FIRE ISLAND NATIONAL SEASHORE

WATER RESOURCES SCOPING REPORT

Water Resources Division

National Park Service
Coastal Research Center
University of Rhode Island

and

Fire Island National Seashore

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EXECUTIVE SUMMARY

The location of Fire Island in the New York metropolitan area, coupled with its extensive beach system, the increasing popularity of recreational activities on Great South Bay, and the accessibility to nearshore ocean areas makes Fire Island National Seashore (FIIS) one of the premier units of the National Park System for water-based recreational activities.

Located primarily on Fire Island, the National Seashore includes approximately 22 miles of ocean frontage, more than 30 miles of backbarrier bay shoreline, and extensive wetland areas which provide important habitat and nursery grounds for a variety of invertebrates and fish, support important wildlife habitat for waterfowl and terrestrial animals, and help to maintain barrier island stability.

The purposes of the FIIS Water Resources Scoping Report include: 1) identifying water resource-related issues and management concerns; 2) providing a summary of the existing hydrological information pertaining to these issues; and 3) proposing Resource Management Plan (RMP) project statements that provide FIIS management with alternatives for addressing water resource-related issues and concerns.

Water resource-related issues discussed in this report include:

- an assessment of water quality pertaining to recreation, resource protection, and the provision of a safe and adequate water supply;
- an analysis of options related to the capping or abandonment of unused wells in the Wilderness Area;
- identification of the need for an island-wide wastewater management study;
- an evaluation of wetlands mapping & delineation requirements;
- an overview of water resource-related aspects of park development and operational activities.

Seven RMP project statements have been prepared (Appendix A) to provide background information and alternatives to address the above issues.

INTRODUCTION

Fire Island National Seashore, located within the New York City metropolitan area, was set aside by Congress to provide "...for the use of future generations relatively unspoiled and undeveloped beaches, dunes, and other natural features ... which possess high value as examples of unspoiled areas of great natural beauty in close proximity to large concentrations of urban population..." (16U.S.C.459e et. seq.)

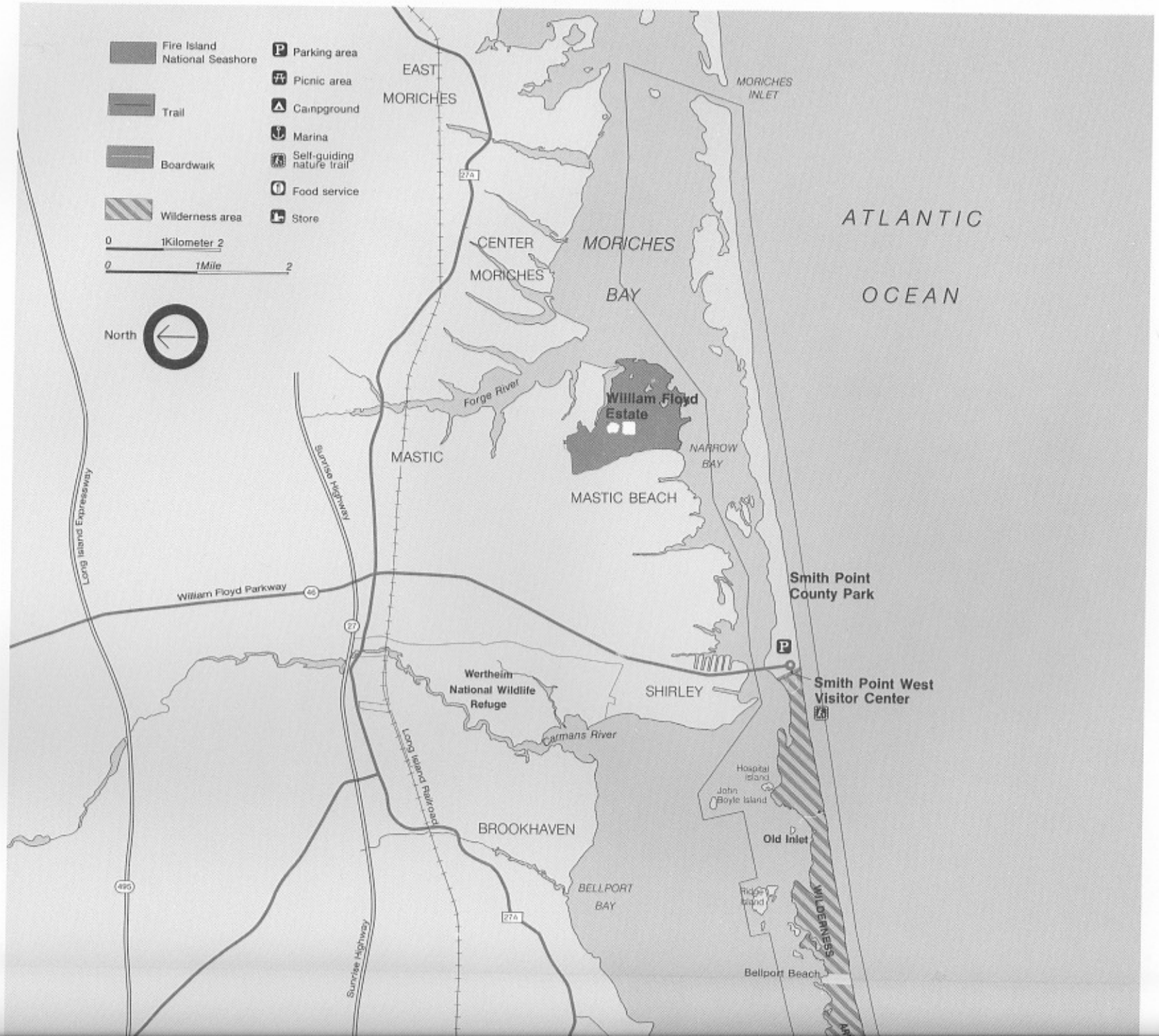
Fire Island is a 48 kilometers (km) (30 mi) long barrier island, extending from Fire Island Inlet (Democrat Point) eastward to Moriches Inlet, and forms the central portion of the barrier island system which runs parallel to the southern shore of western Long Island. Generally the island consists of a typical cross-barrier profile of ocean beach, primary and secondary dunes and swales, with salt marsh and estuarine beaches at the bay-front (Oosting 1954).

FIIS, a unit of the National Park System, is the largest landholder on Fire Island, which also contains a state park, a county park, and approximately 17 private communities, many of which are interspersed among the sub-units of the National Seashore (Figure 1). The boundary of FIIS extends 4000 feet (ft) into Great South Bay, and also includes parts of Narrow Bay and Moriches Bay, as well as waters 1000 ft seaward of mean low water into the Atlantic Ocean. In addition, FIIS administers the William Floyd Estate, a 600-acre tract located on the south shore of Long Island adjacent to Narrow Bay and Moriches Bay, plus administrative facilities located in Patchogue, NY.

The Fire Island barrier forms the south shore of a backbarrier/lagoon system which includes Great South Bay, Narrow Bay, and Moriches Bay. Great South Bay, is the largest of a series of interconnecting shallow lagoons located along Long Island's southern shore. Great South Bay covers an area of approximately 223 km^2 (86 mi^2) and has an average natural depth of approximately 1.3 meters (m) (5 ft), with dredged channels reaching depths of 4-9 m (15-30 ft) (Bokuniewicz and Schubel 1991). To the east, Narrow Bay and Moriches Bay are smaller shallow lagoon systems also separated from the Atlantic Ocean by Fire Island.

Salinity in Great South Bay averages 26 parts per thousand (ppt) which is approximately 6 ppt lower than the salinity in the adjacent ocean. Salinity generally decreases from west to east within the bay influenced both by relative location to direct (Fire Island Inlet) and indirect (South Oyster Bay and Moriches Bay) inlets and the proximity to freshwater inputs occurring along the northern shore of the bay (Wilson, et al. 1991). The quality of the backbarrier bay waters is greatly influenced by freshwater inflow from runoff and from mixing with nearshore oceanic waters. Water quality of nearshore oceanic areas and the backbarrier bays is summarized in more detail later in this report.

Low-lying areas on Fire Island and the shallow water of the backbarrier lagoon system also support a variety of water-dependent ecosystems including freshwater wetlands,


Fire Island National Seashore
Trail
Boardwalk
Wilderness area
Parking area
Picnic area
Campground
Marina
Self-guiding nature trail
Food service
Store
0 1Kilometer 2
0 1Mile 2
North
EAST MORICHES
CENTER MORICHES
MORICHES BAY
MORICHES INLET
ATLANTIC OCEAN
Forge River
William Floyd Estate
NARROW BAY
MASTIC
MASTIC BEACH
Long Island Expressway
Sunrise Highway
William Floyd Parkway
Smith Point County Park
Smith Point West Visitor Center
Wertheim National Wildlife Refuge
SHIRLEY
Carmans River
Long Island Railroad
Hospital Island
John Boyle Island
Old Inlet
BROOKHAVEN
BELLPORT BAY
Riggs Island
WILDERNESS
Bellport Beach

BROOKHAVEN
BELLPORT BAY
Old Inlet
WILDERNESS AREA
Bellport Beach
BELLPORT
Sunrise Highway
Montauk Highway
PATCHOGUE
Medford Avenue
Long Island Expressway
Ocean Avenue
Watch Hill Visitor Center
PATCHOGUE BAY
Park Headquarters
Patchogue River
Watch Hill Ferry Terminal
Ferries operate May to November
Ocean Ridge
Brookhaven Beach
Davis Park
Patchogue Holbrook Road
Town of Brookhaven
Town of Islip
BLUE POINT
Blue Point
Blue Point Beach
Water Island
Barrett Beach
Talisman
Fire Island National Seashore Boundary
Lifeguarded Beach
HOLBROOK
BAYPORT
Veterans Memorial Highway
Long Island Railroad
SAYVILLE
Town of Islip
Town of Brookhaven
Fire Island Pines
Ferries operate May to November
BOHEMIA
WEST SAYVILLE
Cherry Grove
GREAT SOUTH BAY
NICOLL BAY
Sailors Haven Visitor Center
Lifeguarded Beach

GREAT SOUTH BAY
NICOLL BAY
Sailors Haven Visitor Center
Sunken Forest
Oakleyville
Lifeguarded Beach
Connetquot River State Park
OAKDALE
Connetquot River
Veterans
Point O'Woods
Ocean Bay Park
Seaview
Ocean Beach
Corneille Estates
Robbins Rest
Atlantique
Atlantique Beach
Lonelyville
Dunewood
Fair Harbor
Saltaire
Seabay Beach
Kismet
Nicoll Point
Town of Brookhaven
Town of Islip
Heckscher State Parkway
Heckscher State Park
CENTRAL ISLIP
EAST ISLIP
Southern State Parkway
Sunrise Highway
Montauk Highway
Ferries operate May to November
BAY SHORE
GREAT COVE
Ferries operate May to November
Fire Island Lighthouse Visitor Center
Sagtikos State Highway
BRIGHTWATERS
Long Island Railroad
Robert Moses Causeway
Captree State Park
Fire Island Coast Guard Station
Robert Moses State Park
Captree Island
WEST ISLIP
Town of Islip
Town of Babylon
Oak Beach
FIRE ISLAND INLET
Sampawams River
Oak Island
NORTH BABYLON
BABYLON
SOUTH OYSTER BAY
To Jones Beach and Gilgo State Park
Democrat Point

brackish ponds, salt marshes, and areas of submerged aquatic vegetation (e.g., eelgrass beds). Wetland ecosystems along the southern shore of Long Island have been seriously degraded due to extensive development impacts (Smith, et al. 1970). The importance of protecting the remaining wetland resource as essential habitat is widely recognized.

