2.0 Description of Nuclear Power Plant and Site and Plant Interaction with the Environment

The Florida Power and Light Company's (FPL's) St. Lucie Units 1 and 2 are located on Hutchinson Island in St. Lucie County, Florida. The nearest municipalities are Fort Pierce, approximately 11 km (7 mi) northwest of the plant; Port St. Lucie, approximately 7 km (4.5 mi) to the west; and Stuart, approximately 13 km (8 mi) to the south. The plant consists of two units, Units 1 and 2, which are nuclear reactors and the subject of this action. The plant and its environs are described in Section 2.1, and the plant's interaction with the environment is presented in Section 2.2.

2.1 Plant and Site Description and Proposed Plant Operation During the Renewal Term

The St. Lucie Units 1 and 2 site consists of approximately 457 ha (1130 ac) of land on the widest section of Hutchinson Island in an area previously degraded by mosquito control projects, as described in the FPL Environmental Report (ER; FPL 2001a). Figures 2-1 and 2-2 show the site location and features within 80 km and 10 km (50 mi and 6 mi), respectively. Figure 2-3 shows the site boundary in relation to the power block and adjacent features.

St. Lucie Units 1 and 2 are located on the west side of State Road A1A in a relatively flat, sheltered area of Hutchinson Island. West of the facility, the land gradually slopes downward to a mangrove fringe bordering the intertidal shoreline of the Indian River Lagoon. East of the facility, land rises from the ocean shore to form dunes and ridges approximately 4.6 m (15 ft) above mean low water (FPL 2001a). Two county parks with beach access, Blind Creek Pass Park and Walton Rocks Park, lie within the St. Lucie Units 1 and 2 property boundary. Recreational facilities for FPL employees and their families are also available within the site property boundary.

The Indian River Lagoon is a long, shallow, tidally influenced estuary stretching along Florida's central east coast between the mainland and a series of offshore islands. At St. Lucie Units 1 and 2, the Indian River Lagoon is approximately 2195 m (7200 ft) wide. Blind Creek and Big Mud Creek, inlets off the Indian River Lagoon, are adjacent to the site. The stretch of lagoon adjacent to the site is designated as the Jensen Beach to Jupiter Inlet Aquatic Preserve. The North Fork St. Lucie River Aquatic Preserve is located on the north fork of the St. Lucie River at Port St. Lucie. The St. Lucie Canal connects the St. Lucie River with Lake Okeechobee and parallels State Road 76, south of Stuart.

