, defined as a roadway that is a combination of roadway across land and bridge, is also restricted by vehicle design and gross weight.



FIRE ISLAND NATIONAL SEASHORE GENERAL MANAGEMENT PLAN MAP 3-C TRANSPORTATION

- Circulation**
- + Helicopter Landing Area
 - Ferry Dock
 - Ferry Dock and Marina
 - NPS Ferry Dock
 - NPS Ferry Dock and Marina
 - P Public Parking
 - * No Scheduled Ferry Service
 - Vehicle Entry Point
By federal permit only
 - Burma Road
 - - - - NPS Trails
 - ⋯ Ferry Route
 - - - Water Taxi Route
Water Taxis service all docks, but routes can vary.
- Refer to Inset Maps 1-5 for further circulation detail*
- Boundaries / Areas**
- Fire Island National Seashore Boundary
 - Federal Land
 - Island Community
 - Protected Public Land
 - Fire Island Wilderness







INSET 3

- | | | | |
|--------------------|---|---------------------------|--|
| Circulation | Sand Route | Ferry Route | Helicopter Landing Area |
| Burma Road - Paved | Vehicle Access Route / Dune Cut (as permitted) | Ferry Dock | Boundaries / Areas |
| Burma Road - Sand | NPS Trails | Ferry Dock and Marina | Federal Land |
| Boardwalk | Water Taxi Route
<small>Water taxi service all docks, but routes can vary</small> | NPS Ferry Dock | Protected Public Land |
| Concrete Route | | NPS Ferry Dock and Marina | Fire Island National Seashore Boundary |



INSET 4



The William Floyd Parkway (County Route 46) is a north/south principal arterial across Long Island that provides access to the William Floyd Estate and the eastern end of Fire Island. However, based on the description of various roadways (see footnote), the William Floyd Parkway is not actually a true parkway, by definition, because it is not limited in the types of vehicles that can traverse it. It is, instead, a local major arterial connecting the north of Long Island to the south, and over the bridge to Fire Island. Based on 2010 traffic count data, the roadway carries approximately 23,195 vehicles per day (NYS DOT Traffic Data Viewer). On Long Island it intersects State Route 27 and Interstate 495. It is the only roadway access to the Smith Point County Park on Fire Island, which offers one parking lot consisting of 4,000 parking spaces. Fire Island visitors can access the Seashore by walking from the Smith Point parking lot to the Fire Island Wilderness Visitor Center. Annual visitation at the Wilderness Visitor Center is approximately 12,700 per year.

The entrance to the William Floyd Estate is approximately two miles east of the William Floyd Parkway, via residential streets through the village of Mastic Beach. At the Estate, there is a paved parking lot for 30 cars and three buses. Overflow parking for special events is accommodated immediately west of the paved area, utilizing a mown field, which has a capacity of 100 to 125 vehicles. The Estate is open to the public for approximately 80 days per season and annual visitation is estimated at about 4,000. Typical peak parking is about 10 cars during the day, with a length of stay of between 1.5 and 3.5 hours.

Access by Water

Long Island ferry terminals providing access to Fire Island are located in the south shore communities of Bay Shore, Sayville and Patchogue. Each serves different sections and communities within the Seashore. Ferry service from Bay Shore serves communities on the west end of Fire Island. The Sayville ferries serve the Sailors Haven Visitor Center and adjacent Fire Island communities. The NPS Patchogue ferry terminal, located about a mile up the Patchogue River, serves Watch Hill; the Davis Park Ferry Terminal at the mouth of the Patchogue River serves the community of Davis Park. These ferries are described below. There also are two private cross-bay ferries, one serving Point O' Woods from the Bay Shore ferry terminal and the other serving Bellport Beach originating from the village of

Bellport. These ferries are restricted to residents of those communities.

- **Fire Island Ferries**, located on the southern end of Maple Avenue in Bay Shore, owns and operates the ferry service at this location. Fire Island Ferries provides service to eight different locations on Fire Island: Kismet, Saltaire, Fair Harbor, Atlantique, Dunewood, Ocean Beach, Seaview, and Ocean Bay Park. The Fair Harbor and Ocean Beach routes operate all year, depending on the weather. All other routes begin service in May and run through October or November, if weather conditions permit. The Fire Island Ferries fleet consists of nine boats with capacities between 150 and 395 passengers.
- **Sayville Ferry Service**, located on River Road, between Brown River Road and Terry Street in Sayville, owns and operates the ferry service at this location. Sayville Ferry provides service to four different locations on Fire Island: Sailors Haven, Cherry Grove, Fire Island Pines, and Water Island. The Cherry Grove and Fire Island Pines destinations operate all year but limit service in the winter to weekends. All other routes begin service in May and run through October or November as weather conditions permit. The Sayville Ferry fleet includes four vessels with capacities ranging from 105 to 412 passengers.
- **The Patchogue Ferry terminal**, owned by NPS and located on West Avenue across from Amity Street, is operated by a concessions contract with the Davis Park Ferry Company. As described above, Davis Park Ferry Company provides service to two locations on Fire Island from two locations in Patchogue. Both routes begin operation in May and run through November. The Davis Park Ferry fleet consists of four boats with capacities between 49 and 300 passengers.

The three public passenger ferry operators carry approximately 1.6 million passengers to Fire Island annually (National Ferry Data Base 2006). Fire Island Ferries carries 980,000 passengers, over 60 percent of the total ferry ridership to Fire Island. The Sayville Ferry Service carries 470,000 passengers annually, about 30 percent of the ridership to the island. The Davis Park Ferry carries approximately 150,000 passengers

annually. Most of the public passenger ferry ridership is to the communities within the boundaries of Fire Island National Seashore. Two of the ferry routes operate between the mainland and the federally managed sections of Fire Island. The ferry service between Sayville and Sailors Haven carries between 50,000 to 78,000 passengers annually. The annual ridership on the ferry service between Patchogue and Watch Hill is 18,000 to 20,000.

There also are four ferry landings and 10-12 public marinas operated by local communities. Two of the public marinas are NPS facilities operated by Fire Island Concessions: the Sailors Haven marina has 45 slips and the Watch Hill marina has 188 slips. A public marina at Atlantique Beach is operated by the Town of Islip and primarily serves its residents. The Town of Brookhaven operates a marina in Davis Park that serves both residents and non-residents.

Transient slips are available at the Seashore marinas for a fee. During the summer months, all boat slips are typically occupied. Dinghies and similar small boats are allowed on shore within the Seashore. Larger boats can moor off shore.

Lateral water transportation is provided by Fire Island Water Taxi, operated by Fire Island Ferries. The service operates on demand from Memorial Day through the weekend after Labor Day between the Fire Island Lighthouse and the Watch Hill Visitors Center, with service to all communities with public docks.

Public Transportation

It should be noted that any of the public transportation routes and frequencies are subject to change by the relevant agency and must be verified by potential users prior to any visit to Fire Island.

► REGIONAL AIRPORTS

Long Island is served by commercial airline service at Long Island MacArthur Airport in Islip. More extensive domestic and international air service is available at LaGuardia International Airport and John F. Kennedy International Airport in New York City. All of these airports are accessible from Fire Island via the vehicle access routes described above or via public transportation.

► RAIL ACCESS

The towns of Bay Shore, Sayville, and Patchogue on Long Island are served directly by the Metropolitan Transit Authority (MTA) Long Island Rail Road (LIRR). The most convenient connection between the rail line and passenger ferries to Fire Island is in Patchogue, where the train station and ferry terminal are two blocks apart. The train stations in Bay Shore and Sayville are much farther away, and require either a bus transfer, taxi, or private vehicle to get to the ferry terminal. Trains from the major transit hubs of the LIRR, Penn Station in Manhattan and Flatbush Avenue/Brooklyn Station in Brooklyn, converge at Jamaica Station, which serves as the major railroad hub to access Fire Island. Passengers traveling east must change trains either at Jamaica or at Babylon, and depending on their final destinations, must take either the Babylon Branch of the LIRR or the Montauk Branch, both of which extend service along the southern shore of Long Island through the towns of Bay Shore, Sayville, and Patchogue. A survey conducted of ferry passengers in 2001 indicated that one quarter arrived via the LIRR. Almost half of those departing from Patchogue arrived via the LIRR (U.S. Department of Transportation, 2001).

► LOCAL BUS SERVICE

Suffolk County Transit (SCT) provides year-round local bus access for the towns of Bay Shore, Sayville, and Patchogue. SCT operates six local routes within the Bay Shore area, three routes in Sayville, and eight routes within the Patchogue area. Many of these routes provide stops within walking distance of a ferry terminal. SCT operates one bus route and one route extension that run during the summer only and provide access to the Robert Moses State Park and Smith Point County Park.



Transportation on Fire Island

There is very limited vehicle travel on Fire Island, as there are no public roads. A set of rules governing the vehicular transportation on Fire Island, the Final Consensus Agreement, was established in 2003 by collaboration among various stakeholders. The following user groups have vehicle permits:

- Public Utilities
- Essential Service Providers
- Contractors
- Emergency Services
- Residents
- Official and Municipal Agencies

Vehicular access, even with a permit, is restricted during the busy summer months. There are also some temporary off-road recreational driving permits issued during fall fishing and hunting seasons (See the visitor use section of this chapter, below).

No section of the Seashore, other than the Wilderness, is more than a mile from one of the Fire Island communities. The primary means of traveling within on Fire Island is on foot over a network of boardwalks, pathways, and along the oceanfront beach. Bicycling within Fire Island National Seashore is allowed, although opportunities are limited since bicycles are not allowed on NPS boardwalks, in the wilderness, at marinas, and in some of the communities.

The Fire Island Water Taxi service provides lateral connections among the Fire Island communities and some of the Seashore facilities using small, fast passenger ferries. The taxi service operates from Kismet on the west end of the Fire Island to Watch Hill.

Emergency Access

There are nine fire departments serving the 17 communities within the boundaries of the Seashore on Fire Island. Six of the communities have medical clinics. However, those clinics provide limited services and are not adequate for most medical emergencies. Emergency medical services (EMS) within the Seashore are provided as appropriate by NPS rangers, the Suffolk County Police Department (SCPD) personnel, and the fire departments in Saltaire and Ocean Beach. The Seashore has an agreement with Mastic Beach for emergency response at the William Floyd Estate and on the east end of Fire Island.

Almost all medical transports are by boat or by helicopter. The SCPD Marine Bureau and SCPD Aviation Bureau provide medical transport for incidents within the Seashore; except for the most severe emergencies, transports take place via designated landing zones. Baseball fields are used in the communities of Saltaire, Ocean Beach, Seaview and Point O' Woods, and there is a helipad in the community of Davis Park. There are NPS helipads at Sailors Haven, east of Fire Island Pines, and at Watch Hill. An additional helipad is located at Great Gun Beach in Smith Point County Park.