WATER RESOURCE SCOPING REPORT

Whether in support of natural systems or providing for visitor use, water is often a significant resource in units of the National Park System. Consistent with its fundamental purpose, the National Park Service (NPS) seeks to perpetuate surface and ground waters as integral components of park aquatic and terrestrial ecosystems, by carefully managing the consumptive use of water and striving to maintain the natural quality of surface and ground waters in accordance with all applicable federal, state, and local laws and regulations. In addition, water-based recreation such as swimming, fishing, and boating, as well as the health of the estuarine ecosystem are dependent upon the maintenance of adequate water quality.

Thus, water resource inventory and monitoring activities are integral components of resource management at FIIS. This Water Resources Scoping Report assists park management by: 1) providing an overview of existing water resource information, 2) identifying and discussing a number of water resources-related issues and management concerns, and 3) recommending a course of action for addressing water resources-related issues at FIIS. These proposed actions include 7 water resources-related project statements which can be incorporated into the National Seashore's Management Plan (RMP) for future funding consideration.

WATER RESOURCE PLANNING ISSUES AT FIRE ISLAND NATIONAL SEASHORE

Water Resources Division (WRD), North Atlantic Region, and FIIS personnel held an initial water resource scoping session at Fire Island from July 18 - 20, 1991. The purpose of this session was to gain familiarity with FIIS's water resources and to identify water resources issues and management concerns. Subsequent discussions have been held with additional NPS personnel, federal, state, and county officials, and water resources professionals in order to further refine potential water resources issues and develop alternatives pertaining to these issues.

Specific water resources issues identified for consideration in this Water Resource Scoping Report include:

1) Water Quality Issues

The location of Fire Island in the New York metropolitan area, coupled with its extensive beach system, the increasing popularity of recreational activities on Great South Bay, and the accessibility to nearshore ocean areas makes FIIS one of the premier units of the National Park System for water-based recreational activities. Because of its close proximity to urban areas and heavy recreational use, water quality is a particularly important natural resource management concern.

a. Ocean Beaches Water Quality

Water quality data for the Atlantic Ocean along the southern shore of Fire Island is limited primarily to public health-related bacteriological monitoring. From a public health perspective, the water quality of Fire Island's Atlantic Ocean beaches is usually very good, generally meeting or exceeding public health-related bacteriological water quality standards that have sometimes closed ocean bathing beaches in other parts of New York and New Jersey.

The significant exceptions to this high water quality are periodic, reoccurring episodes of contamination from debris including garbage, tar and grease balls, sewage-related items (condom rings, tampon applicators, etc.), and medical wastes which have, on occasion, forced the closure of beaches along the southern coast of Fire Island.

The U.S. Environmental Protection Agency (USEPA) has long monitored fecal coliform bacteria, and has more recently added *Enterococcus* bacterial monitoring at 7 ocean beaches on Fire Island, as part of their New York Bight Water Quality Study (USEPA, 1989). In addition, the Suffolk County Department of Health Services, in cooperation with the NPS, conducts public health monitoring of fecal and total coliform bacteria for most public ocean and bayside beaches, especially during the bathing season.

Table 1 summarizes period of record data for fecal coliform bacteria monitored by the USEPA at 7 ocean beaches on Fire Island. These data indicate generally excellent water quality as measured by this long-standing public health indicator. Utilizing the Membrane Filter (MF) technique, the US EPA found that between 1976 and 1991 the geometric mean concentrations of fecal coliform bacteria were extremely low, ranging from 1.17 to 1.43 organisms/100 milliliters (mL) of water. The highest measurement made at these beaches during this study was 168 organisms/100 mL, which itself would meet the New York State bathing beach standard (fecal coliform bacteria monthly geometric mean, from a minimum of 5 examinations, shall not exceed 200 organisms/100 mL).

The USEPA began *Enterococcus* bacterial monitoring in 1985. This newer methodology, recommended as superior to fecal coliform for marine water quality monitoring (USEPA 1986) also indicates very good to excellent bacterial water quality (Table 2). Differences in geometric mean concentrations for the 7 sites were not notable, ranging from 1.18 organisms/100 mL to 1.35 organisms/100 mL. The recommended US EPA maximum criteria for marine recreational waters is 35 enterococci/100 mL (based upon a monthly geometric mean of not less than 5 examinations).

STATION	PERIOD OF RECORD	n	GEOMETRIC MEAN	RANGE
LIC-17 Robert Moses State Park	1978-1991	181	1.17	0-16
LIC-18 Great South Beach	1976-1991	180	1.23	0-45
LIC-19 Cherry Grove	1976-1991	170	1.21	0-23
LIC-20 Water Island	1976-1991	175	1.24	0-16
LIC-21 Bellport Beach	1976-1991	165	1.33	0-26
LIC-22 Smith Point County Park	1976-1991	167	1.30	0-64
LIC-23 Moriches Inlet (West)	1976-1991	160	1.43	0-168

TABLE 1. Summary of USEPA's fecal coliform bacterial monitoring (Method 31613) for the Atlantic Ocean beaches along Fire Island.

More intensive public health-related bacterial monitoring (fecal coliform and total coliform bacteria) is conducted by the Suffolk County Department of Health Services in cooperation with the NPS at bathing beaches on Fire Island. Table 3 summarizes Most Probable Number (MPN) bacterial determinations for fecal and total coliform bacteria for 13 Fire Island ocean beaches monitored in 1989 and 1990. While the MPN-derived data used in these analyses cannot be directly compared to the MF-derived data

STATION	PERIOD OF RECORD	n	GEOMETRIC MEAN	RANGE
LIC-17 Robert Moses State Park	1985-1991	60	1.30	0-43
LIC-18 Great South Beach	1985-1991	59	1.32	0-24
LIC-19 Cherry Grove	1985-1991	56	1.27	0-24
LIC-20 Water Island	1985-1991	56	1.31	0-21
LIC-21 Bellport Beach	1985-1991	53	1.35	0-24
LIC-22 Smith Point County Park	1985-1991	54	1.35	0-20
LIC-23 Moriches Inlet (West)	1985-1991	49	1.18	0-5

TABLE 2. Summary of US EPA's *Enterococcus* bacterial monitoring (Method 31649) for the Atlantic Ocean beaches along Fire Island.

utilized by the US EPA, both generally indicate good bacterial water quality. An evaluation of laboratory data sheets provided by the Suffolk County Department of Health Services for 1991 indicates that the bacterial water quality was generally good with only a few instances reported when fecal coliform MPN determinations exceeded 200 organisms/100 mL at the ocean beach sites (one time each at Fair Harbor, Atlantique, and Sailors Haven, and twice each at Ocean Beach and Barrett Beach). The increase in bacterial levels in 1990 from 1989 indicate that continued monitoring is required in order to detect any increases in instances where fecal coliform bacteria exceed 200 organisms/100mL.

From 1984-1988, the NPS also conducted independent bacteriological monitoring at three popular visitor-use ocean beaches located in FIIS (Sailors Haven, Watch Hill, and Old Inlet). Bacterial water quality at these beaches was also found to range from very good to excellent (Northup 1986; Reagan 1988; McNulty 1989).

STATION	1989 TOT COLI Geo Mean MPN/100mL	1989 FEC COL Geo Mean MPN/100mL	1990 TOT COL Geo Mean MPN/100mL	1990 FEC COL Geo Mean MPN/100mL
I-13: Kismet Beach	23	23	19	19
I-14: Saltaire	23	19	55	26
I-26: Fair Harbor	33	23	32	29
I-16: Dunewood	21	19	68	32
I-18: Atlantique Beach	26	21	31	24
I-19: Ocean Beach	41	21	24	24
I-23: Seaview	21	19	24	24
BR-34: Point O'Woods	21	19	19	19
BR-33: Sailors Haven	19	19	109	45
I-15: Barrett Beach	22	19	37	23
I-32: Davis Park	23	21	22	22
BR-31: Watch Hill	27	24	76	34
BR-30: Bellport Beach	45	39	37	32

TABLE 3. Summary of Fire Island ocean beaches bacteriological water quality monitoring (MPN) for the 1989 and 1990 bathing seasons (June 1 - Sept 15). Source: Suffolk County Department of Health Services in cooperation with FIIS.

Water quality information for constituents other than bacteria is scarce. An environmental inventory in 1975 provided salinity, pH, Secchi disc depth, dissolved oxygen, phosphate, nitrate, and nitrite data all indicating good water quality (McCormick and Associates 1975). More recent research efforts by the National Oceanographic and Atmospheric Administration (NOAA) seem to indicate that the contaminant effects associated with historic disposal activities in the New York Bight do not appear to reach the nearshore waters of Fire Island (U.S. Department of Commerce 1982). Routine water quality parameters such as dissolved oxygen, bacteria, suspended solids, etc. were also monitored at 4 ocean beaches (Fire Island Lighthouse, Sailors Haven, Watch Hill, and Smith Point) during 1983. Water quality was found to

be acceptable, though a dense bloom of green algae was detected during the August 1983 sampling in the vicinity of the Fire Island Lighthouse (Adams, et al. 1985).

b. Backbarrier Bay Water Quality Issues

Great South Bay, Narrow Bay, and Moriches Bay form a complex estuary system that ranks among the most productive marine habitats in the world (Carpenter, et al. 1991). While long term water quality trends in this backbarrier bay system are difficult to assess, it is apparent that main-bay water quality has adversely been affected by water quality in adjoining bays, by adjacent land-use activity, and by inflow from tributaries along Long Island's southern shore.

Carpenter, et al. (1991) attribute a major phytoplankton species shift that occurred in the backbarrier bay system in the 1930s to uncontrolled waste introduction to the bay from Long Island duck farms. The decline and eventual demise of the area's commercial oyster (*Crassostrea virginica*) industry from the 1930s through the 1950s have been attributed to changes in salinity patterns and to predation brought about by the opening of Moriches Inlet, over-fishing, and, at least partially, to nutrient induced dense blooms of very small green algae (*Nannochloris spp.*) which clogged the cilary tracts of shellfish. In the 1950s and 1960s, the hard clam (*Mercenaria mercenaria*) fishery grew in economic importance. This commercial fishery, too, has suffered a major decline since its peak in 1976, possibly due to the adverse effects of over-fishing and environmental degradation (Kassner and Cramer 1983).