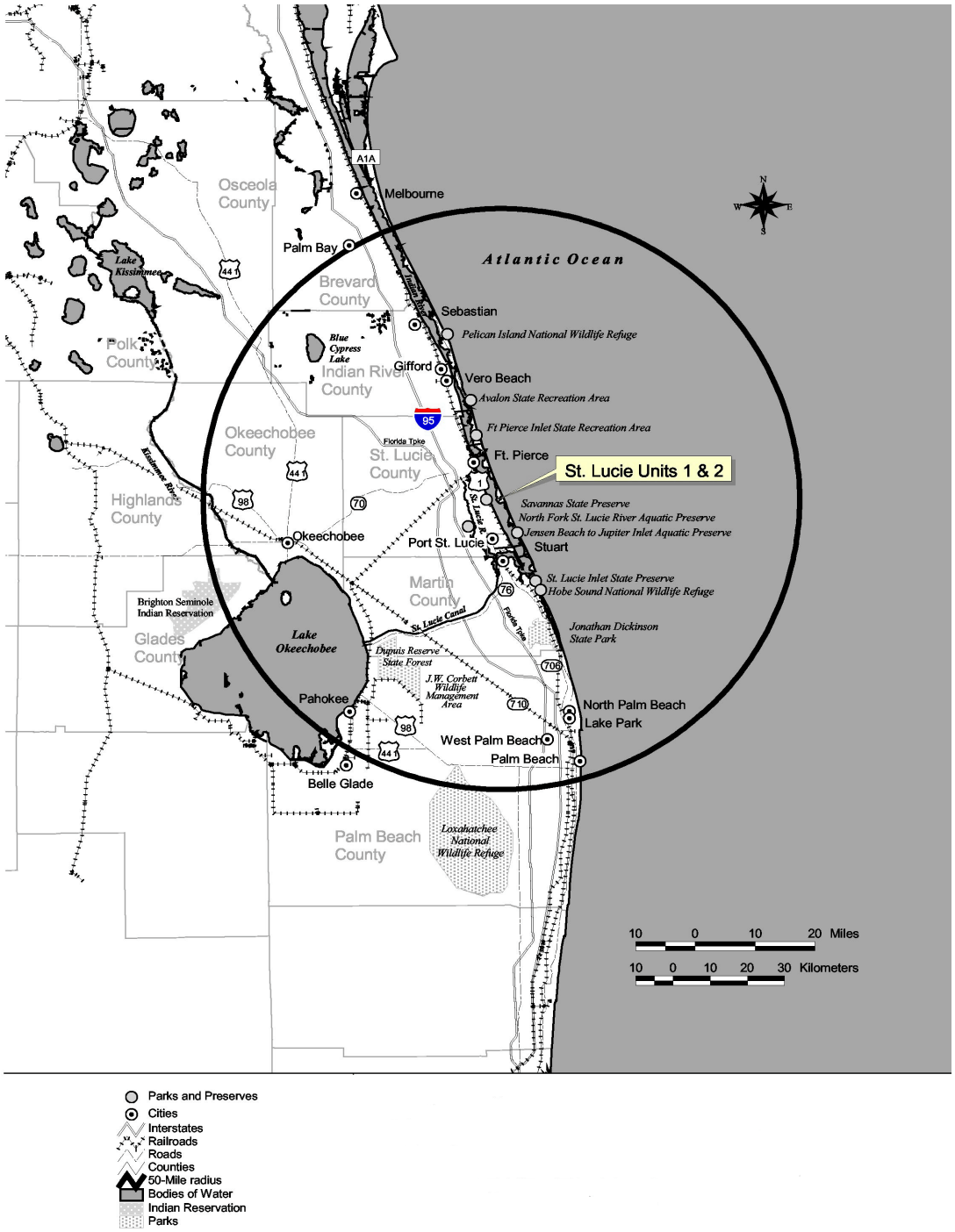

Figure 2-1. Location of St. Lucie Units 1 and 2, 80-km (50-mi) Region

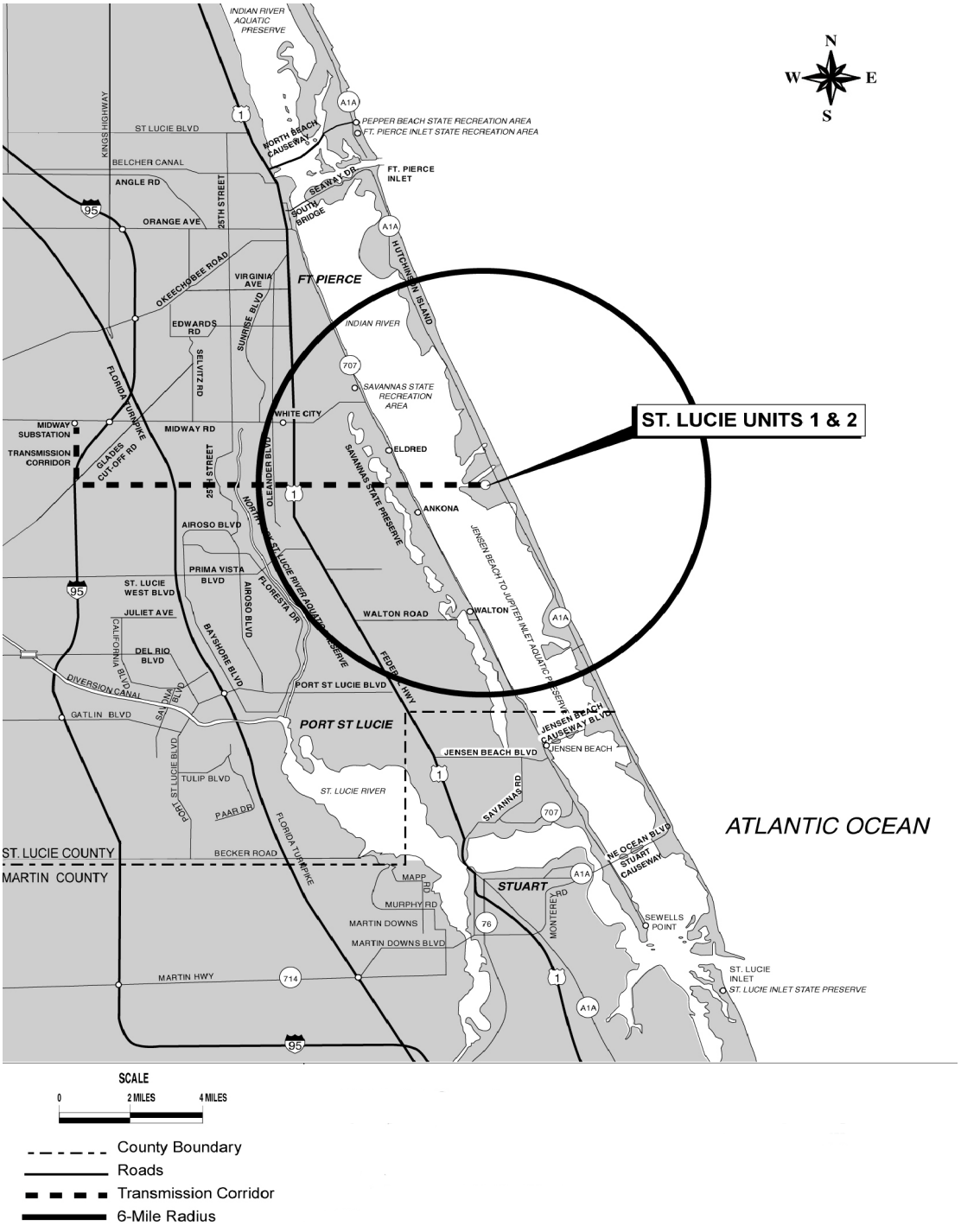

Figure 2-2. Location of St. Lucie Units 1 and 2, 10-km (6-mi) Region

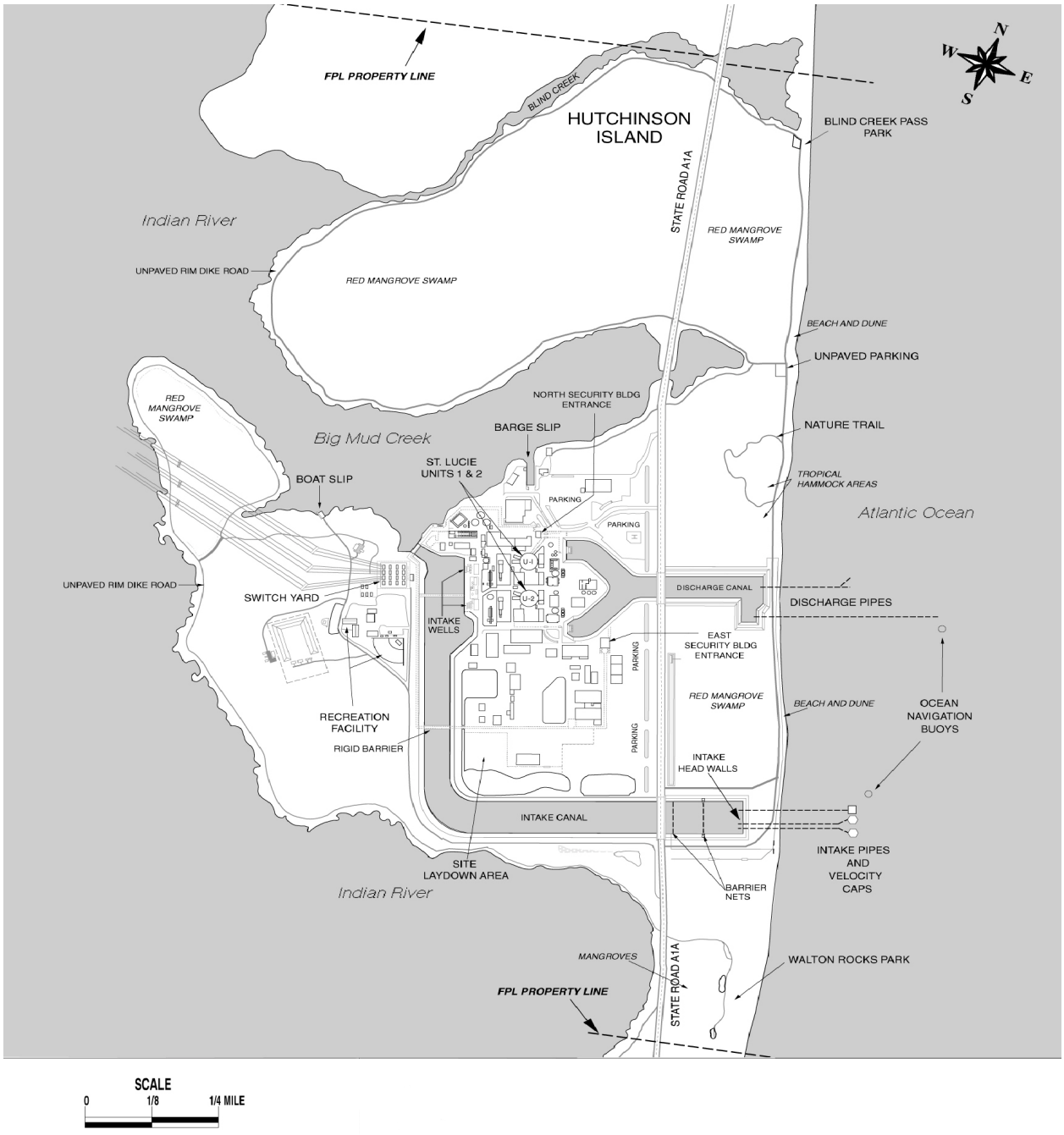

Figure 2-3. St. Lucie Units 1 and 2, Site Boundary

Fort Pierce Inlet State Recreation Area is approximately 14 km (9 mi) north of St. Lucie Units 1 and 2 immediately north of the Fort Pierce Inlet. Recreation area activities include beach access, swimming, picnicking, camping, and hiking. Other State recreation areas include Avalon, Savannas, and Pepper Beach. The Savannas State Preserve, a freshwater lagoon, is located on the mainland approximately 3.2 km (2 mi) west of St. Lucie Units 1 and 2, and offers fishing, hiking, picnicking, and other outdoor-related activities. Other prominent features within 80 km (50 mi) of St. Lucie Units 1 and 2 include Lake Okeechobee; Blue Cypress Lake; Jonathan Dickinson State Park; the Dupuis Reserve State Forest; J. W. Corbett Wildlife Management Area; a portion of the Brighton Seminole Indian Reservation; and the Hobe Sound, Pelican Island, and Loxahatchee National Wildlife Refuges (FPL 2001a).