During the off season, emergency access by police, medical responders, and public utilities on Fire Island is made possible via the Robert Moses Causeway and the William Floyd Parkway bridges on either side of the Seashore. During the summer this is generally not practical due to the heavy visitation and vehicle traffic. The public utility providers store vehicles in several of the communities to facilitate timely responses to incidents.

Freight

Several companies accommodate the varying freight service needs for Fire Island residents and services. The three passenger ferry companies discussed previously also operate separate freight boats. Fire Island Ferries has three freight boats that run one daily trip to eight communities on Fire Island on weekdays, year-round. Saturday service is also available from mid-April through mid-October. Four of the communities served by Fire Island Ferries provide freight storage facilities. Sayville Ferry operates a freight boat with up to 10 trips per week from April through November. Davis Park Ferry operates one freight boat with limited service. The majority of cargo services in Davis Park are provided by private operators.

In addition to the passenger ferry operators, five freight-specific companies serve Fire Island, and the Town of Brookhaven also has a ferry facility that serves Brookhaven communities.

Schools

The Fire Island School District transports approximately 41 students and 9 teachers along the Island and to several locations on Long Island during the school year¹². Seven school buses, all equipped with four-wheel drive to traverse both paved and unpaved roadways, travel a total of 27 routes (U.S. Department of Transportation, 2011).

¹² <http://schools.newsday.com/long-island/districts/fire-island/woodhull-elementary-school/>. Accessed May 8, 2013.



VISITOR USE

The Long Island beaches always have been a popular destination. The secluded nature of Fire Island has made it an especially popular location for recreation and resort development. Since the Fire Island National Seashore was established in 1964, the NPS and its partners have worked to provide for a high-quality visitor experience and to maintain and enhance the recreational opportunities that have always been a part of Fire Island.

Visitation

The porous nature of the Seashore boundary, with virtually limitless points of entry, makes it difficult to accurately measure visitation. In addition to NPS-owned lands, the Seashore's boundary encompasses a county park, 17 private residential communities, and nearly 17,000 acres of bay and ocean waters. Current visitation tracking does not fully account for visitor use in these areas.

Fire Island National Seashore's visitation counts are derived from visitation observed at a number of Seashore facilities. As noted above, visitation at other points of entry within the Seashore boundary do not become part of the official NPS visitation tally. Visitation to Fire Island National Seashore is relatively stable. Throughout most of the Seashore's history, annual visitation has hovered around 500,000 visitors per year with some notable highs and lows. The year 2004 was the Seashore's busiest, with a visitation count of approximately 820,000, while in the year 1995, it received the lowest number of visitors with a visitation count of about 350,000 (NPS 2012). In 2003, the Suffolk County Budget Review Office generated a study of the economic value of the county's beaches and estimated

that total visitation within the boundaries of Fire Island National Seashore reached approximately 2.2 million visitors per year (Suffolk County, 2003).

In 2008, the NPS conducted a visitor-use study at the park. The study included responses from 636 visitors who completed surveys distributed exclusively at NPS facilities in July 2008. Relevant information that emerged from this study includes:

- United States visitors comprised 97 percent of total visitors, from New York (84 percent) and 37 other states and Puerto Rico. International visitors represented 3 percent of total visitation, with 34 percent from Canada, 11 percent from Australia, and the balance from 12 other countries.
- Approximately 54 percent of visitors were ages 36-65 years, 7 percent were 66 years or older, and 18 percent were ages 15 years or younger. Six percent of visitor groups reported physical conditions that made it difficult to access or participate in park services or activities.
- Approximately 43 percent of visitors had visited the park once in the past 12 months, while 34 percent had visited five or more times.
- Prior to this visit, 80 percent of visitor groups were aware that Fire Island National Seashore is a unit of the national park system and 67 percent were aware of the difference between the Seashore and other public beaches on the barrier island.
- Prior to this visit, most visitor groups obtained information about Fire Island National Seashore through previous visits (72 percent) and friends/relatives/word of mouth (48 percent). Approximately

90 percent of visitor groups obtained the information they needed, while 9 percent did not obtain any information about the Seashore prior to their visit.

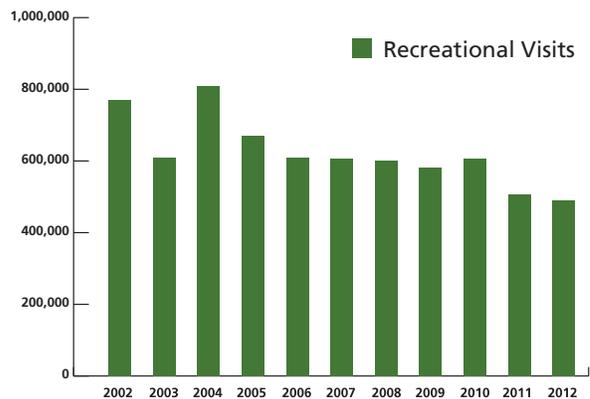
- Local residents accounted for 88 percent of visitor groups (within 45 miles of any park entry point). Visiting Fire Island National Seashore was the primary reason that brought 59 percent of the nonresident visitor groups to the park area, while 19 percent came to visit friends and relatives in the area.
- Of visitor groups that spent less than 24 hours visiting the park, 42 percent spent 5 hours or more at the park. For those who visited for more than 24 hours, 38 percent spent 4 days or more at the park. The average length of stay, including those who spent less than 24 hours and those who spent more, was 27 hours.
- Of the sites operated by the NPS, the beaches and the Fire Island Lighthouse were the most popular, attracting 60 percent and 41 percent, respectively, of visitor groups. The other sites were visited by 3 percent to 25 percent of visitor groups. Among sites not operated by the NPS, Robert Moses State Park was the most popular, attracting 50 percent of all visitor groups.
- Of the activities in which visitors engaged on past trips to Fire Island National Seashore, beach activities were the most common (90 percent), followed by spending time with family and friends (80 percent). The most common activities on the current trip were also beach activities (76 percent) and spending time with family and friends (68 percent).
- Most visitor groups (89 percent) rated the overall quality of services, facilities, and recreational opportunities at Fire Island National Seashore as “very good” or “good.” One percent of visitor groups rated the overall quality as “very poor” or “poor” (NPS 2008e).

Among other things, the findings from this study illustrate the importance of Fire Island National Seashore to the Greater New York region. At the time of the Seashore’s last GMP, only 7 percent of visitors were from outside of the state of New York (NPS 1977). Since then, this percentage has increased to 16 percent.

Patterns of Use

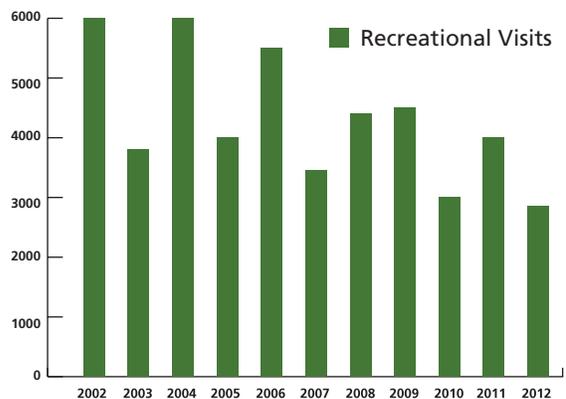
Due to the dynamic nature of barrier islands and the fact that the Seashore is near the largest population center in the country, visitation often changes dramatically from year to year. In general, visitation patterns reflect those of a local park rather than a national park, with day and weekend trips dominating visitation. The large decrease in visitation, between 1994 and 1996, is due primarily to major storm damage to beaches and other park property during this time period (NPS 2007i). Since the majority of visits are day or weekend beach use, weather also has a significant effect on visitation, as evidenced by a decrease in 2003 due to excessive rain.

**3-1. VISITATION TRENDS—
Fire Island National Seashore, 2002–2012**



**Chart 3-1: Visitation Trends for Fire Island National Seashore—
including the William Floyd Estate. Visitation to the Seashore was at
its highest in 2004. Source: NPS Public Use Statistics**

**3-2. VISITATION TRENDS—
William Floyd Estate, 2002–2012**



**Chart 3-2: Visitation Trends for William Floyd Estate
Source: NPS Public Use Statistics; Staff, FISS.**

The William Floyd Estate's Old Mastic House is open to the public on a seasonal basis. Visits to the Old Mastic House and participation in programs and special events are the basis for visitation statistics to the William Floyd Estate; visitors who come to walk the grounds are less likely to be counted. During the late 1990s visitation hovered between 6,000 and 7,000 visitors per year. Since 1999, visitation figures have become far less stable and have experienced a steady decline, with visitation since 2009 ranging from 2,700 to 4,500 visitors (NPS 2012). Formal school programs were offered at the William Floyd Estate beginning in the late 1990s, at which time as many as 230 school programs per year were being provided. By 2006 the number of school programs had declined roughly by half, and demand for such programming had become less consistent. The Estate has not hosted formal school groups since 2007. The decline in demand for school programming is partially attributable to rising concerns about exposure to tick-borne diseases on the part of local school districts. It has also resulted from a reduction in school programming being offered at the Floyd Estate due to limitations in funding and staff.

Information and Orientation

According to the 2008 Visitor Study, over 90 percent of Fire Island visitors sought information about the Seashore prior to their visit. Visitors planning a trip to the Seashore can turn to several sources of information. According to the 2008 Visitor Survey, the majority of visitors relied on information from previous visits to plan their recent trip to the Seashore (72 percent). Nearly half of the Seashore's visitors also relied on word of mouth from friends and family for receiving information for their visit (48 percent). Seashore partners and special interest groups also serve as information sources for visitors (less than 4 percent). These groups include the Appalachian Mountain Club, Fire Island Lighthouse Preservation Society, Friends of Fire Island National Seashore, 4H/ Girl Scouts, Adirondack Mountain Club Mohican Chapter, Amityville Historical Society Tour, and Nassau Hiking and Outdoor Club. Other groups that provided information (less than 3 percent) to visitors included tour groups, local residents, information/visitor centers, and park rangers.



The 2008 Visitor Survey also asked visitors what information was not available to them prior to their trip. The responses, listed below, highlight visitors' reliance on informal sources of information rather than NPS staff or information centers. The types of information visitors were unable to find included:

- Activities
- Areas available to visit
- Assistance for docking
- Directions
- Directions to ferry
- Dock space fee
- Facilities
- Facilities at each ferry stop
- Fees
- Ferry address
- Flora and fauna identification
- GPS system address
- Location of nude beaches
- Maps
- Walking tour of Sunken Forest
- What park has to offer
- What to expect (NPS 2008e)

Much of the information identified as being missing is actually provided by the NPS through the following sources.

Website and Social Media.