While discharges from duck farms to the backbarrier bay system have been largely eliminated, intensive suburbanization including residential, commercial, and industrial development, has been occurring along Long Island's south shore since the 1950s (Koppelman 1991a). Today, the predominant loading of pollutants into the bay system comes from non-point sources related to this development, including stormwater runoff from roadways and residential/commercial developments and leachate from septic systems and cesspools. Additional inputs from localized non-point sources also include runoff from construction sites and sand/gravel mining operations; transport of fertilizers and pesticides applied to agricultural fields, golf courses, and residential lawns; leaking underground storage tanks, pipelines, and sewers; and discharges from the large numbers of boats utilizing the backbarrier bays. Point source inputs include wastewater treatment facilities, combined sewer overflows, industrial discharges, and others. The pollutants associated with these non-point and point sources often include organic compounds, pathogenic bacteria and viruses, petroleum hydrocarbons, metals, and nutrients (Dennison, et al. 1991).

An unusual algal bloom of *Aureococcus anophagefferens*, commonly known as the "brown tide," was first detected in Great South Bay in 1985 and has continued to a greater or lesser extent until the present (Cosper, et al. 1987; Nuzzi and Waters 1989). In addition to impairing the aesthetic qualities of the water, the bloom has had deleterious effects on shellfish populations and eelgrass beds within affected areas (Dennison, et al. 1991).

It is hypothesized that regional meteorological factors contribute to the initiation of "brown tide" blooms (Cosper, et al. 1989). Increased bay salinity caused by reduced rainfall in early summer 1985 probably triggered the initial growth of the alga *A. anophagefferens*. Coupled with reduced flushing (increased residence time) in the bay due to regional sea level changes, conditions were ideal for retention and maintenance of a brown tide bloom. The relationship of human induced pollutant loading to forcing by meteorological conditions remains under investigation (Cosper, et al. 1989).

Accompanying the increase in population along Long Island's south shore has been an increase in recreational demands placed upon Great South Bay. Today the bay is a popular resource for swimming, fishing and shell-fishing, boating, wildlife observation, and environmental education. Consequently, it is safe to assume that water quality issues within Great South Bay have the potential to become more, rather than less, controversial in future years.

FIIS's boundary extends approximately 4000 ft into Great South Bay and Moriches Bay along the northern edge of Fire Island from approximately the western end of the National Seashore eastward to Moriches Inlet. This area of the National Seashore includes extensive shallow bay bottom, wildlife habitat, and wetland areas. While the NPS operates marinas at Watch Hill and Sailors Haven, FIIS does not maintain or operate public beaches on Great South Bay. Bay beaches do, however, exist in the private Fire Island communities of Saltaire, Fair Harbor, Dunewood, Atlantique, Ocean Beach, Seaview, and Point O'Woods. Public health-related bacteriological monitoring is conducted at these bay beaches by the Suffolk County Department of Health Services in cooperation with the National Park Service. Coliform bacterial concentrations at these beaches, while higher than those found on the oceanfront, are usually lower than those found at bay beaches located on the north shore of Great South Bay (Dennison, et al. 1991) and within levels deemed acceptable for public recreation.

Table 4 summarizes bacteriological monitoring data for 6 Fire Island bay beaches during the 1989 and 1990 bathing seasons (June 1-September 15). While the bay beaches usually met the New York State fecal coliform standard for public recreation (geometric mean of 200 organisms/100 mL based upon a minimum of 5 samples per month), there were occasions from July-September 1990 when the geometric mean exceeded 200 organisms/100 mL at bay beaches located in Seaview, Atlantique, and Fair Harbor (Suffolk County Department of Health Services, unpublished data).

STATION	1989 TOT COLI Geo Mean MPN/100mL	1989 FECAL COLI Geo Mean MPN/100mL	1990 TOT COLI Geo Mean MPN/100mL	1990 FECAL COLI Geo Mean MPN/100mL
I-14A: Saltaire Village	33	19	138	51
I-26A: Fair Harbor	97	43	334	116
I-18A: Atlantique	29	19	452	192
I-20: Ocean Beach	55	35	263	84
I-24: Seaview Beach	89	48	724	264
BR-35: Point O'Woods	205	142	56	41

TABLE 4. Summary of Fire Island bay beaches Most Probable Number bacteriological water quality monitoring for the 1989 and 1990 bathing seasons (June 1-Sept 15). Source: Suffolk County Department of Health Services in cooperation with FIIS.

Snow (1982) reported that higher concentrations of coliform bacteria are often found in the vicinity of marinas located along the southern shore of Great South Bay. While marinas typically are not used for swimming, they may serve as a significant source of contamination for nearby bathing beaches. Northup (1986), Reagan (1988), and McNulty (1989) monitored bacterial water quality in the vicinity of the Sailors Haven Marina and Watch Hill Marina of FIIS. The areas with the greatest recreational boating use (i.e., marinas/docking facilities), in most cases, had the highest bacterial concentrations. In 1991, the Suffolk County Department of Health Services began monitoring fecal and total coliform bacteria levels at the marinas/docking facilities located at Atlantique, Ocean Beach, Sailors Haven, Barrett Beach and Watch Hill, as part of their bathing season bacteriological monitoring program. The limited data available to date at these sites indicate high fecal and total coliform levels in the marina areas.

c. *Groundwater Quality & Public Water Supply*

Long Island is underlain by the largest and most important groundwater aquifer in New York State. This aquifer serves as the drinking water supply for more than 3 million people living in the New York City boroughs of Brooklyn and Queens, plus the inhabitants of Nassau and Suffolk Counties (New York Department of

Environmental Conservation, 1983). The aquifer has further been classified as a "sole-source" drinking water aquifer pursuant to Section 1424(e) of the Safe Drinking Water Act.

The groundwater beneath Fire Island occurs in a series of water table (unconfined) and artesian (confined) aquifers, separated by relatively impermeable clay layers. The shallow water table aquifer is composed of recent beach sediments which are recharged by precipitation which has percolated downward from the land surface. Water in this aquifer occurs as freshwater lenses (up to 40 ft thick) which float on a layer of saltier groundwater (McCormick and Associates 1975).

The shallow surface water aquifer is separated from the next lower water-bearing aquifer, the Magothy aquifer, by a confining layer, the Gardiners Clay. A second confining layer, the Raritan Clay, lies below the Magothy Formation. Below the Raritan Clay layer, the Lloyd Sands, a deep aquifer, extends from the Raritan Clay to bedrock, located approximately 1700 ft to 1900 ft below mean sea level (msl).

Both the Magothy Formation and the Lloyd Sands are artesian aquifers which derive their water from recharge areas located in central Long Island. The Magothy aquifer is the primary source of public water supply for Fire Island. The Lloyd Sand aquifer supplies groundwater for Jones Beach, Captree, and Robert Moses State Parks. Yields of wells completed in both aquifers range from 30-500 gallons per minute (gpm) (McCormick and Associates 1975).

Localized overuse and contamination have long threatened ground water quality in the aquifers underlying Long Island. Saltwater intrusion into aquifers is a localized threat to water supplies throughout Long Island (McCormick and Associates 1975). While the state of knowledge pertaining to local barrier island hydrogeology is limited, the close proximity of the aquifers underlying FIIS to the saltwater interface indicates that barrier islands may be particularly sensitive to saltwater intrusion which may, in turn, be influenced by periodic drought, groundwater pumping rates, and reduced infiltration, brought about by development in the surface recharge zone.

In addition, significant groundwater quality problems exist on Long Island from contamination caused by both synthetic organic chemicals (solvents, degreasers, petroleum products, and agricultural pesticides) and nutrients from septic systems and agricultural fertilizers (New York Department of Environmental Conservation 1983). The potential effects of this regional contamination on Fire Island's groundwater quality are largely unknown, but because of the seriousness of the contaminants involved, adequate water supply monitoring and close coordination with regional groundwater management authorities are warranted.

d. Water Quality Monitoring Needs Assessment

While an assessment of the quality of waters in the vicinity of FIIS is a difficult task, the regulation and management of these waters are exceedingly complex. From the use perspective, Fire Island, Great South Bay, the southern shoreline of Long Island, and the nearshore coastal waters of the Atlantic Ocean are subject to a myriad of pressures relating to development, commercial activity, and recreation. These activities include commercial and recreational boating; commercial fin- and shell-fishing; beach protection and dredging; residential construction; marina development; commercial development; swimming and shoreline recreation; and the protection and management of wetland habitat and wildlife. To complicate matters further, Koppelman (1991b) states that over 30 separate departments, agencies, commissions, administrations, and legislative bodies exercise some degree of jurisdiction over these activities.

NPS management policies direct that park managers take appropriate actions to restore, maintain, and enhance the quality of all surface and ground waters within units of the National Park System (NPS 1988). Activities including the implementation of adequate water quality monitoring programs and the establishment of close working relationships with other agencies and governing bodies responsible for the management and protection of the regional water resource are strongly encouraged.

The present cooperation between the Suffolk County Department of Health Services and FIIS for monitoring the bathing beaches of Fire Island provides an excellent example of an efficient and cost-effective means for achieving public health-related management goals shared by both agencies. The continuation, and expansion of this program to include marina-influenced areas, is strongly endorsed. In addition, the eventual expansion of *Enterococcus* monitoring is recommended.

Efforts to restore, enhance, and protect the water resources and water dependent environments of nearshore oceanic areas and the backbarrier bay system affect a much broader constituency than the NPS. However, FIIS's management is encouraged to play an active role in pursuing the sensible management of basin-wide water resources and water dependent environments, in identifying water resource issues that may negatively affect the National Seashore's natural resources, and in encouraging and participating in efforts that attempt to better understand and protect the local estuarine system.

One recommended activity is to reestablish the publication of an annual FIIS Water Quality Monitoring Summary. This report would summarize appropriate data relating the results of the cooperative Suffolk County/NPS bathing beach monitoring program, applicable fecal coliform and *Enterococcus* bacteriological data collected as part of the Environmental Protection Agency's New York Bight Study, and information pertaining to beach closures caused by floating garbage, algal blooms, etc.

In addition, this report could serve as a vehicle to inform management about pertinent on-going water resource studies conducted by other agencies, and provide management with information pertaining to newly identified water resource issues or management concerns.

While no changes to the present water supply monitoring protocols are recommended at this time, the need for an assessment of potential groundwater contamination has been identified in Section 1.c. In addition, FIIS staff are encouraged to meet periodically with New York Department of Environmental Conservation staff to discuss local groundwater contamination issues on Long Island and recommend any changes to public water supply monitoring that may be warranted by contaminant trends detected along the southern shore of Long Island.

Project statements pertaining to surface water quality monitoring (FIIS-N-004) and the need for a geohydrological assessment of potential groundwater contamination issues (FIIS-N-042) are included in Appendix A.