2.1.1 External Appearance and Setting

The prominent structures and housed facilities and equipment associated with each of the units include the containment building, which houses the nuclear steam supply system including the reactor, steam generators, reactor coolant pumps, and related equipment; the turbine generator building, where the turbine generator and associated main condensers are located; the auxiliary building, which houses waste management facilities, engineered safety features components, and other facilities; and the fuel-handling building, where the spent fuel storage pool and storage facilities for new fuel are located. Prominent features beyond the power block area include the intake canal, discharge canal, intake wells, evaporation/percolation ponds, switchyard, technical and administrative support facilities, and public education facilities. The taller buildings on the site, particularly the containment buildings (approximately 61 m [200 ft] high) are visible from the mainland (FPL 2001a). Four evaporation-percolation ponds on the southern part of the site (Figure 2-4) accommodate storm-water runoff.

Two main aquifers are found in the area: a shallow, nonartesian or locally artesian aquifer within the Anastasia Formation, and a deeper, artesian aquifer known as the Floridan Aquifer. The two aquifers are separated by the Hawthorne Formation, which acts as an aquiclude. The groundwater flow direction in the Anastasia Formation is to the east precluding movement from the site westward toward the mainland. The piezometric level in the Floridan Aquifer is higher than that in the Anastasia Formation aquifer. This, in addition to the aquiclude (Hawthorne Formation) that separates the two aquifers, precludes water from moving from the site downward to the Floridan Aquifer (FPL 2000).

2.1.2 Reactor Systems

The arrangement of St. Lucie Units 1 and 2 major structures and equipment in the power block and nearby areas is shown in Figure 2-4. The nuclear power units for St. Lucie Units 1 and 2