The front page of the Seashore's web site (www.nps.gov/fis) provides a listing of upcoming special events and seasonal programs. It also provides phone numbers for general information and specific park offices as well as directions to specific locations within the Seashore and fees or permits that may be required for certain activities. The Seashore maintains a strong social media presence on Facebook and Twitter, which are both used to advertise park programs, provide operational information, and share educational information about park resources and significance.

Summer Program Guide.

At the beginning of each summer season, the NPS produces the Summer Program Guide. This guide is available online and at locations throughout the Seashore and provides daily schedules for park facilities and programs. It also highlights special events that will occur throughout the visitor season, such as the Fire Island Trek. The Summer Program Guide is supplemented by regular park e-newsletters that provide updates on park programs and visitor activities. During shoulder seasons and the winter, monthly program and activity schedules are available on the Seashore's website and as printed bulletins at open Seashore visitor centers and area libraries.

There is no central entrance or orientation point within Fire Island National Seashore; therefore, it is important to the NPS that the information sources described above be readily available to the public. Once visitors reach the Seashore, orientation is provided by signs and maps at key locations, as well as by NPS staff. Visitors arriving by ferry at NPS facilities encounter staffed visitor centers, outdoor bulletin boards, and interpretive waysides near the dock that include park maps and other information. Those arriving by ferry at Fire Island's residential communities are currently offered little information related to the Seashore. Visitors traveling to Fire Island by private vehicle may enter at either end of the National Seashore. Traveling from the west, visitors can stop at the Fire Island Light House Visitor Center to obtain maps and other information relevant to their visit. For visitors traveling from the east, this information is provided at the Wilderness Visitor Center. Visitor orientation at the William Floyd Estate is

provided by signage, a visitor kiosk, and in the reception room of the Old Mastic House, where visitors are greeted by rangers and volunteers.

Interpretation and Education

The 1994 *Interpretive Prospectus* (NPS 1994) serves as the basis for the Seashore's interpretive and educational programs. Although the document addresses all of the visitor facilities within the Seashore, not all of the plans recommended in the prospectus have been carried out.

Many of the NPS outreach, education, and public relations functions are housed at the Seashore's administrative headquarters on Long Island. The warehouse building at the Patchogue Maintenance Facility (PMF) houses several Seashore offices including interpretive staff offices, the park library, and the resource management laboratory. These locations are not open to the public, but provide educational opportunities for researchers and visitors upon request. The new Patchogue Ferry Terminal was constructed in 2010 to replace the existing terminal and includes additional exhibit areas and a multi-purpose room that can accommodate visitors and Seashore staff.

The William Floyd Estate is the other interpretive and educational facility on Long Island. From late-May through mid-November, visitors may take guided tours of the Old Mastic House. The grounds are open year-round, enabling visitors to explore the 613-acre landscape; NPS interpreters and volunteers offer thematically relevant programming and nature walks as staffing and conditions permit. The Old Mastic House reflects a continuum of historical use over more than two centuries that is manifest in its structural modifications and multi-period furnishings. The current interpretive focus of the property is on the continuum of use, emphasizing Floyd and his descendants and the historical evolution of the property as it reflects important national and regional trends. To supplement this story, the NPS recently initiated tours of the Seashore's curatorial storage building located at the William Floyd Estate. The collections include items related to the Floyd family as well as the general history of the region. A wide range of programming is offered on the Estate throughout the year.

On Fire Island, educational and interpretive activities occur at several locations. Seashore-wide outreach programs are aimed toward informing the surrounding communities about the resources at Fire Island and finding ways to provide focused programs to local schools

and other interest groups. To meet this goal, Seashore staff regularly coordinates with local teachers to identify roles the Seashore can play in different curricula and plan field trips for classes. Educator workshops are conducted annually. Several curriculum-based activities on the topic of shoreline dynamics were developed for use by middle- and high-school educators taking self-guided classes to the Seashore, and equipment for the activities is available at park sites for their use. A traveling trunk is available for loan by schools as orientation preparation for an on-site class visit.

Thirty-three wayside exhibits are located throughout Fire Island National Seashore to interpret features that are visible from the given location or to provide general orientation within the Seashore. The waysides provide text, photographs, illustrations, and maps that relate to the history of the location on Fire Island. Several waysides highlight resource-protection issues and efforts. A variety of park brochures and publications are available at visitor contact stations including rack cards on safety, ticks, and mosquitoes; six different topical junior-ranger booklets; site bulletins including the “The Storm Beach,” “The Science of Shifting Sands;” bird checklists, the Seashore’s “unigrid” or park brochure, and partner publications.

One of the primary destinations for interpretive and educational programming on Fire Island is the lighthouse. Owned by NPS and operated by the Fire Island Lighthouse Preservation Society (FILPS) through a cooperative agreement with the NPS, the lighthouse provides specialized educational programs to over 7,000 local elementary school children each year. The group provides interpretive materials and displays on the main floor. Small tours of the tower also are available. With the help of its volunteer group and the NPS, FILPS provides educational programs related to the history of the lighthouse, the history of regional maritime activities, as well as the overall role of lighthouses along the Atlantic Ocean.

Another educational opportunity is provided at Sailors Haven. The Sunken Forest, adjacent to Sailors Haven, is a popular attraction for school groups and many of the Seashore’s recreational visitors. Interpretive signs within the Sunken Forest enable visitors to take self-guided tours along the 6,100-foot long boardwalk that winds through the site. Within the developed portion of Sailors Haven, a small pre-existing house has been adapted to serve as a visitor contact station and program area. It contains a number of locally prepared exhibits, aquaria, and an information desk. Programming at Sailors

Haven includes school programming during the spring and fall; and summer programming for youth and family audiences highlighting the significance of the Sunken Forest, marine life of the Great South Bay, shoreline dynamics, endangered species, and other topics relating to the site.

Watch Hill is another location on Fire Island with facilities for interpretation and education. The 3,500-foot nature trail/boardwalk allows for self-guided and ranger-guided tours through a salt marsh. These tours are supported by educational materials obtained at one of the two visitor contact stations at Watch Hill. The first contact station is a visitor center located at the Watch Hill dock. The small space provides for visitor contact with NPS rangers and a series of formal and somewhat dated, exhibits. The exhibits interpret the salt marsh habitat, the ocean beach, Great South Bay, and other natural resources and feature several aquaria and touch tables. The other visitor contact station, the dune station, is located along the boardwalk near the crossover to the beach. It is a small structure that can be used for interpretive programming.

Programming at Watch Hill is geared for children and family audiences and highlights significant Seashore topics such as endangered species, bay-to-beach habitats, shoreline dynamics, marine life in the Great South Bay, and salt marsh issues and resources. Watch Hill is the western entry to the Fire Island Wilderness, and the Visitor Center provides seasonal support and check-in for the backcountry camping program. The site hosts the ranger-guided canoe program into the marshes of Watch Hill.

The Wilderness Visitor Center is open year-round for beach access and as the eastern entry to the Fire Island Wilderness. The facility contains a staffed information desk, sales space, rest rooms, displays, and a gathering space on the second floor. In-house exhibits focus on the natural history and maritime history of the Seashore and feature several aquaria and a touch table. Year-round programming geared to adults, families, and children is offered on a variety of topics such as wilderness value, barrier island habitats, beachcombing, winter bird-watching and botany, endangered species, maritime music, astronomy, and other related topics. Guided and self-guided education programming at this site focus on the topics of beach ecology and shoreline dynamics. The visitor center provides staffing support for the Seashore’s off-road driving, hunting, and backcountry camping programs.

Recreational Activities (Visitor Use Regulations)

There are a wide variety of recreational activities available at Fire Island National Seashore. Some of these activities are regulated by the NPS to provide equal opportunities and a safe environment for all visitors, while protecting Fire Island's vast resources. Some activities, such as kite flying, camping, and picnicking, are restricted to certain areas and times of year within the Seashore. Other activities, like back-country camping and private events, require NPS permits. Regulated or recently restricted activities at Fire Island National Seashore include clothing-optional recreation, recreational driving, and fishing and fowling. The regulations or restrictions that guide these activities are described below.

► CLOTHING-OPTIONAL RECREATION

New York State law prohibits public nudity. On Fire Island, clothing-optional use of beaches is a long-standing activity that predates Congressional establishment of Fire Island National Seashore. However, in response to recent events and ongoing public use conflicts, in February 2013 the National Park Service announced its decision to enforce New York State law with regard to public nudity in high-visitor-use areas on federal lands.

► OFF-ROAD OR RECREATIONAL DRIVING

The Seashore regulates recreational driving. Off-road driving on the beach is a popular recreational activity, which is limited to the fall and early winter months, when visitation is low and there are no threats to nesting or breeding wildlife. Permits must be obtained for all off-road driving on Fire Island. Unpermitted vehicles are restricted to roads and parking lots near the bridges connecting Fire Island to Long Island. The only zone where recreational driving is allowed is the eastern zone between the Wilderness Visitor Center and Long Cove.

In addition to the permits, the NPS has established rules to protect Fire Island resources while allowing access to recreational opportunities. To protect the dunes that provide barriers to the ocean's waves and storms and habitat important for endangered species and other coastal wildlife, vehicles are not permitted within 20 feet seaward of the toe of dunes or visible beach grass at any time of year. If 20 feet of beach is not available from the toe of the dune/beach grass to the water's edge due to tides and/or wave run-up, then motor vehicle travel through that portion of the island is prohibited. Along

with protecting the beach environment, driving rules also protect the special-status species on the island. To ensure adequate protection of this resource, beach driving is closely monitored through the vehicle checkpoint cuts as well as on the beach.

► FISHING AND HUNTING

Along with the driving restrictions, fishing and fowling regulations protect the natural, scenic, and recreational resources in Fire Island National Seashore. Hunters must obtain a New York State hunting license as well as Special Use Permit from NPS to hunt within the Seashore. Areas where hunting is permitted include the following.

1. **East End Hunting Area:** This area is adjacent to the Fire Island Wilderness. A recreational vehicle driving permit may be used to access the beach on the Atlantic Ocean side of the Wilderness from September 15 through December 31, but access to the bay side of Fire Island is by foot or shallow-draft vessel only. Waterfowl hunting is permitted only from Hayhole Point (west of the Wilderness Visitor Center and boardwalk) to Long Cove (east of Watch Hill). No hunting is allowed from the small bay islands north of Fire Island in this area. A portion of the Pattersquash Gun Club's hunting rights are within the Seashore's boundary.
2. **West End Hunting Area:** This area is restricted to shoreline waterfowl hunting from East Fire Island, West Fire Island, and Sexton Island.