2- Capping or Abandonment of Unused Wells

During a site visit to FIIS in July 1991, hydrologists from the WRD examined 3 presently unused flowing wells and 1 water table well located within the Wilderness Area (Memorandum to the Superintendent, from Chief, WRD, dated September 4, 1991). Sites examined included:

a) Smith Point Well: The Smith Point Well is an unused US Coast Guard well located just north of the boardwalk at Smith Point. Records from this well indicate that it was drilled in 1943 to a depth of 377 ft. Three strings of casing, including 8-in, 6-in, and 4-in casings were seated in the well, with all strings carried to the surface. The well head was completed below ground and surrounded by a 5 ft x 5 ft x 5 ft brick enclosure.

A completion report for this well, submitted by the NPS to the New York Department of Conservation in 1974, indicates that the well was capped with a control valve and 1.5-in riser pipe that is depicted as projecting out of the brick pit. During the field inspection in July 1991, it was noted that the brick enclosure had been covered with wood planks which could not be removed without proper hand tools. No evidence of the riser pipe or other capping devices was observed. Water was flowing up through the wooden planks that cover the well pit, indicating that the cap was no longer intact. It was not possible to determine flow rate at the time of the site visit.

b) Bellport Beach Wells: Two flowing wells were located during the July 1991 site visit in the vicinity of Bellport Beach. New York Department of Environmental Conservation's (NYDEC) record search found a completion report for one well in the

vicinity (S-3839), but revealed no record for the second well observed. While it is possible that the second "well" is an overflow relief drain for well S-3839, the fact that both wells had cased well heads protruding above ground surface, and were flowing at a uniform rate of about 15 gpm, makes it more plausible that each constitutes a separate well. Additional ground-checking will be necessary to determine conclusively if these are separate wells or whether a piped connection exists between the individual well-heads, with one well serving as a relief drain for the other.

The completion report for S-3839 indicates that it was drilled for the US Coast Guard in 1944 to a depth of 365 ft. The well was completed with 10-in casing to a depth of 150 ft. An 8-in casing and screen was set inside the 10-in casing from land surface to total depth.

c) Old Inlet Bay Well: An apparently shallow, non-flowing surface water table well is located at Old Inlet Bay adjacent to the NPS comfort station. Water is pumped from this well to a comfort station that houses shower and toilet facilities. While no records of this well were retrieved from state files, observations indicate that this well consists of a 2-in or 3-in diameter casing at the well head, connected to a small centrifugal pump used to pump water from the well to the comfort station facilities. Based upon these observations, it seems unlikely that this well produces water from the same formation as the flowing wells previously discussed, and is probably fed from the surfacial water table aquifer. It is speculated that the constructed depth of this well is probably less than 75 ft.

Management attention has been focused upon these wells as a result of a 1989 order from the NYDEC to plug and abandon the flowing well at Smith Point and any other flowing wells that the NPS may own to "prevent further wasting of Long Island's groundwater resource..." (letter to Superintendent from NYDEC, dated August 16, 1989).

Alternatives and cost estimates relating to the future use or abandonment of these wells have been provided to FIIS (Memorandum to the Superintendent from Chief, WRD, dated September 4, 1991). It is recommended that the three flowing artesian wells be plugged and abandoned in accordance with NYDEC specifications (NYDEC, N.d.) or capped and converted to monitoring wells for use in regional aquifer studies. No recommendation is made regarding the future use or abandonment of the Old Inlet Bay Well as options for the continued use or abandonment of this non-flowing well are more properly addressed as part of wilderness management planning activities.

The abandonment regulations basically require that the wells be restored, as much as possible, to the previously existing geologic condition. The abandonment objective for flowing artesian wells requires that grout or cement materials be installed under pressure from the bottom of the well to the surface. Prior to the sealing operation, flowing wells must be checked for casing integrity. For water table wells, the objective

of the abandonment operation is to prevent the percolation of the surface water through the well structure or along side the casing to the water table. All obstructions in any of the wells, such as pumps or other debris that might interfere with the sealing of the well, must be removed.

Appropriate actions to properly and legally abandon, or otherwise manage these wells, may require the use of heavy equipment or other surface disturbing activities. As these wells are located in an area that will attain full wilderness management designation in 1992, it is recommended that capping or abandonment activities be undertaken concurrent with the planned removal of existing structures within the Wilderness Area. Appendix A contains a project statement relating to well capping or abandonment (FIIS-N-043).

3- Island-Wide Wastewater Management Study

Visitation to Fire Island is highly seasonal with much of the eastern end of the island little used except during the summer season. Year-round residents number approximately 400, about 350 of whom are concentrated in Ocean Beach. The private communities on Fire Island do, however, contain over 3800 private residences and more than 150 seasonal commercial establishments which cater to a population that exceeds 20,000 during the summer.

Wastewater management presents a concern on Fire Island. With the exception of Ocean Beach, which has a municipal wastewater treatment plant, sewage systems on Fire Island consist largely of open-bottomed septic systems constructed of cesspool block covered by a reinforced concrete slab. The building code requirements for these systems (Suffolk County Department of Health 1967) are less restrictive on Fire Island than they are for the rest of Suffolk County, largely because of the seasonal nature of the residences. The design criteria are lenient and the required placement distances from adjacent buildings and property lines (10 ft), water lines (12 ft), and wells (100 ft) are minimal. In addition, a large number of residences on Fire Island are quite old, and predate even these requirements.

Little information is available regarding the effects of Fire Island's antiquated sewage systems on water quality. A survey of shallow water table wells, conducted by the Suffolk County Department of Health in the mid-1970s, confirmed that coliform levels in the shallow water table wells often exceeded levels recommended for drinking water (McCormick and Associates 1975). This information was used by Suffolk County to make the communities aware of the need for developing deep-well water supplies.

However, no local studies have been conducted to identify possible impacts of these disposal systems on adjacent bathing beaches. The heavy reliance upon individual on-

site septic disposal systems coupled with the high seasonal use, the porous soils, and the shallow depth to groundwater presents a potential contaminant issue warranting additional investigation.

In addition, damage surveys conducted after recent storm events revealed a number of individual sewage systems have been exposed and/or damaged by shoreline erosion. This trend is likely to continue as rising sea level appears to be causing increased erosion on parts of the island. A project statement pertaining to the need for an island-wide wastewater impacts study is presented in Appendix A (FIIS-N-044).

4- Delineation and Management of Wetlands

Wetlands are among the most productive ecosystems known to man. They produce organic material utilized by organisms in adjacent waters, provide important habitats and nursery grounds for a variety of invertebrates and fish, support important wildlife habitat for water fowl and terrestrial animals and help in maintaining barrier island stability both by trapping sediments and reducing erosion by protecting the shoreline from wave activity.

a. Fire Island

Low-lying terrestrial areas of Fire Island support a diverse variety of wetland habitats ranging from freshwater bogs to tidal marshes. McCormick and Associates (1975) identified four primary categories of terrestrial wetland vegetation in 1973 maps (1:4800 scale). The primary wetland categories include: 1) bayside tidal marsh, 2) marsh elder/groundsel bush tidal swamps, 3) common reed grassland, and 4) cranberry/cattail/rush marshes.

The bayside tidal marshes are found in areas subject to frequent tidal flooding and are comprised of four sub-category vegetation associations including tall cordgrass marsh, short cordgrass marsh, saltmeadow grass/black grass/spike grass/threesquare rush high marsh, and goldenrod rush/threesquare rush high marsh (McCormick and Associates 1975).

The marshelder/groundsel bush tidal marshes are found inland of the bayside tidal marsh and along many of the abandoned mosquito control drainage ditches generally in areas that are inundated with brackish water only during storm tides (McCormick and Associates 1975).

Phragmites stands can be found in slightly elevated areas along the bay shore, between bayside tidal marshes and upland vegetation, on dredge spoil piles, and in isolated stands in inland areas where drainage is minimal. It is often found in dense, almost impenetrable stands, and is considered to be of low value as wildlife habitat

(McCormick and Associates 1975).

The cattail/cranberry/rush marsh is a complex vegetation type occurring in small inland depressions or poorly drained sites capable of supporting fresh or slightly brackish marshes or bogs. Its five recognized subtypes include narrowleaf cattail marsh, spike rush marsh, sphagnum bog, cranberry bog, and mixed cattail-cranberry bog. Descriptions of these categories are found in McCormick and Associates (1975).

The wetland resources of Fire Island have been substantially impacted by human activity. Similar to many of the coastal marshes found along the Mid-Atlantic coast, much of Fire Island's tidal marshes were ditched in a parallel grid in support of mosquito control in the 1930s. While mosquito ditch maintenance activities were terminated by the NPS in 1976, the extensive ditch system is still apparent (Roman, et al. 1988). In addition, DDT was used extensively throughout Suffolk County during the 1950s and early 1960s in an attempt to control the salt marsh mosquito, *Aedes sollicitans* (Odum et al. 1969). While little quantitative information is available, it is known that DDT was dumped on the marshes of the present Fire Island Wilderness Area in the 1960s (Dr. Allan O'Connell, NPS Cooperative Park Studies Unit, University of Maine, personal communication). These tidal marsh sediments, as well as those in many other coastal areas, may remain contaminated with DDT residues and other pesticides.

As wetlands may be impacted by various human-induced and other activities (e.g., accelerated sea level rise), the periodic re-mapping of wetlands areas is important to long-term wetland management. Further, wetlands, particularly the interior freshwater types, are particularly valuable as habitats for rare biota. Species inventories should be pursued. A project statement pertaining to this periodic inventory, mapping, and monitoring activity is included in Appendix A (FIIS-N-045).

b. William Floyd Estate

The William Floyd Estate is a mostly forested, 600-acre tract on the southern shore of Long Island which had been occupied by one family since the eighteenth century. The wetland resources on the Floyd Estate consist of both bayside tidal marshes comprised of high water cordgrass, low water cordgrass, large areas of salt meadow grass, and spike grass, and areas of Phragmites, generally in association with artificial ponds. The tidal marsh areas have been extensively ditched for mosquito control.

In the early 1980s, wells on the Floyd Estate were found to be contaminated by pesticide residues (Dr. Allan O'Connell, NPS CPSU, University of Maine, personal communication). While the source of this contamination was never located, an extensive survey of sediment contamination has shown extremely elevated concentrations of DDT residues in a localized area around Floyd's Pond (Adams, et al. 1985). Possibly correlated with these high concentrations of DDT have been the

reduction and almost complete disappearance from the area of blue claw crabs (*Callinectes sapidus*), fiddler crabs (*Uca* sp.), and ribbed mussels (*Geukensia demissus*). In addition, biomonitoring data have indicated that concentrations of DDT by-products found around Floyd's Pond were still high enough to possibly exert deleterious effects upon sensitive biota in the adjacent marsh as recently as 1987 (Sprenger, et al. 1987).