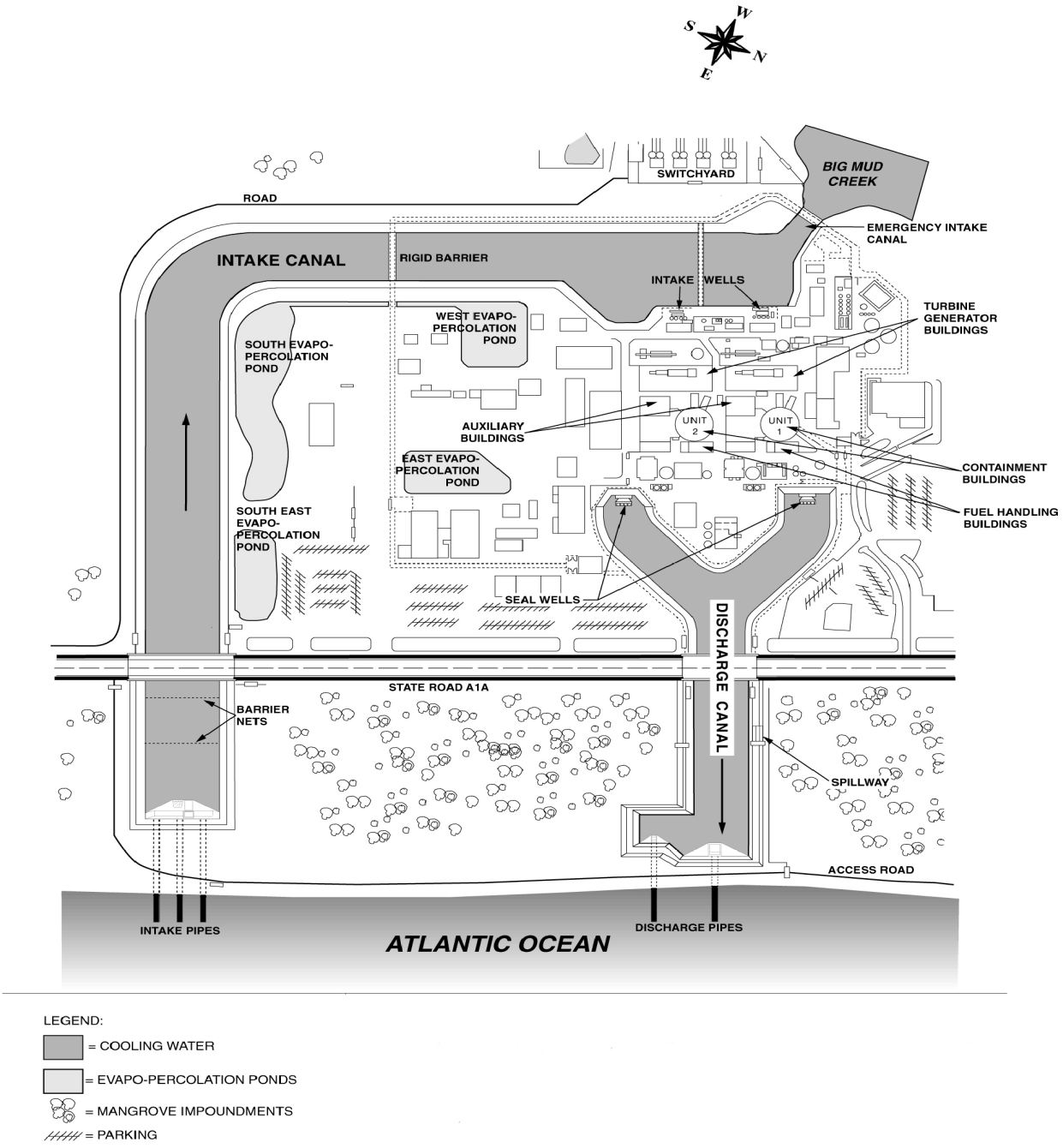

Figure 2-4. St. Lucie Units 1 and 2, Power Block Area

are of comparable design, each consisting of a pressurized light-water reactor (LWR) with two steam generators that produce steam, which turns a turbine to generate electricity. Each unit is currently licensed to operate at an output of approximately 2700 megawatts thermal [MW(t)], with a corresponding gross electrical output of approximately 890 megawatts electric [MW(e)], for a combined plant capability of 1678 MW(e), discounting onsite electrical power usage (net summer rating [FPL 2001a]).

Each reactor is housed in a containment structure comprising a steel-containment vessel surrounded by a reinforced concrete shield building. The dry-containment structures are designed to withstand environmental effects and the internal pressure and temperature accompanying a postulated loss-of-coolant accident (LOCA). Together with its engineered safety features, each containment structure is designed to adequately retain fission products that could escape from the reactor coolant system in the event of a LOCA.

St. Lucie Units 1 and 2 are licensed for uranium-dioxide fuel that is slightly enriched with up to 4.5 percent by weight uranium-235. The uranium-dioxide fuel is in the form of pellets contained in zircaloy tubes with welded end plugs to confine radionuclides. The tubes are fabricated into assemblies designed for loading into the reactor core. Each reactor core includes 217 fuel assemblies.

FPL currently replaces approximately one-third of the fuel assemblies in each reactor at an interval of approximately 18 months. FPL operates the reactors such that the average burnup is approximately 47,000 megawatt-days per metric ton uranium (MWd/MTU).

2.1.3 Cooling and Auxiliary Water Systems

Water from the Atlantic Ocean is used at St. Lucie Units 1 and 2 to remove heat from the main condensers and other auxiliary equipment. Most of this cooling water is used for the circulating-water system. Heat generated in the reactors is transferred in a way that useful energy is extracted to produce electricity. St. Lucie Units 1 and 2 have a two-loop, three-stage heat-transfer design. The primary system circulates reactor coolant (demineralized water that has been treated to control chemistry and corrosion) under high pressure through the reactor and two steam generators. The steam generators, steam turbine, and main turbine condensers are connected in a secondary closed loop containing treated, demineralized water. Secondary-system water flashes to steam in the steam generators, and the steam turns the turbine to generate electricity. After exiting the turbine, the steam in the secondary system passes through the main condensers, where it is cooled to liquid water before returning to the steam generator to complete the secondary loop.