Surf and jetty fishing is the most common form of fishing on the ocean side of Fire Island. Although a recreational marine fishing license is not required by the State of New York to surf fish or fish in the Great South Bay, NYS requires that anglers register with the no-fee recreational marine fishing registry and be aware of fishing seasons and catch limits established by the state. Anglers are encouraged to voluntarily report their catch in the state's on-line angler logbook. No fishing is allowed within NPS maintained marinas or designated lifeguard beach swimming areas. In addition, no commercial fishing is permitted within the Seashore.

Public Facilities and Services

Fire Island National Seashore is composed of public and private lands, including federal, town, and county parklands, and private communities. Interspersed between NPS lands are 17 private communities that were established before the creation of the Seashore.

Today these communities include 4,200 homes. Some of these communities have provisions for guests and tourists, while others are strictly residential. These communities are discussed in detail in the Socioeconomic Environment section of the EIS.

Infrastructure on NPS lands includes 12 miles of boardwalks, 26 campsites, three visitor centers, 67 buildings, 23 housing units, 233 overnight boat slips located at two marinas, and a public dock for loading/unloading at Talisman. Seashore infrastructure also includes a ferry terminal in Patchogue. The primary locations managed by the NPS at Fire Island National Seashore are described below.

William Floyd Estate

The William Floyd Estate, located in the Village of Mastic Beach, on the south shore of Long Island, is the Seashore's primary resource on Long Island. The Estate is a 613-acre tract of land donated to the NPS by the Floyd family in 1976. It includes the main house, with furnishings, which is a 25-room, two-story, white frame structure built around 1724 with 18th-, 19th- and 20th-century additions. The house is an example of Georgian and Greek Revival architecture with Colonial Revival embellishments. The Estate also includes 12 historic outbuildings, a family cemetery, visitor parking, walking trails, fields, forests, ponds, and salt marshes. The NPS maintains a curatorial storage facility on the property, housing natural and cultural resources and artifacts not presently on display elsewhere at the Seashore. The Estate has been maintained in relatively the same condition as when the NPS was given the property.

Wilderness Visitor Center

The Wilderness Visitor Center is located at the eastern boundary of the wilderness, adjacent to Smith Point County Park. The 1,800-square foot visitor center supports NPS seasonal programs, ranger-led tours and programs, wilderness camping, and recreational and permitted driving. It also provides restrooms, exhibits, and unique views of the wilderness. The structure has been maintained in good condition; however, many of the displays were produced in-house and are out of date. The Smith Point West Nature Trail extends from the visitor center onto the landscape, where visitors can experience self-guided or ranger-led walks. When it was first constructed, the boardwalk was over a mile long. Since then, storm damage and concerns about the wilderness character have led the NPS to reduce its footprint.

Fire Island Lighthouse

The Fire Island Lighthouse, built in 1858, is located on the far western end of the Fire Island National Seashore. The lighthouse was acquired by the NPS in 1978 to preserve and interpret the maritime history of Fire Island, including the U.S. Lifesaving Service and the U.S. Coast Guard. It was placed on the National Register of Historic Places (NRHP) in 1981. The Lighthouse is currently run by the Fire Island Lighthouse Preservation Society (FILPS). On-site personnel open and close the 2,664-square foot lighthouse visitor center and tower, conduct tower tours, provide information and programs to visitors as well as organized group tours, and provide for the daily maintenance activities and minor repairs for the preservation of the national historic site. Since the NPS took over the lighthouse, extensive work has been done to rehabilitate and preserve the lighthouse resources. Working cooperatively the NPS and FILPS have undertaken improvements including maintaining an operating light in the tower, repairing portions of the building, and reacquiring the original Fresnel lens and making it available for display and educational purposes in an exhibit building that was constructed over the footprint of the original generator building. In 2012, the Fire Island Light Station had approximately 109,000 visitors, primarily pedestrians from neighboring Robert Moses State Park and visitors arriving via occasional ferry service or water taxi.

Sailors Haven

Sailors Haven encompasses restrooms, a small visitor center, and lifeguarded beach administered by the NPS and a 45-slip bayside marina and snack bar operated by concessioners. The Sunken Forest, accessed via a boardwalk from Sailors Haven, is an old-growth maritime forest consisting predominantly of American holly and sassafras. The forest is defined by its location behind the secondary dune system that protects it from Atlantic Ocean storms and salt spray. Materials provided at the visitor center, along with signs located throughout the forest, provide for a self-guided tour through some of the Fire Island's rarest environs. Ferry service to Sailors Haven is provided by the Sayville Ferry Company from the hamlet of Sayville. Although the visitor center's appearance and displays are outdated, the structures are in good condition.

Watch Hill

Watch Hill includes a visitor center, nature trail, campground and beach area. A 188-slip bayside marina,



William Floyd Estate

- Seasonal
- Estate
- 9.2 Miles Total Length
- 27-Space Lot

Fire Island Wilderness Visitor Center

- Year-round Visitor Center
- .25 Miles Total Length
- Backcountry camping - maximum of 36 permits a day

Watch Hill

- Seasonal
- 3 Miles Total Length
- 26 - Site Campground

Talisman

- Seasonal
- .65 Miles Total Length

Sailors Haven

- Seasonal
- 3 Miles Total Length

Fire Island Light Station

- Year-round Visitor Center
- Historic Lighthouse
- .75 Mile Total Length

Recreation

- Camping
- Self-Guided Hiking Trails
- Lifeguarded Swim Area
- Bathhouse/Changing Room
- Picnic Area

Information / Education

- Visitor - Orientation Facility
- Restroom
- Museum

Concessioner Services

- Store
- Restaurant / Snack Bar
- Bar

Transportation / Boating

- Ferry Terminal
- Marina/Public Boat Dock
- Parking

- Federal Land
- Fire Island Wilderness
- Island Community
- Protected Public Land
- Fire Island National Seashore Boundary
- Ferry Route
- Hiking Trail / Walking Route



restaurant, snack bar, and store are operated and maintained by a concessioner. The visitor center hosts a cooperating association bookstore and marine aquaria as well as professionally designed and fabricated exhibits that are outdated. The site is located at the western boundary of the Fire Island Wilderness and provides access to the wilderness for hikers and backcountry campers. The Watch Hill nature trail is used for self-guided or ranger-led walks. Ferry service to Watch Hill is based out of the NPS Patchogue Ferry Terminal in the village of Patchogue, near the Seashore headquarters.

Talisman

Talisman is located at the approximate center of the barrier island and extends from the eastern boundary of Fire Island Pines eastward to the western boundary of the small enclave of houses informally known as Spatangaville. Access to Talisman is by private boat, and visitors moor offshore to access the area. There is no regular ferry service. Historically, the marina and lifeguarded beach area was known as Barrett Beach. It was donated to the NPS in 1997 by the Town of Islip and subsequently renovated by the NPS. It now contains a dock for ferry landings and a boat landing for visitors to offload their beach gear. Additionally, there are restrooms and showers. The Talisman area is regularly maintained by the NPS.

SOCIOECONOMIC ENVIRONMENT

Long Island consists of four counties: Queens County, Kings County, Nassau County, and Suffolk County. For the purpose of this analysis, only Nassau and Suffolk Counties will be considered, as Queens and Kings Counties are considered part of New York City.

Nassau County

► POPULATION TRENDS

In 2010, Nassau County had the sixth largest county population in New York State, with an estimated 1,339,332 residents, and a population density of approximately 4,704 people per square-mile (U.S. Census 2010a, StatsIndiana 2012). Between 1990 and 2011 the county had a growth rate of 4.4 percent (StatsIndiana 2012). Approximately 98 percent of the population reported only one race, with 73 percent reporting White and approximately 11 percent reporting African-American. Approximately 15 percent of the County's population

identified themselves as Hispanic (any race) in 2010 (U.S. Census Bureau 2010a).

In 2010, approximately 79 percent of the people living in Nassau County were native to the United States and 72 percent were born in New York State (U.S. Census Bureau 2010b). Twenty-seven percent of Nassau County residents 5 years or older in 2010 spoke a language other than English at home. Of those residents, 42 percent spoke Spanish and 58 percent spoke some other language. Additionally, 38 percent of those that spoke a language other than English at home reported that they did not speak English "very well" (U.S. Census Bureau 2010b).

Many of the residents of Nassau County are highly educated. Based on 2010 Census data, nearly 90 percent of Nassau County residents 25 years and over had at least graduated from high school, and over 40 percent had a bachelor's degree or higher (18 percent had completed a graduate or professional degree, compared to 14 percent statewide). This compares favorably to the education rates for New York State as a whole (84 percent of the state population has at least a high school degree and 32 percent have a bachelor's degree or higher) (U.S. Census Bureau 2010b). Levels of education in 2010 were consistent with those reported in the 2000 Census (approximately 90 percent of residents had at least a high school degree, and 40 percent had a bachelor's degree or higher) (U.S. Census Bureau 2000).

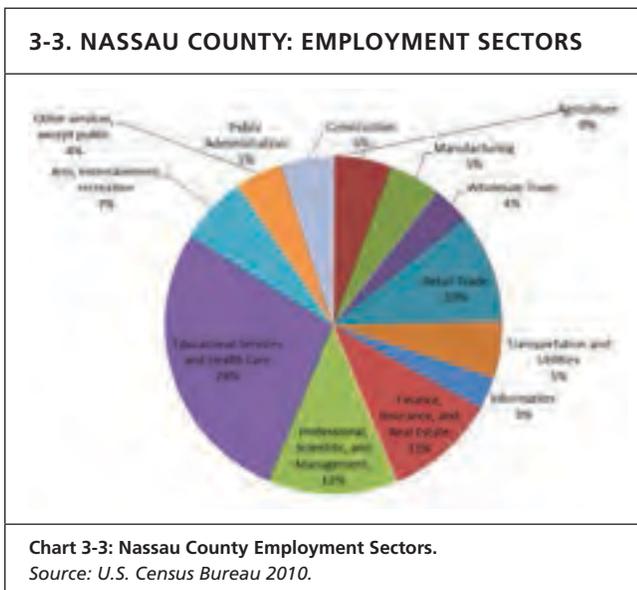
► HOUSING

In 2010, the average household size in Nassau County was approximately 2.9 persons compared to an average family size within the county of 3.4 persons. According to the 2010 U.S. Census, there were approximately 468,346 housing units, about 80 percent of which were owner occupied (U.S. Census Bureau 2010a). The median value of homes in Nassau County in 2010 was \$487,900 and the median rent was \$1,447 (U.S. Census Bureau 2006-2010). These housing costs are considerably higher than the statewide median home value of \$301,000 and median rent of \$1,025 (U.S. Census Bureau 2010c).

In 2010 families accounted for nearly 77 percent of the households in the county, with an estimated 62 percent of the families identified as married couples and approximately 15 percent identified as other families. During the same timeframe, nonfamily households comprised an estimated 23 percent of all households in the county (U.S. Census Bureau 2010b).