Because of this contamination, the Floyd Estate site has been listed on the Federal Agency Hazardous Waste Compliance Docket (ID# NY141719521) by the USEPA. The NPS has recently provided preliminary assessment/site investigation information to the USEPA in order to facilitate the ranking of this site for additional study and possible remediation.

As the half life of DDT in the environment is approximately 20 years, DDT contaminant levels appear to be decreasing, and removal activities can sometimes enhance the mobilization of pesticide residues, Sprenger, et al. (1987), recommended that contaminated soils not be removed from the vicinity of Floyd's Pond. A project statement (FIIS-N-047) addressing the residual DDT contamination at the Floyd estate currently supports this recommendation but may require re-evaluation based upon the USEPA's pending findings.

5- Water Resource Issues Related to Park Operations and Development

a. Sewage Systems

The NPS operates sewage collection and disposal facilities at the Fire Island Lighthouse, Sailors Haven, and Watch Hill visitor use areas on Fire Island. These systems typically consist of restroom facilities, residential hook-ups, commercial hook-ups (Sailors Haven, and Watch Hill), marina pumping stations (Sailors Haven and Watch Hill), lift stations, settling tanks, and septic mound leach systems. Design and maintenance problems have complicated the operation of these systems, almost from their inception.

A site inspection of the Fire Island Lighthouse septic mound system (constructed in the mid-1980s) indicates the probability of hydraulic failure early in the septic mound's operation. The septic mound system is presently being re-designed, and construction is planned in the near future (Bob Merrick, Denver Service Center, personal communication).

Systems at Sailors Haven and Watch Hill (constructed in the early 1980s), have experienced frequent problems that have included pump failure, pipe clogging, pipe ruptures, and sewage spills. These problems are at least partially attributable to difficulties associated with the proper maintenance of these systems. Their settling tanks require sludge removal on a periodic (2-3 year) basis. Until recently (1992), it has not been possible to pump these tanks because of their island location. Systems at

Sailors Haven and Watch Hill were damaged in the "Halloween Storm" of 1991 and are presently being re-designed and repaired. Also, a contractor has recently been located to perform periodic sludge removal, albeit at a relatively high cost of approximately $1.00/gallon (Tom Logan, FIIS, personal communication).

In summary, proper design and maintenance of these systems is important because of the potential water quality and possible public-health ramifications associated with problem-plagued sewage disposal systems. This is especially important since these systems are in close proximity to heavily utilized beaches.

b. Marina Operations

Fire Island is serviced by commercial ferries and provides tremendous recreational and commercial boating opportunities throughout the summer season. Fire Island contains 15 protected marinas, 13 in the private communities and 2 operated by the NPS. In addition, there are at least 13 additional community or NPS sponsored unprotected docks, some of which are quite large (Diane Abell, FIIS, personal communication).

In 1985, the USEPA conducted an environmental assessment of coastal marina development in the southeastern United States in an attempt to resolve resource-use conflicts between shell-fishermen and developers, as well as to gain a better understanding of the need for balancing the development of marinas with efforts to conserve and protect the coastal resources (USEPA, 1985). This study found that most environmental impacts associated with marinas related to three primary considerations: siting, design, and operations.

The two NPS marinas, Watch Hill, and Sailors Haven, are located in Great South Bay. Watch Hill Marina is located in a former salt marsh which was dredged to provide a relatively well-protected harbor. Circulation/flushing within the marina is poor, and the marina requires periodic dredging because it functions as a settling basin for large amounts of organic materials deposited from the surrounding marsh and estuary. Poor water quality, manifested by high bacterial levels, is a recurring problem at the Watch Hill Marina. While the reasons for the high bacterial levels have not been documented, they are most probably related to improper sewage disposal from boats using the harbor, where boat use ranges from day-use to mooring for periods of up to 7 days. There are sewage pumpout but no public fueling facilities at the Watch Hill Marina.

The Sailors Haven Marina is in a more exposed location and so exhibits greater circulation/flushing than Watch Hill. Much of the protection from waves is provided by human-made structures. Approach channels to Sailors Haven require periodic dredging, and the dredge spoils have been deposited in large piles on Fire Island. As at Watch Hill, boat usage ranges from day use to "live-aboards" and sewage pumpout facilities but no public fueling facilities are available. Because of the increased

circulation/flushing, bacterial water quality at Sailors Haven is usually better than at Watch Hill (Suffolk County Department of Health Services, unpublished data).

FIIS is encouraged to undertake appropriate public education and enforcement activities to reduce instances of improper sewage disposal in marina areas. The use of sewage pumpout facilities along most coastal areas is generally light and "Y-valves" installed on many boat holding tanks allow for the improper and illegal disposal of sewage within the coastal waters of the United States. It is probable that the elevated bacterial levels often found in the marinas is the result of improper sewage disposal by boaters.

Another issue relevant to marina operations at FIIS is related to dock and bulkhead construction with wood pressure treated with chromated copper arsenate (CCA). There is concern, as well as some evidence (Hegarty and Curran 1986; Warner, et al. 1988), that chromium, arsenic (USEPA priority pollutants) and copper could leach into aquatic environments. In recent laboratory studies, Weis, et al. (1991), have documented toxic effects of CCA leachate on estuarine organisms (fiddler crabs, mummichog embryos, and mud snails). Definitive field evaluations of the toxicity effects, if any, of CCA-treated wood leachate on estuarine organisms is lacking. Although this issue, as a research topic, is relevant to FIIS, it is perhaps best addressed at the national level through cooperative interagency efforts. The marina embayments of Fire Island (e.g., Watch Hill, and Sailors Haven) would provide ideal study sites.

Dredge material disposal is another marina-related issue that requires attention. While these issues fall beyond the scope of a water resource assessment, the need for a Dredging/Dredge Material Disposal Management Plan is apparent. This need has been identified in FIIS's draft RMP (FIIS-N-022).

c. Spill Contingency Planning

It is important to address oil and hazardous substances spill contingency response for FIIS from both a local and a regional context.

Locally, fuel leaking from recreational boats is considered the most likely type of contamination to be encountered, especially in the vicinity of marinas where boating activity and accidents most frequently occur. The NPS maintains a limited supply of boom and adsorbent materials for emergency response to small spills. The Fire Island Coast Guard Station is located only 2 miles west of the Fire Island Lighthouse and would be contacted immediately for assistance with spills other than minor fuel leakage.

In the case of a major spill, response would be coordinated by the New York/New Jersey Federal Regional Response Team (Region II). Appropriate resources for a major spill would be made available as requested by the On-Scene Coordinator and Regional Response Team from the U.S. Coast Guard Atlantic Strike Team (Fort Dix, NJ), the

USEPA Environmental Response Team (Edison, NJ), the NOAA Scientific Support Coordinator (Governors Island, NY), the Occupational and Safety Health Administration (OSHA) Response Team (Westbury, NY), and the U.S. Army Explosive Ordinance Detachment (USEPA, 1986b). Department of the Interior (DOI) representation on the Regional Response Team is currently provided by Mr. William Patterson, the DOI North Atlantic Regional Environmental Officer.

It is recommended that FIIS develop a formal Spill Contingency Plan (SCP) that specifies Standard Operating Procedures (SOPs) to be undertaken between the time a spill is discovered and when appropriate spill response authorities arrive on scene. In addition, the SCP should provide information pertaining to high value and particularly spill-sensitive natural resources, and develop a mechanism to provide resource-specific information and advice to the DOI Regional Response Team representative in the event of a major spill.

As with all similar documents, it is important the SCP be updated as necessary and that spill response SOPs be practiced on at least an annual basis. A project statement for the development of a Spill Contingency Plan (FIIS-N-047) is included in Appendix A.

d. Hazardous Materials Management

The NPS has an inherent obligation to comply with all federal, state, and local statutes relating to hazardous materials use, storage, and disposal (NPS 1991). Recently, the USEPA announced a federal facility compliance strategy (USEPA 1988) which has resulted in increased enforcement of environmental regulations on federal facilities by both state and federal regulators.

Hazardous materials usage at FIIS includes fuel, waste oil, anti-freeze, solvents, batteries, etc. used in park operations and maintenance activities. If storage tanks develop leaks or hazardous materials are disposed of improperly, the groundwater resources may be seriously contaminated. In addition to NPS sources, the 17 private communities on Fire Island also generate unknown quantities of hazardous waste, for which the disposal mechanisms are not known.

The NPS is also called upon to occasionally secure drums and other containers, often containing unidentified, potentially hazardous substances, which wash up on the National Seashore's beaches. These items are turned over to the Suffolk County Police Hazardous Materials Team which tests unidentified substances and then assists in arranging for their proper disposal.

The need for the development of a Hazardous Waste Management Plan (FIIS-N-033) has been identified in FIIS's draft RMP (NPS, in preparation). This plan will identify all NPS hazardous material uses and storage, recommend measures to reduce hazardous waste production, and provide mechanisms for the removal and proper disposal of

wastes. The plan should also incorporate a mechanism for addressing hazardous material issues within the private communities on Fire Island.

e. Fire Protection Water Supply Wells

The highest density of development occurs within the Western District of FIIS. Fire protection within the district is provided cooperatively by both the private communities and the NPS.

Presently, there is a need for up to 5 additional shallow groundwater wells within the Western District in order to support fire protection activities (Jay Lippert, Western District Ranger, FIIS, personal communication). Critical locations for the placement of these wells include the Fire Island Lighthouse, the NPS residence area, the western entry station, and at a location approximately halfway between the western boundary of FIIS and a well maintained by the Village of Kismet.

While the cost of developing these wells (approximately $1800 each) would have to be borne out of operational funding, the WRD could provide technical assistance relating to well location, design, pumping yield rates, etc.

RECOMMENDATIONS

The water-related resources of FIIS are affected by their relatively close proximity to a major metropolitan area. Specific water resource issues include maintenance of the relatively high existing recreational water quality, assessment of potential water supply/ground water contamination issues, management and protection of existing wetlands, the proper capping or abandonment of unused water wells, and possible impacts of residual contamination from past pesticide application.

While these issues are complex, they do not warrant the development of a programmatic Water Resource Management Plan. Rather, it is recommended that these issues be addressed through amending the existing FIIS RMP.

Appendix A provides the following amended and new water resource-related project statements:

FIIS-N-004 Surface Water Quality Monitoring
FIIS-N-042 Potential Groundwater/Water Supply Contamination Assessment
FIIS-N-043 Capping or Abandonment of Unused Wells in Wilderness Area
FIIS-N-044 Island-Wide Wastewater Impacts Study
FIIS-N-045 Mapping & Delineation of Wetlands
FIIS-N-046 Residual DDT Biomonitoring (Floyd Estate)
FIIS-N-047 Development of Spill Contingency Plan

The inclusion of these proposed project statements in the FIIS's RMP not only defines relevant water-related concerns, but should also enhance the ability of FIIS to compete for available natural resource funding. Priorities for each project should be established at the unit level, where full consideration can best be given to all resource management needs.