The circulating-water system is the final (tertiary) stage in this heat-transfer system. The tertiary stage is unconfined. Water is drawn through three offshore ocean intake structures into

the intake canal. This water is then pumped from the intake canal at the intake wells through the main condensers to the discharge canal. The heated water is finally discharged back to the Atlantic Ocean through offshore diffusers (Figures 2-3 and 2-4). Water circulation in the system is provided by eight pumps (four per unit) located at the intake wells. Nominal total capacity of the pumps is 61,070 L/s (968,000 gpm), though capacity may range from 50,470 to 70,660 L/s (800,000 gpm to 1,120,000 gpm), depending on condenser cleanliness (FPL 1996). When all pumps are operating and both units are operating at 100 percent capacity, temperature rise across the condensers is about 13°C (24°F).

The three cooling-water intake structures for St. Lucie Units 1 and 2 are located about 370 m (1200 ft) offshore, where the water is about 7 m (23 ft) deep. Two of the structures were installed before startup of Unit 1 in 1976. The third intake structure is larger than the initial two and was installed in 1983. The designs of the structures are essentially identical, featuring a large concrete base with a vertical cylindrical opening in the center and a concrete velocity cap supported by columns extending about 1.8 m (6 ft) from the base (NRC 1982). The velocity cap configuration was designed to reduce potential entrainment of marine organisms by eliminating vertical flows and limiting horizontal flow velocities. Water withdrawn from the structures is conveyed through separate buried pipes, beneath the beach and dune system, to the intake canal. The inside diameters of the pipes, which correspond to those of the vertical cylindrical openings in the concrete bases of the structures, are 4.9 m (16 ft) for the large intake and 3.7 m (12 ft) for the two smaller intakes. Flow velocities vary within the intake system (Table 2-1) (Ecological Associates 2000).

The intake canal, a 1500-m (4920-ft) -long trapezoidal channel about 55 m (180 ft) wide and 9.1 m (30 ft) deep at normal water levels (USACE 1993), conveys cooling water to the intake wells during normal operation. FPL has installed and maintains three barriers in the channel to reduce potential losses of marine life, particularly sea turtles, and to facilitate the return of turtles to the ocean. These include deployment of a 12.7-cm (5-in.) mesh barrier net across the channel approximately midway between State Road A1A and the canal headwall, a 20.3-cm (8-in.) mesh barrier net immediately east of State Road A1A, and installation of a rigid barrier across the north-south arm of the intake canal (Figure 2-3) (Ecological Associates 2000).

FPL dredged accumulated sediments from the intake canal on several occasions, most recently in the fall of 2002. On one occasion (in the mid-1990s) the dewatered sediments were sold as clean fill. Dredging is in accordance with a U.S. Army Corps of Engineers (USACE) permit (USACE 1993). The permit includes provisions for periodic dredging in the future, if needed (USACE 1993). Under emergency conditions (e.g., failure of the intake canal headwall as a result of a design-basis earthquake), water can be withdrawn from Big Mud Creek via the emergency intake canal (Figure 2-4) through two 137-cm (54-in.) pipe assemblies in the barrier wall that separates the creek from the canal. FPL does not use this intake during normal

Table 2.1 Calculated Flow Velocities at Various Points in the Intake System of St. Lucie Units 1 and 2

	Velocity m/s (ft/s)	
Location	**3.7-m (12-ft) Diameter Intakes**	**4.9-m (16-ft) Diameter Intakes**
Velocity Cap Intake	0.11 to 0.12 (0.37 to 0.41)	0.27 to 0.30 (0.9 to 1.0)
Vertical Section	0.37 to 0.40 (1.2 to 1.3)	1.9 to 2.1 (6.2 to 6.8)
Intake Pipe	1.3 to 1.4 (4.2 to 4.7)	1.8 to 2.1 (5.9 to 6.8)
Intake Canal	0.30[(a)] (1.0)	

(a) Flow rate represents the combined flow from all intake pipes once merged in the intake canal.

operations but does test this system semiannually by exercising the valves in the two pipe inlets.

Water is withdrawn from the intake canal at eight separate intake wells (four per unit). Water enters the wells through a series of trash racks (vertical bars spaced 7.6 cm [3 in.] apart), then through traveling screens (1-cm [3/8-in.] mesh), which are periodically backwashed. The water is then pumped from the wells through the main turbine condensers. Heated water is discharged to the discharge canal. Biofouling of the condenser tubes and other system components is controlled exclusively using plastic foam balls (Taprogge® system) and injecting sodium hypochlorite. The foam balls are injected upstream from the condenser, scrub the condenser tubes as they pass through the tubes, and are collected in ball strainers downstream from the condensers (FPL 1996). FPL uses best management practices to minimize ball loss to the environment. Sodium hypochlorite injections are controlled to ensure that free available oxidant is at or below 0.5 mg/L at the condenser outlet and total residual oxidant concentration at the eastern end of the discharge canal is at or below 0.10 mg/L, as required by the Industrial Wastewater Facility Permit for St. Lucie Units 1 and 2 (FDEP 2000).