► **ECONOMY**

In 2010, Nassau County had a labor force of approximately 690,926 persons and an unemployment rate of 5.8 percent, slightly higher than the state rate of 4.8 percent. However, the county had an estimated median household income of \$93,613 and estimated per capita personal income of \$41,387, both above the statewide figures for the same year (approximately \$56,000 and \$31,000, respectively). The poverty rate of Nassau County, 5.1 percent, also compares very favorably to the state average of nearly 14 percent. Between 2000 and 2010 the county’s per capita income grew by 28.7 percent (U.S. Census Bureau 2010b, U.S. Census Bureau 2000).



The distribution of employment by industry in Nassau County was concentrated in four major sectors:

- Educational services, health care, and social assistance: 27 percent
- Professional, scientific, management, and administrative and waste management services: 12.3 percent
- Finance, insurance, and real estate: 10.8 percent
- Retail trade: 10.2 percent

Suffolk County

► **POPULATION TRENDS**

In 2010, Suffolk County had the fourth largest county population in New York State, with an estimated 1,493,350 residents, and a population density of approximately 1,637 people per square mile (U.S. Census Bureau 2010a, StatsIndiana 2012). Between 1990 and 2011 the population in Suffolk County grew by 13.4 percent (StatsIndiana 2012). Approximately 98 percent of the population reported only one race in 2010, with an estimated 81 percent reporting white and approximately 7 percent reporting African-American. Approximately 16.5 percent of the Suffolk County population reported to be of Hispanic origin (U.S. Census Bureau 2010a).

Approximately 85 percent of the people living in Suffolk County in 2010 were native to the United States, with 77 percent born in New York State. Nearly 20 percent of the Suffolk County residents who were 5 years or older in 2010 spoke a language other than English at home. Of those residents, 58 percent spoke Spanish and 42 percent spoke some other language. Additionally, 45 percent of those that spoke a language other than English at home reported that they did not speak English “very well” (U.S. Census Bureau 2010b).

Like Nassau County residents, those who live in Suffolk County have more education than the state as a whole. Approximately 89 percent of Suffolk County residents 25 years and over had at least graduated from high school (compared to 84 percent statewide) and an estimated 32 percent had a bachelor’s degree or higher (consistent with the statewide rate of 32 percent). Fourteen percent of the population had completed a graduate or professional degree as well, which also is consistent with statewide rates for this level of education (U.S. Census Bureau 2010b). Similar to Nassau County, education levels in 2010 are consistent with those reported in the 2000 Census (approximately 89 percent of residents had at least a high school degree, and 31 percent had a bachelor’s degree or higher) (U.S. Census Bureau 2000).

There are two Native American reservations in Suffolk County: the Poospatuck reservation in Mastic and the Shinnecock reservation in Shinnecock Bay, Southampton. The Shinnecock Indian Nation tribe is among the oldest self-governing tribes in the United States, has been a state-recognized tribe for over 200 years, and became a federally-recognized tribe in 2010. The Unkechaug

Indian Nation of the Poospatuck Reservation is a state-recognized tribe with its 55-acre reservation located on Poospatuck Creek in Mastic.

► HOUSING

Similar to Nassau County, the average household size in Suffolk County in 2010 was 2.9 persons compared to an average family size of 3.4 persons. During this same year, there were 567,748 housing units in Suffolk County. In 2010, the county had 499,922 occupied housing units, approximately 79 percent of which were owner occupied. In 2010, Suffolk County homes had a median value of \$424,000 and a median rent of \$1,461 (U.S. Census Bureau 2010b). These figures are comparable to Nassau County and also trend above median housing value and rent for New York State as a whole (U.S. Census Bureau 2010c).

Families made up almost 76 percent of the households in Suffolk County, with approximately 60 percent of the families identified as married-couples and approximately 16 percent identified as other families. Nonfamily households made up an estimated 24 percent of all households in the county (U.S. Census Bureau 2006-2010).

► ECONOMY

In 2010, Suffolk County had a labor force of approximately 772,746 persons and an unemployment rate of 5.8 percent, above the state average of 4.8 percent. However, during the same timeframe, the county had an estimated median household income of \$84,506 and per capita personal income of approximately \$35,755, both of which are above the estimated statewide figures of approximately \$56,000 and \$31,000, respectively. The poverty rate of Suffolk County, 3.8 percent, also compares very favorably to the state poverty rate of approximately 14 percent. Between 2000 and 2010 the county's per capita income grew by nearly 16 percent (U.S. Census Bureau 2010b, U.S. Census Bureau 2000).

3-4. SUFFOLK COUNTY: EMPLOYMENT SECTORS

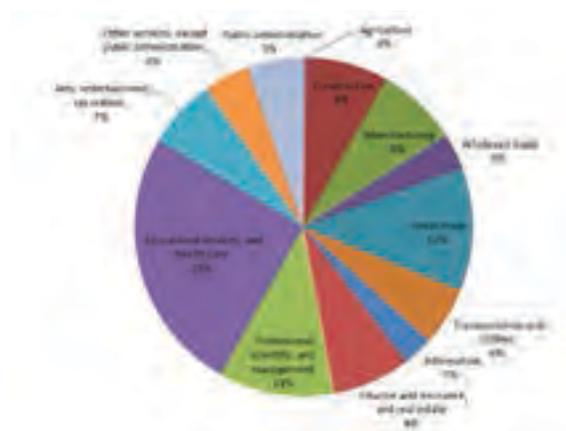


Chart 3-4: Suffolk County Employment Sectors.
Source: U.S. Census Bureau 2010.

Census data reported that between 2006 and 2010 the distribution of employment, by industry, in Suffolk County was concentrated in three major sectors:

- Educational services, health care, and social assistance: 25 percent
- Retail trade: 11.7 percent
- Professional, scientific, management, and administrative and waste management services: 11.1 percent (U.S. Census Bureau 2010b).

Fire Island

Fire Island is located in southern Suffolk County, south of Long Island, and is separated from the mainland portion of Long Island by the Great South Bay. Approximately 80 percent of Fire Island is public park land that will remain open and undeveloped. The entire landmass known as Fire Island includes the Robert Moses State Park, which is west of the western boundary of the national seashore, and Fire Island National Seashore, which has within its boundaries Smith Point County Park, Bellport Beach, Leja Beach and Marina (Brookhaven Town Beach/Davis Park) and Atlantique Beach & Marina (Islip Town Beach). Also included within Fire Island National Seashore is privately developed land within 17 distinct communities. When the Seashore was established in 1964, its enabling legislation stated that these communities and pre-existing commercial uses would be allowed to remain, as long as development was consistent with zoning standards established by the Secretary of the Interior (NPS 1977). Zoning codes from the four zoning authorities having jurisdiction on Fire Island were approved by the Secretary in 1985.

The U.S. Census defines Fire Island, New York as comprising three separate census tracts: Fire Island Census Data Place (CDP), Ocean Beach Village, and Saltaire Village. Fire Island CDP is the largest of the three, with a total year-round population of 292 people (U.S. Census Bureau 2010a). The two villages have smaller populations: Ocean Beach Village has a total population of 79 people and Saltaire Village has an estimated population of 37 people (U.S. Census Bureau 2010a). This amounted to an Island-wide total of 408 year-round residents in 2010. This represents a decline of approximately 17 percent from the population as counted by the U.S. Census in 2000, which identified 491 year-round residents on Fire Island (U.S. Census Bureau 2000a). A total of 4,200 structures are located on Fire Island, the vast majority of which are residential-units that are occupied during the summer visitor season.

► LAND AREA/POPULATION DENSITY

The land area of the Fire Island CDP is approximately 9 square miles, 7 miles of which are designated federal wilderness. The villages of Ocean Beach and Saltaire are considerably smaller in their land area, each being considerably less than one-half square mile. Fire Island CDP, comprising 15 communities within two towns (Islip and Brookhaven) had a population density of approximately 34 people per square-mile in 2010. In

contrast, Ocean Beach Village had a population density of approximately 654 people per square mile, and Saltaire Village approximately 132 people per square mile. The population density for each of these communities within Fire Island CDP was much lower than that of Suffolk County in the same year (over 1,600 people per square mile) (U.S. Census Bureau 2010b). As mentioned in previous sections, the seasonal population density on the Fire Island CDP is significantly higher during the summer months due to the presence of summer residents and visitors. U.S. Census data only considers a family or individual's primary place of residence when calculating population and population density.

► POPULATION CONCENTRATIONS AND TRENDS

Fire Island CDP

The Fire Island CDP had a permanent year-round population of 292 residents in 2010,¹³ and the median age was approximately 46; notably higher than the county's median age of nearly 40 (U.S. Census Bureau 2010a). The Fire Island CDP's permanent year-round population in 2000 was 310, indicating a decline in population of approximately 6 per cent between 2000 and 2010 (U.S. Census Bureau 2000a).

Ocean Beach Village

In 2010, Ocean Beach Village had a permanent population of approximately 79 residents. The median age for Ocean Beach in 2010 was approximately 55, notably higher than the county's median age of nearly 40 (U.S. Census Bureau 2010a). Ocean Beach's permanent year-round population in 2000 was 138, indicating a decline in year-round population of approximately 43 percent between 2000 and 2010 (U.S. Census Bureau 2000a).

Saltire Village

In 2010, Saltaire Village had a permanent population of 37 residents, and the median age for the Village was 55, well above the county (U.S. Census Bureau 2010a). Saltaire's permanent year-round population in 2000 was 43, indicating a decline in year-round population of approximately 14 percent between 2000 and 2010 (U.S. Census Bureau 2000a).

13 There are no population size requirements for the CDPs designated in conjunction with Census2000 and 2010. For the 1990 and earlier censuses, the U.S. Census Bureau required CDPs to qualify on the basis of various minimum population size criteria. Therefore, 1990 data for Fire Island CDP is not available.

TABLE 3-6: SUMMARY OF POPULATION CHARACTERISTICS AND TRENDS, FIRE ISLAND, NY*

	Fire Island CDP	Ocean Beach (village)	Saltaire (village)	Total / Average
2010 (Year-round residents)	292	79	37	408
2000 (Year-round residents)	310	138	43	491
Percentage Change in population – 2000 to 2010	- 6%	- 43%	- 14%	-17%
2010 Median Age	46	55	55	52
2000 Median Age	42	42	37	40

*U.S. Census, 2000, 2010

► **HOUSING**

Fire Island CDP

In 2010, the average household size in Fire Island CDP was 2.4 persons. There were approximately 3,029 housing units and a housing density of approximately 352 homes per square mile. Fire Island CDP had nearly 120 occupied housing units in 2010, of which approximately 81 percent were owner occupied. Nearly 3,000 (96 percent) housing units within Fire Island CDP were reported to be vacant in 2010 and were intended for seasonal, recreational, or occasional use (U.S. Census Bureau 2010a, U.S. Census Bureau 2010b). In 2010, families made up approximately 65 percent of the households in Fire Island CDP. Homes in Fire Island CDP had a median value of \$378,600. (U.S. Census Bureau 2010a, U.S. Census Bureau 2010b).