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APPENDIX A

Proposed Water Resource-Related Project Statements

PROJECT STATEMENT SHEET

PROJECT NUMBER: FIIS-N-004.000

TITLE: SURFACE WATER QUALITY MONITORING

FUNDING STATUS: FUNDED: 0.0 UNFUNDED: 48.0

SERVICEWIDE ISSUES: N11 WATER QUAL-EXT N20 BASELINE DATA

CULTURAL RESOURCE TYPE CODE: N/A

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

An extensive beach system on Fire Island provides exceptional recreational opportunities for hundreds of thousands of visitors each year. While water quality of the ocean beaches usually ranges from very good to excellent, periodic episodes of contamination from floating garbage and debris have occasionally resulted in ocean beach closings. While the quality of the water monitored at the bay beaches is not as high as that monitored at the ocean beaches, it generally meets standards deemed acceptable for swimming.

In order to meet New York State requirements for public beaches, public health-related bacteriological monitoring (fecal coliform bacteria and total coliform bacteria) is conducted on a weekly basis during the bathing season under a cooperative effort between the Suffolk County Department of Health Services and Fire Island National Seashore.

While public health and safety considerations dictate the continuation of this monitoring, there is presently no mechaism to summarize this data or for incorporating information gained from this program with information available from other water quality monitoring programs. Thus, it is currently difficult to assess overall water quality or establish water quality trends in the waters of Fire Island National Seashore.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

The Fire Island National Seashore Water Resources Scoping Report (1992) strongly endorses the continuation of cooperative monitoring program. It also recommended that the use of Enterococcus monitoring, a public health-related bacterial indicator currently recommended for marine recreational waters by the U.S. Environmental Protection Agency, be more fully incorporated into the monitoring program.

In addition, the scoping report further recommends the publication of an annual Fire Island National Seashore Water Quality Monitoring Summary. The purposes of this annual summary

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include: 1) assessing the results of the annual Suffolk County/Fire Island National Seashore monitoring program; 2) incorporating complementary fecal coliform and Enterococcus data from the Environmental Protection Agency's New York Bight Study; and 3) providing information related to necessary beach closings. The annual report would also serve as a vehicle to inform management about the results of pertinent water resources studies conducted by other agencies and to provide information relating to newly identified water resources issues or management concerns.

Eventually, data bases developed to support the annual report could be used to assess long term water quality trends and to rapidly pin-point deviation from normal data patterns at specific sites.

Activities and annual costs recommended to accomplish the above objectives include:

1- Establish in-house database/data processing capability for water quality data utilizing Water Resources Division software.
(Annual Cost: $ 0 K 0.1 FTE)

2- Publication of annual Fire Island Water Quality Summary.
(Annual Cost: $ 2 K 0.2 FTE)

3- Incorporation of Enterococcus monitoring into public-health water quality monitoring program.
(Annual Cost: $ 10 K 0.0 FTE)

BUDGET AND FTEs:

FUNDED

	Source	Act Type	Budget ($1000s)	FTEs
Year 1:	PARK-NR	MON	0.0	0.2
Year 2:	PARK-NR	MON	0.0	0.2
Year 3:	PARK-NR	MON	0.0	0.2
Year 4:	PARK-NR	MON	0.0	0.2
		Total:	0.0	0.8

UNFUNDED

	Source	Act Type	Budget ($1000s)	FTEs
Year 1:	PARK-NR	MON	12.0	0.3
Year 2:	PARK-NR	MON	12.0	0.3

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Year 3:	PARK-NR	MON	12.0	0.3
Year 4:	PARK-NR	MON	12.0	0.3
		Total:	48.0	1.2

(OPTIONAL) ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Under a NO ACTION ALTERNATIVE Fire Island National Seashore would continue to cooperate with the Suffolk County Department of Health Services in the implementation of the bathing season public health-related monitoring program. However, Suffolk County is presently experiencing fiscal difficulties and it is likely that the program will be scaled back in coming years.

While this program presently provides the minimum information needed to determine appropriate beach closings, sampling is not adequate to gain insight into the sources, extent, or trends associated with the contamination. Money is also not available to summarize and report on the annual monitoring program or to compare results with previous years data or other complementary monitoring efforts.

COMPLIANCE CODE(s):

EXPLANATION:

PROJECT STATEMENT SHEET

PROJECT NUMBER: FIIS-N-042.000

TITLE: POTENTIAL GROUNDWATER/WATER SUPPLY CONTAMINATION

FUNDING STATUS: FUNDED: 0.0 UNFUNDED: 30.0

SERVICEWIDE ISSUES: N11 WATER QUAL-EXT N12 WATER FLOW

CULTURAL RESOURCE TYPE CODE: N/A

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

The public water supplies for the communities and park facilities on Fire Island are solely derived from groundwater obtained from shallow surface wells or the two confined aquifer systems--the Magothy Formation and the Lloyd Sands. The quality of water within these aquifers may be vulnerable to threats from two unrelated processes that are occurring along the northern Atlantic Coast: saltwater intrusion and contamination emanating at inland recharge areas.

Saltwater intrusion is caused when dense saltwater from the ocean replaces freshwater within the aquifer that is removed by the "mining" of the groundwater, or is reduced in quantity by drought or development over the recharge zone of the aquifer. Localized saltwater intrusion is a documented problem throughout Long Island. However, there appears to be a lack of information that has been collected and interpreted specifically for the groundwater regimes of Fire Island. Because of the proximity of the island to the saltwater interface, the aquifers may be particularly vulnerable to saltwater intrusion.

Water supplies on Fire Island may also be threatened from contamination that is originating at inland Long Island recharge areas of the Magothy Formation and Lloyd Sands. Serious groundwater quality problems exist on Long Island from contamination by organic solvents, petroleum products, pesticides originating from both point sources and stormwater runoff, as well as nutrients from septic systems and fertilizers. It is not known whether the problems in Long Island's aquifers are a threat to groundwater supplies on Fire Island.

If either of the groundwater quality threats are occurring, or have the potential to occur, alternatives to the existing public water supplies may have to be developed, or treatment of the existing supplies prior to consumption would have to occur. A timely analysis of the potential for saltwater intrusion or contamination from inland sources would allow NPS management to react, if need be, to these problems.

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Note: Additional background information relating to this issue is provided in the Fire Island National Seashore Water Resources Scoping Report (1992).

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

A review, synthesis, and interpretation of existing water supply information, geologic and geohydrologic studies and maps, groundwater quality data and reports, and existing land use inventories will be conducted for the purpose of determining: (1) if a water quality threat exists to the groundwater supplies of Fire Island National Seashore from the migration of contaminants from central Long Island, and (2) if saltwater intrusion has occurred within the Magothy and Lloyd Sands aquifers at other New York coastal locales. Specifically, this analysis should entail the identification and location of major public and private water supply wells on Fire Island, a review and interpretation of the available geohydrologic information concerning the Magothy and Lloyd formations (as they relate to their central Long Island recharge areas), and any documentation of any occurrences of saltwater intrusion in these aquifer systems that has occurred on barrier islands. The review and interpretation should focus on the following specific elements:

(1) Retrieval and interpretation of water supply source data, geologic maps, geohydrologic investigations, and groundwater quality data:

An intensive archival search should be conducted for well logs and published and unpublished interpretive and data reports which relate to the geohydrologic and chemical nature of groundwater flow through the Magothy and Lloyd formations. Information such as water use and, static water levels (or pressures) from wells now producing from shallow surface aquifer or the Magothy and Lloyd formations should be reviewed and interpreted for the purpose of constructing a potentiometric surface map which is sufficient to determine the direction of groundwater flow from the recharge areas to FIIS. In addition, all studies related to contamination of these aquifers in central Long Island will be reviewed to determine the type of contaminants that have been detected in the aquifers, and the direction and magnitude of the contaminant plume migration. The interpretation of this data should be conducted relative to the potential impacts of contaminant plume migration on the public water supplies on Fire Island. Further, all groundwater quality monitoring that has been conducted under the auspices of the Safe Drinking Water Act for public water supplies on Fire Island should be reviewed and analyzed for the presence of contaminants that have been documented in groundwater supplies of central Long Island.

(2) Review of the Occurrence of Saltwater Intrusion in Confined Aquifer Systems:

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Information related to the occurrence of saltwater intrusion into confined aquifers along the northern Atlantic Coast should be reviewed. This review should focus particularly on the occurrence of saltwater intrusion on barrier islands, the formations that have been involved, and a history of the quantity of groundwater withdrawals that have occurred in the affected aquifer. The information should be reviewed as it relates to the public water supplies of Fire Island National Seashore.

BUDGET AND FTEs:

FUNDED

	Source	Act Type	Budget ($1000s)	FTEs
Year 1:				
Year 2:				
Year 3:				
Year 4:				
		Total:	0.0	0.0

UNFUNDED

	Source	Act Type	Budget ($1000s)	FTEs
Year 1:	WATER RES	RES	30.0	0.0
	PKNR-OTH	ADM	0.0	0.1
		Subtotal:	30.0	0.1
Year 2:				
Year 3:				
Year 4:				
		Total:	30.0	0.1

(OPTIONAL) ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Under a NO ACTION ALTERNATIVE, the period of time for which Fire Island National Seashore management would be forewarned of any potential public water supply/groundwater quality problems would be significantly shortened. This would greatly reduce time available to conduct an adequate analysis of alternative water supplies and/or treatment technologies should it become necessary.

COMPLIANCE CODE(s):

PROJECT STATEMENT SHEET

PROJECT NUMBER: FIIS-N-043.000

TITLE: CAP OR ABANDON UNUSED WELLS IN WILDERNESS AREA

FUNDING STATUS: FUNDED: 0.0 UNFUNDED: 26.5

SERVICEWIDE ISSUES: N12 WATER FLOW

CULTURAL RESOURCE TYPE CODE: N/A

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

The newly designated wilderness area of Fire Island National Seashore contains a number of unused flowing artesian and non-flowing groundwater wells. In 1989, the New York Department of Environmental Conservation (NYDEC) ordered the National Park Service (NPS) to properly plug and abandon a flowing well at Smith Point and any other wells that the NPS may own in order to "prevent any further wasting of Long Island's ground water resources..." (letter to the Superintendent from NYDEC, dated August 16, 1989).

During a site visit in July, 1991 the Water Resources Division observed three abandoned flowing artesian wells subject to this order. A recommendation was made in the Fire Island Water Resources Scoping Report (1992) that repairs be made and legitimate uses be developed for these wells (e.g. groundwater monitoring and research) or that the three wells be properly and legally abandoned in accordance with NYDEC specifications. The report further recommends that a management decision be made regarding the future use or abandonment of remaining non-flowing shallow groundwater wells contained in the wilderness area.