The discharge canal is about 670 m (2200 ft) long with transverse dimensions similar to those described for the intake canal. The canal transports the heated cooling water to two discharge pipes at its eastern terminus. The pipes transport water beneath the beach and dune system back to the Atlantic Ocean. One pipe, completed in 1975 to serve St. Lucie Unit 1, is 3.7 m (12 ft) in diameter, extends about 460 m (1500 ft) offshore, and terminates in a two-port "Y" diffuser. The second pipe, installed in 1981 for two-unit operation, is about 4.9 m (16 ft) in diameter, extends about 1040 m (3400 ft) offshore, and features a multiport diffuser. This diffuser consists of 58 41-cm (16-in.) -diameter ports located 7.3 m (24 ft) apart on the easternmost 430 m (1400 ft) of the pipe. The discharge of heated water through the Y-port and multiport diffusers ensure distribution over a wide area and rapid and efficient mixing with ambient waters (FPL 1996; Foster Wheeler 2000). Modeling studies presented by the U.S. Atomic Energy Commission (AEC) and the U.S. Nuclear Regulatory Commission (NRC) in

the operating stage Final Environmental Statements indicate that under typical conditions, the areas of the thermal plumes to the 1.1°C (2°F) isotherm (above ambient) from the St. Lucie Units 1 and 2 diffusers would be about 73 ha (180 ac) and 71 ha (175 ac), respectively (AEC 1973; NRC 1982).

The temperature of the discharged cooling water is limited by the Industrial Wastewater Facility Permit for St. Lucie Units 1 and 2 (FDEP 2000). These limits require that heated water from the diffusers, as measured near the exit from the discharge canal, do not exceed 45°C (113°F) or 16.7°C (30°F) above ambient during normal operations. A maximum temperature of 47.2°C (117°F) or 17.8°C (32°F) above ambient is permitted during certain maintenance operations, when throttling circulating water pumps to minimize use of chlorine, and when cleaning the circulating-water system.

The auxiliary cooling-water system for St. Lucie Units 1 and 2 is also a once-through cooling system, but uses much less water than the circulating-water systems. Up to 3660 L/s (58,000 gpm) of ocean cooling water is pumped from the intake canal using intake cooling-water pumps. This noncontact cooling water is pumped through heat exchangers to provide cooling for a wide variety of plant equipment and is discharged to the discharge canal. Low-level chlorination is used to control biofouling of this system (FPL 1996).

2.1.4 Radioactive Waste Management Systems and Effluent Control Systems

FPL uses liquid, gaseous, and solid radioactive waste management systems to collect and process the liquid, gaseous, and solid wastes that are the by-products of the operation of St. Lucie Units 1 and 2. These systems process radioactive liquid, gaseous, and solid effluents to maintain releases to the environment within regulatory limits. The St. Lucie Units 1 and 2 waste disposal system meets the design objectives of 10 CFR Part 50, Appendix I ("Numerical guides for design objectives, and limiting conditions for operation to meet the criterion 'As Low as is Reasonably Achievable' for radioactive material in light-water-cooled nuclear power reactor effluents") and controls the processing, disposal, and release of radioactive liquid, gaseous, and solid wastes. Radioactive material in the reactor coolant is the source of gaseous, liquid, and solid radioactive wastes in LWRs. Radioactive fission products build up within the fuel as a consequence of the fission process. These fission products are contained in the sealed fuel rods, but small quantities escape from the fuel rods and contaminate the reactor coolant. Neutron activation of the primary coolant system is also responsible for coolant contamination.

Nonfuel solid wastes result from treating and separating radionuclides from gases and liquids and from removing contaminated material from various reactor areas. Solid wastes also consist of reactor components, equipment, and tools removed from service, as well as contaminated

protective clothing, paper, rags, and other trash generated from plant design modifications and operations and routine maintenance activities. Solid wastes are shipped to a waste processor to reduce volume before disposal at a licensed burial site. Spent resins and filters are stored or packaged for shipment to a licensed offsite processing or disposal facility. St. Lucie Units 1 and 2 have separate radwaste systems. For reporting effluent releases and calculating offsite doses, the releases for the two units are combined (FPL 2000, 2001b).

Fuel rods that have exhausted a certain percentage of their fuel and are removed from the reactor core for disposal are called spent fuel. St. Lucie Units 1 and 2 currently operate on a staggered 18-month refueling cycle per unit. Spent fuel is stored onsite in the spent fuel pool in the Fuel Handling Building (FPL 2001a).

The *Offsite Dose Calculation Manual* (ODCM; FPL 2002) is subject to NRC inspection and describes the methods and parameters used for calculating offsite doses resulting from radioactive gaseous and liquid effluents. It is also used for calculating gaseous and liquid effluent monitoring alarm/trip setpoints for release of effluents from St. Lucie Units 1 and 2. Operational limits for releasing liquid and gaseous effluents are specified to ensure compliance with NRC regulations (FPL 2001b).