Ocean Beach Village

Similar to the Fire Island CDP, the average household size in Ocean Beach Village was 2.0 persons in 2010. There were more than 600 housing units, with a housing density of almost 4,300 homes per square mile. Approximately 92 percent of the housing units were owner-occupied, though more than 90 percent of the village’s housing units were reported to be vacant in 2010. This is consistent with the fact that most (99 percent) residential units within Ocean Beach Village are for seasonal, recreational, or occasional use. In 2010, families made up approximately 34 percent of the households in the village. Homes in Ocean Beach Village had a median value of \$820,800 in 2010 (U.S. Census Bureau 2010a, U.S. Census Bureau 2010b).

Saltaire Village

The average household size in Saltaire Village in 2010 was 2.6 persons. There were over 450 housing units, with a housing density of approximately 1,600 units per square mile. The village had 33 occupied housing units (7.3 percent of the total housing units), 93 percent of which were owner occupied in 2010. As evidenced by the U.S. Census Bureau data, and consistent with conditions in Ocean Beach Village CDP and Fire Island CDP, nearly all of the housing units within Saltaire Village are for seasonal, recreational, or occasional use. Families made up approximately 67 percent of the households in the village in 2010. Homes in Saltaire Village had a median value of more than \$1,000,000 in 2010 (U.S. Census Bureau 2010b).



TABLE 3-7: SUMMARY OF HOUSING, FIRE ISLAND, NY*

	Fire Island CDP	Ocean Beach (village)	Saltire (village)	Total / Average
Total Housing Units	3029	601	458	4088
Housing Density (Land Area)	352 units/ sq. mi. (9.2 square miles)	4,300 units / sq. mi. (0.1 square mile)	1600 units/ sq.mi. (0.3 square mile)	—
Occupied Housing Units (Year round)	120	53	33	206
Household size (average)	2.4	2.0	2.6	2.3
% Owner Occupied	81%	92%	93%	—
% Households described as families	65%	34%	67%	—
Median Home Value (2010)	\$ 378,600	\$ 820,800	\$ 1,000,000	\$ 732,900

*U.S. Census, 2010

► ECONOMY

Fire Island CDP

In 2010, Fire Island CDP had a labor force of 127 persons and an unemployment rate of approximately 7.2 percent, which is above the Nassau and Suffolk County and state averages of nearly 5.8 percent and 4.8 percent, respectively. Despite the elevated unemployment rate, the CDP had an estimated median household income of \$64,250 in 2010 and an estimated per capita personal income of approximately \$41,100, well above the estimated 2010 Nassau and Suffolk County and New York State averages. Although incomes continued to be above state averages, between 2000 and 2010, the per capita income in Fire Island CDP decreased by nearly 6 percent, compared to a 32 percent increase statewide.

According to 2010 Census data, distribution of employment by industry in Fire Island CDP was concentrated in three major sectors (U.S. Census Bureau 2010a):

- Educational services, and health care and social assistance: 25 percent
- Retail trade: 21 percent
- Professional, scientific, and management, and administrative and waste management services: 19 percent

This is a significant change from 2000, when the professional, scientific, and management, and administrative and waste management services sector (formerly categorized as “management, professional, and related occupations”) accounted for 46 percent of the labor force in Fire Island CDP, followed by sales and office occupations (24 percent) and construction, extraction, and maintenance occupations (23 percent) (U.S. Census Bureau 2000).

Ocean Beach Village

According to 2010 Census data, Ocean Beach Village had a labor force of over 60 persons and a 100 percent employment rate. The village had an estimated median household income of approximately \$60,800 and per capita personal income of approximately \$52,000. The village’s estimated median household and per capita incomes are lower than the estimated 2010 averages for Nassau and Suffolk County, though are still notably above statewide averages. Additionally, between 2000 and 2010, the per capita income for residents in Ocean Beach Village increased approximately 80 percent, compared to a 32 percent increase for the state.

2010 Census data shows that distribution of employment by industry in Ocean Beach village was concentrated in four major sectors:

- Arts, entertainment, and recreation, and accommodation and food services: 36 percent



- Finance and insurance, and real estate and rental and leasing: 19 percent
- Educational services, and health care and social assistance: 12 percent
- Transportation and warehousing and utilities: 11 percent

Similar to conditions at Fire Island CDP, employment concentrations have notably changed since 2000 when the largest employment sector for residents of Ocean Beach Village CDP was professional, scientific, and management, and administrative and waste management services (31 percent of the labor force) (U.S. Census Bureau 2010b, U.S. Census Bureau 2000), followed by sales and office occupation (28 percent), construction, extraction, and maintenance occupations (19 percent), and production, transportation, and material moving occupations (17 percent).

Saltaire Village

Saltaire Village had a labor force of 26 persons and a 100 percent employment rate in 2010. The village had an estimated median household income of approximately \$81,800 and an estimated per capita personal income of \$72,100, both of which are well above statewide estimates for the same year. The median household incomes are similar to those reported for Nassau and Suffolk County, though the per capita income is notably higher. Since 2000, per capita income estimates in Saltaire Village increased over 300 percent.

2010 Census data shows that distribution of employment by industry in Saltaire village was limited to 7 sectors (U.S. Census Bureau 2010b):

- Construction: 35 percent
- Retail trade: 17 percent
- Educational services, and health care and social assistance: 23 percent
- Finance and insurance, and real estate and renting and leasing: 8 percent
- Professional, scientific, and management, and administrative and waste management services: 10 percent
- Other Services, except public administration: 5 percent
- Public Administration: 2 percent

Consistent with conditions at Fire Island and Ocean Beach Village CDP, employment distribution has notably changed since 2000 when the labor force was concentrated in what is now the professional, scientific, and management, and administrative and waste management services sector (50 percent). The labor force was further distributed into the sales and office occupations (25 percent), construction, extraction, and maintenance occupations (13 percent) and service operations (13 percent) sectors (U.S. Census Bureau 2010b).

TABLE 3-8: SUMMARY OF ECONOMY, FIRE ISLAND, NY*

	Fire Island CDP	Ocean Beach (village)	Saltaire (village)	Total/ Average
Labor Force (Employed Persons)	127	60	26	213
Unemployment Rate	7.2	0	0	---
Median Household Income	\$ 64,250	\$ 60,800	\$ 81,800	\$ 68,950
Per Capita Income	\$ 41,100	\$ 52,000	\$ 72,100	\$ 55,100
Employment by Sector				
Construction	4%	0%	35%	---
Manufacturing	0%	11%	0%	---
Retail trade	18%	7%	18%	---
Transportation and warehousing, and utilities	6%	11%	0%	---
Finance and insurance, and real estate and rental and leasing	8%	13%	8%	---
Professional, scientific, and management, and administrative and waste management services	14%	0%	10%	---
Educational services, and health care and social assistance	36%	18%	23%	---
Arts, entertainment, and recreation, and accommodation and food services	10%	36%	0%	---
Other services, except public administration	0%	5%	5%	---
Public administration	4%	0%	3%	---
<i>U.S. Census, 2010</i>				

Community Character

To establish baseline conditions and gain a more complete understanding of the resources and values that define Fire Island, the NPS prepared a Community Character Study for Fire Island, New York. The study was co-sponsored by the National Parks & Conservation Association (NPCA) and was undertaken by A. Nelessen Associates, Inc, a firm that pioneered the type of visual analysis used in the study. The final report, completed in July 2012, evaluates and describes the physical features of Fire Island's 17 residential communities.

The study process employed a series of over 200 images of Fire Island as well as a series of demographic, policy, and market questions to develop a fuller understanding of participant responses to the images. Data for the report was collected through a project website established for these purposes. Input from 545 total participants (local residents and visitors) was

collected between November 2009 and January 15, 2010 and analyzed to identify the values and issues that are of the greatest concern.

According to the results of the online analysis, a vast majority (85 percent) of the participants have either resided on or visited Fire Island for at least 10 years. Of those who reside on Fire Island, the largest number of respondents reported living in Seaview (14 percent), Fair Harbor (13 percent), or Fire Island Pines (10 percent). The majority of respondents were seasonal residents, with approximately 33 percent residing on the island for 3-6 months per year. Nearly all participants identified that they are either 'satisfied' (approximately 42 percent) or 'highly satisfied' (approximately 53 percent) with the general quality of life on Fire Island.

The project website presented viewers with various images from Fire Island that portrayed a range of features and characteristics that defined the island's built environment and larger landscape. These features

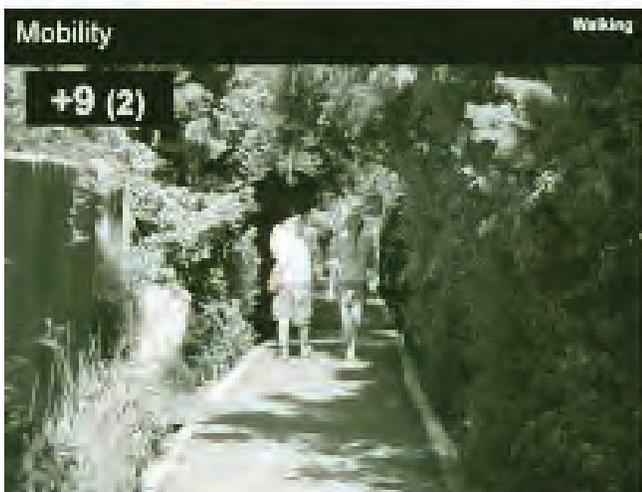
and characteristics included the natural environment, vehicular circulation, pedestrian ways, entrances, fences, landscaping, residential development, commercial development, gathering places and recreational spaces, and mobility (getting around). Participants were asked to rate each image either positively or negatively, based on how each made them feel. Four images received exceptionally high positive ratings: a community gathering place at sunset; pedestrians on a boardwalk; people disembarking from the ferry; and an assembly of carting wagons. These images spoke much more to the distinct experience of place rather than specific elements of the built environment.

However, this is not to imply that respondents were neutral on topics related to the built environment and larger landscape on Fire Island. Images of the natural beaches and dunes, dune vegetation efforts, wildlife, and naturalized portions of the bayshore all scored positively in the natural environment category. Boardwalks with

loosely landscaped or natural edges, well-designed entrances and fencing associated with private residences, and naturalized, “beach tolerant” landscape treatments all elicited positive responses. In terms of residential development, positive responses appeared to be driven less by architectural style than by materials, colors, window configuration, and landscaping. The highest-rated images of residential development depicted structures of natural wood, white trim, lots of windows, and natural landscape treatments. Images of gathering places and recreational spaces that also garnered positive responses included activities like fishing, clamming, the ferries, and youth- and family-based activities. Finally, in terms of mobility, walking and water-based transportation dominated the positively rated images.