Under the DEVELOP LEGITIMATE USES ALTERNATIVE, cooperation with the U.S.Geological Survey (USGS) is required to determine the usefulness, feasibility, and costs of capping these wells for groundwater monitoring or research use. If such an alternative is adopted, capping of these wells should occur as part of the wilderness restoration activities since the use of motorized equipment may be necessary. In addition, the USGS would have to be granted long term access to these wells for monitoring and maintenance purposes.

Under the ABANDONMENT ALTERNATIVE, proper abandonment may require surface disturbing activities and the use of heavy equipment. It is recommended that this work be accomplished in conjunction with the planned removal of existing structures remaining within the wilderness area.

Costs presented in the budget section of this project statement

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are those estimated for the ABANDONMENT ALTERNATIVE. Cost estimates for the DEVELOP LEGITIMATE USES ALTERNATIVE could not be estimated at this time, as it is possible that cost-sharing opportunities may be available. It is anticipated, however, that the costs associated with capping and utilizing these wells for monitoring/research purposes could be less than those associated with permanent plugging and abandonment.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

A management decision needs to be made concerning the preferred alternative. Under either the DEVELOP LEGITIMATE USES ALTERNATIVE or ABANDONMENT ALTERNATIVE the use of specialized equipment is probably required. It is recommended that the work be completed by an experienced, licensed contractor and with the concurrence of the NYDEC.

Should the ABANDONMENT ALTERNATIVE be selected, activities for the proper plugging and legal abandonment of the flowing wells must conform with NYDEC specifications listed in Water Unit Specifications for Abandoning Wells and Boreholes in Unconsolidated Materials.

BUDGET AND FTEs:

FUNDED

	Source	Act Type	Budget ($1000s)	FTEs
Year 1:				
Year 2:				
Year 3:				
Year 4:				
		Total:	0.0	0.0

UNFUNDED

	Source	Act Type	Budget ($1000s)	FTEs
Year 1:	REHAB	MIT	26.5	0.1
Year 2:				
Year 3:				
Year 4:				
		Total:	26.5	0.1

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(OPTIONAL) ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Under the NO ACTION ALTERNATIVE the wells at Smith Point and Bellport Beach would be allowed to continue to flow, allowing water to disperse as overland flow, and ultimately infiltrate into the sandy soils of the island. Selection of this alternative would risk a future enforcement action by the State of New York. The State's regulatory authority for management of groundwater resources is derived from Article 15 of the New York State Environmental Conservation Law. Potential penalties may include civil penalties of a $500 fine per violation and a $100 per day fine for each day that the violations continue. Criminal penalties may also be assessed in amounts up to $500 per day for each day the violation continues.

In addition, allowing the artesian wells to continue to flow unimpaired to the surface and allowing well appurtenaces such as well-head plumbing to remain in their present condition may not be consistent with the goals and objectives for wilderness management of the area. Water now flowing from the wells has created artificial aquatic habitats that may invite the establishment of exotic plant and animal species that may not be compatible with the management goals consistent with wilderness designation. It should noted that activities to cap or plug these wells could alter the presently existing artificial wetland habitats.

LITERATURE CITED

Department of Environmental Conservation. Undated. Region I - Water Unit Specifications for Abandoning Wells and Boreholes in Unconsolidated Materials. New York State Department of Environmental Conservation, Albany, NY. 2 pp.

COMPLIANCE CODE(s): OTHER

EXPLANATION: NYDEC COMPLIANCE ORDER

Proposal Date: 92

PROJECT STATEMENT SHEET

PROJECT NUMBER: FIIS-N-044.000

TITLE: ISLAND-WIDE WASTEWATER IMPACTS STUDY

FUNDING STATUS: FUNDED: 0.0 UNFUNDED: 210.0

SERVICEWIDE ISSUES: N11 WATER QUAL-EXT

CULTURAL RESOURCE TYPE CODE: N/A

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

Wastewater management is a concern on Fire Island. While the year-round population is only 400, the private communities contain over 3800 private residences and more than 150 seasonal commercial establishments which cater to a seasonal population which may exceed 20,000 during the summer season.

With the exception of the community of Ocean Beach, which has a municipal wastewater treatment system, development on the island relies upon individual on-site septic disposal systems. Given the porous sandy soils of the island, the somewhat antiquated septic design requirements, the high seasonal usage, and the shallow depth to groundwater, the potential for contamination of shallow domestic wells, bathing beaches, and natural resources (wetlands, estuaries, etc.) could be significant. Potential contaminants of concern include pathogenic organisms associated with sewage, and nutrients including phosphorous and nitrogen compounds.

Additional background information relating to this issue is provided in the Fire Island National Seashore Water Resources Scoping Report (1992).

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

The general approach for an islandwide wastewater impacts study is three-fold: 1) intensively study several sites along the island to determine contaminant loading to areas of concern (beaches, wetlands, estuaries, public wells), 2) develop a contaminant loading model allowing development of islandwide predictions of impact and analysis of the effect of alternative mitigation strategies, and 3) determine if the contaminant loading is having a significant immediate, cumulative, or long-term effect on the resources of concern.

The first phase implements intensive studies which will require fairly elaborate instrumentation of sites to document hydrologic flow paths, volume transport, and contaminant levels given a diversity of conditions (e.g., soil type, water table level, hydraulic gradient, vegetation cover and type, topographic

relief, etc.).

The second phase involves development, testing, and application of an islandwide contaminant loading model. Such models, when supported by adequate field data, represent excellent tools for assessing potential impacts on a large (islandwide) scale. Several loading models currently exist (eg., HSPF, AGNPS, ANSWERS, CREAMS, GWLF, and others). It must be determined if: 1) an existing model would be appropriate for application at Fire Island, 2) an existing model or models must be modified, or 3) a new model developed.

The third phase of the proposed study -- determining the significance of resource impact -- is perhaps the most difficult to accomplish. Here, collaboration with existing research efforts is necessary. For example, to evaluate the potential impacts of nutrient loading on estuarine resources, information on Great South Bay hydrodynamics and mixing characteristics must be considered.

The proposed wastewater impacts study must also consider, and perhaps, test, alternative design septic systems for use on Fire Island. Upgrading the efficiency of existing systems may represent a good solution to minimizing contaminant loading impacts to park resources. Other alternatives must also be considered.

BUDGET AND FTEs:

FUNDED

	Source	Act Type	Budget ($1000s)	FTEs
Year 1:				
Year 2:				
Year 3:				
Year 4:				
		Total:	0.0	0.0

UNFUNDED

	Source	Act Type	Budget ($1000s)	FTEs
Year 1:	WATER RES	RES	70.0	0.0
	PKNR-OTH	ADM	0.0	0.1
		Subtotal:	70.0	0.1
Year 2:	WATER RES	RES	70.0	0.0
	PKNR-OTH	ADM	0.0	0.1

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		Subtotal:	70.0	0.1
Year 3:	WATER RES	RES	70.0	0.0
	PKNR-OTH	ADM	0.0	0.1
		Subtotal:	70.0	0.1
Year 4:				
		Total:	210.0	0.3

(OPTIONAL) ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS: N/A

COMPLIANCE CODE(s):

EXPLANATION:

Proposal Date: 92

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PROJECT NUMBER: FIIS-N-045.000

TITLE: DELINEATION & INVENTORY OF WETLANDS

FUNDING STATUS: FUNDED: 0.0 UNFUNDED: 70.0

SERVICEWIDE ISSUES: N20 BASELINE DATA

CULTURAL RESOURCE TYPE CODE: N/A

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

The bayside of Fire Island National Seashore and the Seashore's William Floyd Estate is fringed with Spartina-dominated salt marshes. These systems, and associated eelgrass beds (Zostera marina), provide essential habitat for finfish, shellfish, waterfowl, and other marine-estuarine dependent organisms. The interior of the barrier island and Estate contain nontidal fresh- and brackish-water wetlands. These range from permanent ponds with borders of aquatic vegetation, to shrub-dominated wetland thickets, to temporary vernal ponds/wetlands. Interior wetlands provide habitat for amphibians, reptiles, waterfowl, songbirds, mammals and others. Rare species, both plant and animal, are sometimes found in these habitats.

Fire Island lacks a comprehensive inventory and assessment of wetlands. Given a wetlands database, resource management staff will be better able to evaluate changes to these fragile systems as caused by human-induced (e.g., nutrient loading, fire, visitor impacts) or natural factors (e.g., accelerated sea level rise, storms/overwash), and then to hopefully design and implement appropriate mitigation strategies. Priority should be given to freshwater wetland delineation and inventory. Beginning in FY92, assessments of salt marshes and eelgrass beds will be initiated as part of a regionwide NRPP-funded study.

Note: Additional background information relating to this issue is provided in the Fire Island National Seashore Water Resources Scoping Report (1992).

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

The freshwater wetlands at Fire Island National Seashore, including the William Floyd Estate, will be delineated and mapped by a combination of aerial photography interpretation and field reconnaissance. Representative wetland types will then be selected for intensive inventory of flora and fauna. A quantitative biotic sampling program, spanning all seasons, will provide a comprehensive assessment of each wetland type. Critical wetlands and wetland complexes, as defined by rare species

occurrences or intensive utilization for breeding, will be highlighted.

A second phase of the freshwater wetlands study will include an assessment of hydrological effects on the structure and function of Fire Island National Seashore wetlands. Given a database on wetland water table levels and water quality (particularly nutrient loading) and corresponding vegetation and faunal data, it will be possible to predict, for example, the response of wetlands to water table fluctuations in response to accelerated sea level rise or nutrient inputs from development activities.

BUDGET AND FTEs:

FUNDED

	Source	Act Type	Budget ($1000s)	FTEs
Year 1:				
Year 2:				
Year 3:				
Year 4:				
		Total:	0.0	0.0

UNFUNDED

	Source	Act Type	Budget ($1000s)	FTEs
Year 1:	WATER RES	MON	35.0	0.0
	PKNR-OTH	ADM	0.0	0.1
		Subtotal:	35.0	0.1
Year 2:	WATER RES	MON	35.0	0.0
	PKNR-OTH	ADM	0.0	0.1
		Subtotal:	35.0	0.1
Year 3:				
Year 4:				
		Total:	70.0	0.2

(OPTIONAL) ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS: N/A

COMPLIANCE CODE(s):

EXPLANATION:

PROJECT STATEMENT SHEET

PROJECT NUMBER: FIIS-N-046.000

TITLE: RESIDUAL DDT MITIGATION/MONITORING (FLOYD ESTATE)

FUNDING STATUS: FUNDED: 0.0 UNFUNDED: 5.2

SERVICEWIDE ISSUES: N11 WATER QUAL-EXT N02 T&E ANIMAL

CULTURAL RESOURCE TYPE CODE: N/A

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

From the 1950s through the mid-1960s, DDT was extensively used for mosquito control in the estuarine marshes of Long Island. While there is no recorded history of the use of pesticides on the William Floyd Estate, analysis of the water and sediments revealed greatly elevated levels of DDT residue in the vicinity of Floyd's Pond (Adams et al., 1985).

An intensive survey of more than 30 sites in the Floyd's Pond Marsh confirmed the presence of DDT and its breakdown products throughout the marsh sediments with several "hot spots" containing more than 50 ug/g (dry weight basis) of DDT + DDD + DDE. At one site, the combined DDT and residual breakdown products concentration exceeded 112 ug/g (dry weight basis). In addition, DDT residues were detectable in the water column of Floyd's Pond with concentrations ranging from below detection (less than 0.02 ug/L) to 0.06 ug/L (Adams et al., 1985).

Contamination from DDT and its breakdown products has caused eggshell thinning in a number of bird species, and has been linked to a decline in Osprey populations on Long Island (Spitzer et al., 1978). In addition, the large-scale spraying and potential misapplication of DDT on Long Island before 1966 may have contributed to the reduction and almost complete disappearance of blue claw crabs, fiddler crabs, ribbed mussels and oysters from the marshes around Great South Bay (Foehrenbach, 1972).

Because of this contamination, the Floyd Estate site has been listed on the Federal Agency Hazardous Waste Compliance Docket (ID# NY141719521) by the U.S. Environmental Protection Agency. The National Park Service has recently provided preliminary assessment/site investigation information to the U.S. Environmental Protection Agency in order to facilitate the ranking of this site for additional study and possible remediation.

The half-life of DDT in the environment is estimated to be 20 years. However, DDE, a major degradation product of DDT, is more

stable in the environment. Thus, it must be assumed that the area around Floyd's Pond remains a source of contamination within the William Floyd Estate and may still be exerting a deleterious influence on sensitive invertebrate populations within the marsh.

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

While it is assumed that the area around Floyd's Pond remain a source of contamination for DDT and its breakdown products, Floyd's Pond is only one of many of Long Island's marshes that are possibly contaminated by DDT residues (Odum et al., 1969). While the elimination of this source of contamination to the environment would be beneficial, the probable presence of other contaminated areas within the vicinity would still be a concern. In addition, an apparent return of fiddler crabs to the vicinity in recent years indicates that the marsh may be in the process of natural restoration.

An analysis of sediment cores (Sprenger et al., 1987) indicates that higher DDT concentrations exist below the marsh surface. Dredging or other mechanical removal activities could potentially resuspend and increase the availability of these contaminants, indirectly exacerbating the problem.

Thus, no mitigation activities are recommended at this time. However, this issue may require re-evaluation pending the U.S. Environmental Protection Agency's ranking and recommendations.

In the meantime, National Park Service staff should remain aware of the contamination issue and seek cooperative efforts for periodic environmental contaminants monitoring through existing US Fish & Wildlife Service monitoring programs or in cooperation with local or state efforts efforts to assess existing environmental contaminants issues on Long Island.

Adequate funding is recommended at this time, to support these minimal monitoring activities.

BUDGET AND FTEs:

	FUNDED			
	Source	Act Type	Budget ($1000s)	FTEs
Year 1:				
Year 2:				
Year 3:				
Year 4:				
Total:			0.0	0.0

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	Source	Act Type	Budget ($1000s)	FTEs
	UNFUNDED			
Year 1:	PKNR-OTH	ADM	0.0	0.1
	WATER RES	MON	2.5	0.0
		Subtotal:	2.5	0.1
Year 2:	PKNR-OTH	ADM	0.1	0.1
Year 3:	PKNR-OTH	ADM	0.0	0.1
	WATER RES	MON	2.5	0.0
		Subtotal:	2.5	0.1
Year 4:	PKNR-OTH	ADM	0.1	0.1
		Total:	5.2	0.4

(OPTIONAL) ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

In addition to the preferred LIMITED ACTION ALTERNATIVE, two additional alternatives were considered.

Alternative 1: IMPLEMENT BIOMONITORING & TOXICITY ASSESSMENT

Methods are presently available whereby the National Park Service could conduct periodic biomonitoring and toxicology assessments of the contaminated areas in the vicinity of Floyd's Pond. Information gained from these studies could be used to monitor the natural recovery of the marsh system and to provide management with an assessment when the contamination had decayed to the point that the marsh could be considered healthy.

Thorough biomonitoring and toxicity assessment activities, however, would likely be fairly expensive, with costs ranging from perhaps $15,000-$25,000 each time an assessment was undertaken. More modest cooperative monitoring activities, which take advantage of existing programs, appear more appropriate, pending the receipt of U.S. Environmental Protection Agency recommendations.

Alternative 2: IMPLEMENT BIO-REMEDIATION PROGRAM

The U.S. Environmental Protection Agency is currently developing bio-remediation methods to accelerate the in-situ natural decay of certain contaminants. The advantage to these techniques is that they do not require dredging (which may re-suspend sediments), and the expensive disposal of contaminated sediments.

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While these techniques have shown great promise, they are still considered experimental and tend to be quite expensive. Because of the probability of additional contaminated areas in the general vicinity, expensive efforts to mitigate this one location are probably not warranted at this time. Fire Island National Seashore staff may, however, wish to pursue this option at some future date, should bio-remediation techniques become more readily available at a more reasonable cost.

LITERATURE CITED

Adams, D.A., A.W. McIntosh and M.D. Sprenger. 1985. Water quality at Fire Island National Seashore. Final report - National Park Service Contract No. CX1600-2-006. Center for Coastal and Environmental Studies and the Department of Environmental Sciences, Rutgers University, New Brunswick, NJ 55 pp.

Foehrenbach, J. 1972. Chlorinated pesticides in estuarine organisms. Journal of the Water Pollution Control Federation 44:4 619-624.

Odum, W.E., G.M. Woodwell and C.F. Wurster. 1969. DDT residues adsorbed from organic detritus by Fiddler Crabs. Science 164:576-577.

Spitzer, P.R., R.W. Risebrough, W. Walke, R. Hernandez, A. Poole, D. Poleston and I.C.T. Nisbet. 1978. Productivity of Ospreys in Connecticut and Long Island increases as DDT residues decline. Science 202(22):333-335.

Sprenger, M.D., D.A. Adams and A.W. McIntosh. 1987. DDT Distribution Study. Final report - National Park Service North Atlantic Region Contract 85 4-28201. Center for Coastal and Environmental Studies, Rutgers, The State University of New Jersey, New Brunswick, NJ. 61 pp.

COMPLIANCE CODE(s):

EXPLANATION:

Proposal Date: 92

PROJECT STATEMENT SHEET

PROJECT NUMBER: FIIS-N-047.000

TITLE: DEVELOPMENT OF SPILL CONTINGENCY PLAN

FUNDING STATUS: FUNDED: 1.0 UNFUNDED: 24.0

SERVICEWIDE ISSUES: N11 WATER QUAL-EXT N24 OTHER

CULTURAL RESOURCE TYPE CODE: N/A

10-238 PACKAGE NUMBER:

PROBLEM STATEMENT:

Hazardous material spills that affect Fire Island National Seashore or its adjacent waters are infrequent. However, the National Seashore contains approximately 22 miles of ocean shoreline and approximately 30 additional miles of shoreline on Great South Bay. Because of its proximity to the New York City metropolitan area, the waters are heavily travelled and the occurrence of a major oil or other hazardous material spill is a constant threat.

A major oil or hazardous material spill in the vicinity of Fire Island National Seashore could have serious consequences. The presence of several threatened or endangered species (e.g., Piping Plover, Least Tern, Sea Beach Amaranth, Beach Tiger Beetle, and Osprey) have been documented and a spill could adversely affect natural processes upon which these species depend.

In addition, Fire Island National Seashore is a premier recreational resource in the New York metropolitan area. A spill could also seriously impact coastal recreational activities (e.g., boating, fishing, swimming, tourism, etc.) creating a significant impact on the coastal recreation-based economy.

In the case of a major spill, response would be coordinated by the New York/New Jersey Federal Regional Response Team (Region II). However, Fire Island National Seashore needs to develop a Spill Contingency Plan (SCP) outlining Standard Operating Procedures (SOPs) detailing actions to be undertaken from the time a spill is discovered to when appropriate spill response authorities arrive on the scene. In addition, the SCP should identify spill equipment, response activities, and training requirements to address the small spills (fuel, sewage, etc.) that occur on occasion in the marina areas.

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PROJECT STATEMENT SHEET

DESCRIPTION OF RECOMMENDED PROJECT OR ACTIVITY:

The development of a Spill Contingency Plan (SCP) would begin with a review of all spills that have affected Fire Island National Seashore in the past, and an evaluation of actions undertaken in response to these spills. In addition, all applicable regional or local Hazardous Materials Spill Contingency Plans, and response action Standard Operating Procedures (SOPs), etc. will be acquired and reviewed.

A local SCP will then be prepared providing SOPs detailing actions that should be undertaken by Fire Island National Seashore staff upon the discovery of a spill. These SOPs will outline response procedures for small spills that can be addressed locally, and identify notification and response procedures for larger spills that will require immediate additional assistance. In addition, the SCP would provide information relating to necessary spill response equipment and training needs for potential spill response personnel.

The Fire Island National Seashore SCP will also discuss inventory needs in order to delineate high value and particularly spill-sensitive natural resources and develop a mechanism to provide resource-specific information and advice to the DOI Regional Response Team representative in the event of a major spill.

LITERATURE CITED

U.S. Environmental Protection Agency. 1986. region II Regional Oil and Hazardous Substances Contingency Plan. Emergency and Remedial Response Division, Region II, U.S. Environmental Protection Agency, New York, NY. 316 pp.

BUDGET AND FTEs:

	FUNDED			
	Source	Act Type	Budget ($1000s)	FTEs
Year 1:	PKBASE-OT	ADM	1.0	0.1
Year 2:				
Year 3:				
Year 4:				
		Total:	1.0	0.1

Proposal Date: 92

PROJECT STATEMENT SHEET

UNFUNDED

	Source	Act Type	Budget ($1000s)	FTEs
Year 1:	RG-NR-RM	RES	4.0	0.2
	PARK-NR	RES	4.0	0.2
		Subtotal:	8.0	0.4
Year 2:	RG-NR-RM	RES	8.0	0.2
Year 3:	PKBASE-OT	MON	4.0	0.2
Year 4:	PKBASE-OT	MIT	4.0	0.2
		Total:	24.0	1.0

(OPTIONAL) ALTERNATIVE ACTIONS/SOLUTIONS AND IMPACTS:

Under the NO ACTION ALTERNATIVE Fire Island National Seashore would rely solely upon the existing knowledge and experience of responding personnel to assess and respond to local spills. Larger spills would be addressed, when reported, by the US Coast Guard and, if necessary, the Regional Response Team.

Without a thorough knowledge of the regional spill contingency procedures and established working relationship with regional spill response agencies, NPS input is likely to be reactive. It is possible that NPS concerns could be overlooked in the event of a major response.

COMPLIANCE CODE(s):

EXPLANATION:

Proposal Date: 92