Few images were universally disliked, but included cyclone or chain-link fencing and unscreened collections of construction material or debris that accumulate under elevated properties.

Images given the highest ratings by study participants. Source: A.Nelesen Associates, Inc.



Fire Island National Seashore's Contribution to the Local Economy

National park tourism is a significant driver in the national economy returning \$10 for every \$1 invested in the National Park Service. These findings are the result of a peer-reviewed visitor spending analysis conducted by U.S.G.S. economists for the National Park Service. The report shows \$14.7 billion of direct spending by 283 million park visitors in communities within 60 miles of a national park unit. This supported 243,000 jobs nationally, with 201,000 jobs found in the gateway communities, and had a cumulative benefit to the U.S. economy of \$26.75 billion (Cullinane Thomas et al, 2014).

In 2012, Fire Island National Seashore had about 483,000 recreational visitors resulting in an estimated \$19 million spent within the Seashore or surrounding communities. It is estimated that the monetary impacts from visitor spending supported 206 jobs (Cullinane Thomas et al, 2014).

Non-federal Lands within Fire Island National Seashore

Fire Island encompasses approximately 19,579 acres of marine and terrestrial lands, of which the NPS owns over 6,240 acres. The remainder of Fire Island is divided between other public lands (approximately 12,420 acres) and privately owned lands (approximately 920 acres). There are 17 communities within the Seashore, which include approximately 4,200 privately held developed properties.

In 1938, Robert Moses, as chairman of the Long Island State Park Commission, proposed creating a spur of the Ocean Parkway that would traverse the length of Fire Island. This project never materialized but it has been viewed as a major impetus behind local support for the Seashore's creation. The proposed Ocean Parkway Extension would have been developed through a number of Fire Island communities that were otherwise accessible only by ferry. Its construction would have meant the condemnation of hundreds of homes, most occupied by summer residents. Due to fears of reduced property values and the loss of isolation on Fire Island, as well as concerns over the high cost of the proposed project, the Suffolk County Board of Supervisors ultimately voted against the Moses plan. In 1964, Congress established the Fire Island National Seashore, largely in response to pressure to protect Fire Island from the real estate development and population growth that were engulfing Long Island. The decision to leave substantial amounts

of land within the Seashore in the hands of homeowners prompted the development of a complex system of land-use regulations intended to achieve federal land-management objectives through local zoning ordinances. There were two legislative objectives: first, to protect the natural environment; and second, to make the natural beauty of Fire Island available to the visiting public for recreational uses in harmony with the first (Kaufman and Starks 2008). The Seashore's boundary, established in its enabling legislation, recognized 17 communities contained within it. These communities are, from west to east:

- Kismet (including Seabay Beach)
- Saltaire
- Fair Harbor
- Dunewood
- Lonelyville
- Atlantique
- Robbins Rest
- Fire Island Summer Club
- Corneille Estates
- Ocean Beach
- Seaview
- Ocean Bay Park
- Point O'Woods
- Cherry Grove
- Fire Island Pines
- Water Island
- Davis Park (including Ocean Ridge)

Some Fire Island communities have only a few housing units, while others have hundreds of houses. A few of the communities have restaurants, grocery stores, retail stores, and other businesses. Only a small number of residents remain on Fire Island during the winter; however the population increases dramatically during the summer and early fall months. The primary policing authorities on Fire Island are the Suffolk County Police Marine Bureau and the NPS park rangers. Zoning is under the jurisdiction of four distinct municipalities: the towns of Islip and Brookhaven and the villages of Saltaire and Ocean Beach. In addition, some of these communities have homeowners' associations that provide additional guidance on land use and zoning

requirements within their communities. The Fire Island National Seashore Land Protection Plan (NPS 1984b) directed the NPS to support the local communities in developing appropriate zoning and development within the communities. It also called upon these communities and the county that governs them to support the NPS by protecting open space and other resources within their boundaries.

By 1967, the failure of land management on Fire Island was already apparent. Critics of the Seashore believed that there was too much development on the NPS's own land and not enough regulation on private land to protect Fire Island's resources. In order to satisfy these critics, the NPS had dropped most of its recreational development plans by 1975. Despite these efforts, the existing land-use and zoning patterns have allowed Fire Island's natural resources to continue to degrade. These conditions are addressed in the respective resource sections of this chapter. The potential causes of these conditions have been identified and are described below:

- Traditional zoning, which is designed to separate uses from each other, is poorly suited to manage the problems of development on a dynamic barrier island where the dominant land-use problems are erosion and impacts on natural resources.
- The federal dune district line, delimiting the area most in need of protection from development, has never been re-mapped, with the consequence that it has literally drifted out to sea as Fire Island has shifted over time.
- NPS is not able to enforce the federal standards effectively because it lacks an effective enforcement mechanism (Kaufman and Starks 2008).

In addition to these residential communities, there are several state and local parks on Fire Island. Robert Moses State Park, an 875-acre park on the western end of Fire Island, is outside of the boundaries of Fire Island National Seashore but adjacent to the Seashore's west end, in the vicinity of the Fire Island Light Station. Robert Moses State Park includes approximately 5 miles of ocean beach where visitors can swim, surf or surf-fish. Anglers can also fish from piers. A day-use boat basin can accommodate 40 boats. The state park also has picnic areas and an 18-hole pitch & putt golf course. A fee is charged to use the state park's parking lot, which provides pedestrian access to Fire Island National Seashore. Robert Moses State Park provides 8,200 parking spaces among four parking lots, including the 2,460-space lot adjacent to Fire Island

National Seashore. All four parking fields fill up at times during the summer months.

Smith Point County Park, within the boundary of the Seashore, is located on the opposite end of Fire Island. This area extends six miles east from Smith Point West to Moriches Inlet. The park is accessible via the William Floyd Parkway and is the county's largest oceanfront park, with swimming, scuba diving, surfing, saltwater fishing, camping, outer beach access, food concession, playground, showers, as well as seasonal special events. Reservations are required for all the sites in the campground. All sites have water, and many have electric hookups and sewer outlets. Outer beach camping is available on a first come, first served basis, beach conditions permitting. Off-road vehicles with a permit are allowed to drive on the eastern portion of the outer beach for recreational purposes. Smith Point County Park provides one parking lot of 4,000 spaces. National Park visitors can access the Fire Island Wilderness by walking from the Smith Point parking lot to the Fire Island Wilderness Visitor Center.

Finally, there are four recreational facilities operated by local municipalities. Atlantique Beach is owned and managed by the Town of Islip and includes a marina with approximately 150 boat slips, ferry access, snack bar, and restrooms. Leja Beach is located in the center of the community of Davis Park and is owned and managed by the Town of Brookhaven. It includes a 200-slip marina, ferry access, public restrooms, restaurant, store, and other amenities. Bellport Beach bisects the Fire Island Wilderness and is for the exclusive use of Bellport



residents. It has a small marina and docking area, ferry access, snack bar, and restrooms. Great Gun Beach is owned and managed by the Town of Brookhaven, though located at the eastern end and within the boundary of Smith Point County Park. It has a small marina, ferry access, snack bar, and restrooms.

SEASHORE OPERATIONS

Most of the land that is now Fire Island National Seashore was formerly a mix of public and private lands. The Seashore was designated in 1964 and included these lands, along with 17 residential communities. The facilities, roads, buildings, and utilities currently used for Seashore operations and by the visiting public are a mix of structures that existed prior to the establishment of the Seashore, as well as new infrastructure installed by the NPS.

Concessions & Commercial Services

Fire Island National Seashore has three main concessions contracts that manage the commercial aspects of visitor services: the Davis Park Ferry Company, the Sayville Ferry Service, Inc., and Fire Island Concessions, LLC, which was awarded a 10-year contract in the spring of 2005. This is a new and innovative approach for the Seashore that expanded the concessioner's responsibility for maintenance and capital improvements in the assigned areas. This contract covers all marinas, the campground, a store, snack bars, restaurant, and docking at both the Sailors Haven and Watch Hill Marinas.

Sailors Haven contains a marina and snack bar operated by concessioners and a lifeguarded beach administered by the NPS. Watch Hill also includes a marina and beach area, as well as a restaurant, snack bar, store, and campground, which are operated by concessioners. Talisman contains a dock facility for ferry landings and boaters to offload their beach gear. Additionally, there is a renovated concession area for snacks, restrooms, and showers, though the snack bar remains closed.

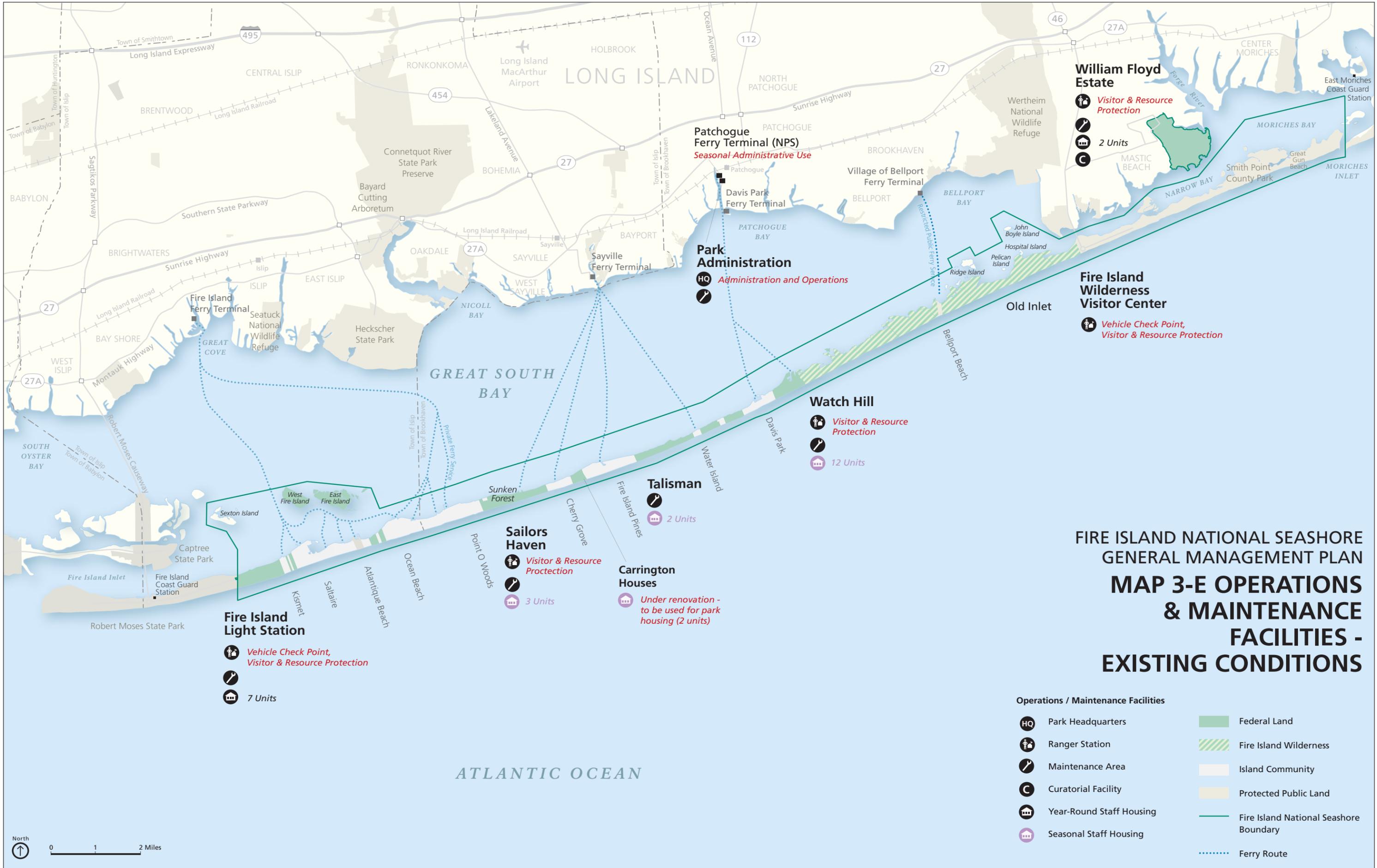
Concessioners are responsible for routine maintenance of the structures they use to support their services. However, concession contracts do not cover the maintenance and repair of all infrastructure related to their operation. Monies for the Seashore's circulation and access and marine channel maintenance are not routinely included in the Seashore's budget, but come from the regional or national NPS account by request.

Administrative and Maintenance Facilities

The Seashore's administrative and maintenance operations are based out of two locations along the Patchogue River, in the village of Patchogue on Long Island and at the William Floyd Estate. The Seashore's headquarters building is a small two-story structure along the river at 120 Laurel Street. There is a small gravel parking lot to the south and pull-in, off-street parking that provides ample parking for the NPS staff stationed there, as well as for the adjacent Seashore boat dock. The building houses offices for the superintendent, information officer, administrative officer, chief ranger, facility manager, the chief of natural resource management, and three assistants. The cultural resource management staff is based at the William Floyd Estate near Mastic Beach on Long Island, about a 30-minute drive from Patchogue. The headquarters building is connected to the village's utility system and is provided with electric, water, natural gas, and phone service by local utilities. Due to the high water table and proximity to the river, the building's on-site septic disposal system often backs up. Also, the parking area and yard flood during extreme tides and storm events, making parking difficult and dangerous.

The remainder of the Seashore's administrative and maintenance facilities are housed in a small complex of buildings approximately 1/3 of a mile from the headquarters, in an area called the Patchogue Maintenance Facility (PMF) on West Avenue: the "deli" building and a converted warehouse. The "deli" building (a name reflecting its original use), formally referred to as PMF-A, is located immediately on West Avenue, was constructed in the 1940s or 1950s. PMF-A houses the Seashore's information technology department, park planning, and resource management offices. It is served by local utilities but is connected to an on-site septic disposal system for waste water, located beneath a gravel parking lot behind the building which also provides access and staff parking to the warehouse.

The warehouse is set back from West Avenue closer to the Patchogue River. The warehouse was acquired by the NPS in the 1970s and is divided into two areas. One area, referred to as PMF-B, has been remodeled to support office use and is climate controlled. This portion houses workshop space for painting and woodworking, the Seashore's library, and offices for administration, interpretation, and resource management. Portions of the warehouse that are not climate controlled include the



William Floyd Estate
 Visitor & Resource Protection
 2 Units

Fire Island Wilderness Visitor Center
 Vehicle Check Point, Visitor & Resource Protection

Patchogue Ferry Terminal (NPS)
 Seasonal Administrative Use

Park Administration
 Administration and Operations

Watch Hill
 Visitor & Resource Protection
 12 Units

Talisman
 2 Units

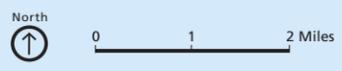
Sailors Haven
 Visitor & Resource Protection
 3 Units

Carrington Houses
 Under renovation - to be used for park housing (2 units)

Fire Island Light Station
 Vehicle Check Point, Visitor & Resource Protection
 7 Units

**FIRE ISLAND NATIONAL SEASHORE
 GENERAL MANAGEMENT PLAN
 MAP 3-E OPERATIONS
 & MAINTENANCE
 FACILITIES -
 EXISTING CONDITIONS**

- Operations / Maintenance Facilities**
- Park Headquarters
 - Ranger Station
 - Maintenance Area
 - Curatorial Facility
 - Year-Round Staff Housing
 - Seasonal Staff Housing
 - Federal Land
 - Fire Island Wilderness
 - Island Community
 - Protected Public Land
 - Fire Island National Seashore Boundary
 - Ferry Route



maintenance storage areas, garage, and a maintenance office. The warehouse building is connected to local utilities, including the village of Patchogue sewer system.

Behind the warehouse, the Patchogue River abuts a large gravel lot. A small storage building in the lot has been converted into the Seashore's small conference room (known as the River Room). A second small building houses the Seashore's vehicle maintenance shop. The remainder of the lot is used for employee parking and NPS vehicle and boat storage and maintenance. The NPS also maintains a marina, boat launch, and dock at this location for administrative purposes. Because there is limited space on Fire Island to store equipment, most of the Seashore's maintenance activities are initiated from this dock.

The property immediately to the north of the warehouse includes a public parking lot to accommodate the Seashore's ferry terminal in the same location. There is no charge to use the parking lot and it is usually filled to capacity on summer weekends. The ferry terminal building provides ferry ticket sales, restrooms, a sheltered waiting area, and a multi-purpose meeting room.

Staff Housing

Consistent with the Seashore's approved housing plan, staff housing is provided at several locations on Fire Island and at the William Floyd Estate. At Watch Hill, there are two housing units for concessioners' staff, nine units for NPS seasonal staff, and one unit remains unoccupied due to its location in a sensitive area (wetland). Talisman has two housing units for seasonal NPS employees. At Sailors Haven, three housing units are next to the maintenance area: one is used by an NPS concessioner and the other two are used by NPS seasonal employees. The housing units have limited utilities and are connected to on-site sewage disposal systems, like the other homes on Fire Island. Two units of staff housing are located at the William Floyd Estate on Long Island. The condition of a number of the cottages has deteriorated over the years. Repairs are made as staff and funding become available.

Operations

Operations at Fire Island National Seashore are divided into five functional areas: visitor and resource protection, interpretation and education, resource management, maintenance, and administration. In total, in fiscal year (FY) 2011, the Seashore employed 65 full-time

equivalencies (FTE) and had an operational budget of approximately \$4.9 million (NPS 2011a).

Visitor and Resource Protection

The Visitor and Resource Protection functional area represents the Seashore's operational resources that go toward protecting the Seashore and ensuring visitor safety. In FY 2011, there were a total of 18.3 full-time equivalent positions (FTE) available to address the responsibilities under this functional area. The total annual budget for this area was approximately \$1.3 million, approximately 27 percent of the Seashore's total budget (NPS 2011a).

The visitor and resource protection staff includes Seashore rangers and ocean lifeguards who protect park visitors, resources, and property through professional services in law enforcement, emergency medical services, search and rescue, beach safety, and community assistance.

Interpretation and Education

The Interpretation and Education functional area is represented by interpretive and educational program staff including Seashore interpretive rangers and guides who provide visitor information, develop and deliver public and educational programming, operate visitor centers, design and develop non-personal media (exhibits, signage, publications, social media, etc.) and oversee the



volunteer program. In FY2011, there were a total of 9.7 FTE available to undertake the responsibilities associated with this functional area. The total annual budget for this area was approximately \$ 640,000, approximately 13 percent of the Seashore's total budget (NPS, 2011a).

Resource Management

Operations in the resource management functional area include the monitoring, management, protection, and preservation of natural and cultural resources. The Seashore is charged with the protection of miles of ocean and bayside shoreline, uplands, wetlands, maritime forests, and endemic, migratory, and endangered species. In addition to natural resources, the Seashore is charged with protecting two historic properties – the William Floyd Estate and the Fire Island Light Station, both of which are listed on the National Register of Historic Places. The Seashore's List of Classified Structures identifies 40 historic structures as contributing resources associated with these properties. Resource management is one of the smallest functional areas of the Seashore, with only 8.7 FTE in FY2011. Expenditures in this area made up approximately 14 percent of the total Seashore expenditures, approximately \$670,000 (NPS 2011a).

Maintenance & Facility Operations

Maintenance & Facility operations consist of activities that prolong the life of the Seashore's numerous assets – buildings, fleet, trails, utilities, roads and water channels – many of which are more than 40 years old and were not built for current visitation levels. In FY2011, 19.5 FTE were available for recurring maintenance, including facilities operations staff, accounting for 28% of the Seashore's budget (nearly \$1.7 million in FY2011) (NPS 2011a).

Facility operations consist of the activities necessary to manage the Seashore's infrastructure efficiently and safely on a day-to-day basis, as well as to complete extensive opening and closing procedures before and after the peak summer season (June-September). Included in facility operations are the Seashore's utilities: public water, waste water, fuel distribution, fire suppression, and electrical systems. Most of these services are provided by utilities companies on Long Island; however, some are owned and operated by the Seashore. The Seashore's utility systems are exposed to extreme conditions in a marine environment, which has accelerated deterioration. This, along with a lack of routine maintenance, has led to increased expenses related to periodic repair and rehabilitation.

Management and Administration

The Management and Administration functional area is directed by the Superintendent's Office in cooperation with the management team. This team must address internal issues as well as focus on all external commitments. Administrative staff provide essential support to all Seashore operations. Park planning is part of this management team and provides support on issues related to building and zoning within the communities, as well as limited GIS support. The Administrative staff includes a public affairs and communication coordinator. Combined expenditures for these activities in FY11, including Superintendent's staff, totaled approximately \$870,000, which accounted for 8.75 FTE and approximately 18 percent of total park funding, excluding investments (NPS 2011a).

As reported in the Seashore's 2004 Business Plan, all of these functional areas were evaluated as lacking the necessary staffing and funding to meet their objectives. Therefore, programs were likely to be cut or limited, facilities would not be kept in the optimal conditions, and Seashore resources would be exposed to potential damage (NPS 2004a). The Seashore's situation relative to funding for operations has remained largely unchanged.