2.1.4.1 Liquid Waste Processing Systems and Effluent Controls

Potentially radioactive liquid wastes are processed by two systems: a boron recovery system and a liquid waste system. The boron recovery system processes water from the reactor coolant system that will be recycled in the plant. The liquid waste system processes liquid waste from outside of containment, such as process water from equipment drains, floor drains, laboratory drains, decontamination drains, building sumps, and laundry wastes (FPL 2000, 2001b).

The reactor coolant wastes, which are of potentially high activity, are collected from the chemical and volume control system and from valve and equipment leakage from containment drains and are placed in holdup tanks. The holdup tanks provide storage until there is an appropriate volume for batch processing. Storage allows for decay of the short-lived radionuclides. Degasification that occurs during storage is monitored by the plant vent monitors. The holdup tanks are sampled and processed until the contents meet the criteria for discharge. Before the controlled discharge of the treated liquid waste, the fluid is analyzed to determine that the activity is acceptably low for discharge. Discharged liquids pass through an effluent radiation monitor that records the release activity level and automatically terminates the release upon high radiation to the circulating water discharge. If the liquid is to be reused in the plant, it is analyzed for acceptability of both chemistry and activity (FPL 2000, 2001b).

The ODCM (FPL 2002) provides the control statements, limits, action statements, and surveillance requirements for ensuring that the liquid effluents released to unrestricted areas or the site boundary will be maintained within the requirements of 10 CFR Part 20, 40 CFR Part 190, 10 CFR 50.36.a, and 10 CFR Part 50, Appendix I. The ODCM also contains the calculation of the liquid effluent monitoring alarm/trip setpoints. The alarm/trip setpoint for each liquid-effluent monitor is based on the measurements of radioactivity in a batch of liquid to be released or in the continuous liquid discharge (FPL 2002).

During 2000, there were 31 batch releases for each unit at St. Lucie with a total volume of 7.2×10^7 L (1.9×10^7 gal) of liquid waste released before dilution for the two units. This liquid waste had a total fission and activation product activity of 2800 MBq (0.076 Ci) and total tritium activity of 2.1×10^7 MBq (557 Ci) (FPL 2001b). These volumes and activities are typical of past years.

FPL does not anticipate any increase in liquid waste releases during the renewal period.

2.1.4.2 Gaseous Waste Processing Systems and Effluent Controls

The gaseous waste systems for St. Lucie Units 1 and 2 process the vent gases from equipment located in the chemical volume control system, waste management system, and fuel pool system. Gaseous releases come from the reactor auxiliary building ventilation, turbine system leakage, steam jet air ejector operation, gland steam condenser operation, and containment purging in addition to releases from the gas collection header and gas surge header. The gaseous waste system is designed to protect workers and the public as well as meet the requirements in 10 CFR Part 20 and 10 CFR Part 50, Appendix I (FPL 2000, 2001b). Gases handled by the gaseous waste system may be compressed and stored in the gas decay tanks or may be released to the plant vent if the activity is sufficiently low. After decay, the gas in the waste gas decay tanks is sampled to ensure that the radioactivity levels are within acceptable limits for release. The monitored gaseous release points are the containment building purge, the reactor auxiliary building, the fuel-handling building, and the turbine generator building (FPL 2000). These release points are continuously monitored for noble gases, radioiodines, and particulate activity. The ODCM (FPL 2002) prescribes alarm/trip setpoints for these effluent monitors and control instrumentation to ensure that the alarm/trip will occur before exceeding the limits of 10 CFR Part 20 for gaseous effluents. These release points are continuously monitored and provide alarms and automatic valve closure when radiation levels exceed a preset level, thus terminating discharge.

During 2000, there was a total fission and activation gas activity of 5.2×10^5 MBq (14 Ci), a total iodine activity of 0.55 MBq (1.5×10^{-5} Ci), a total particulate activity including gross alpha, beta, and gamma of 14 MBq (3.8×10^{-4} Ci), and a total tritium activity of 6.6×10^6 MBq (178 Ci)

released from the two units. These releases are typical of past years. In addition, during 2000, there was a minor unplanned gaseous release from Unit 2 that resulted in a release of 2.3×10^5 MBq (6.2 Ci) of radioactive material (FPL 2001b). The dose contribution from this unplanned release was negligible and no site release rate, quarterly dose limits, or annual dose limits were exceeded.

FPL does not anticipate any increase in gaseous releases during the renewal period and releases will remain within the regulatory limits.

2.1.4.3 Solid Waste Processing

The solid wastes from St. Lucie Units 1 and 2 consist of concentrated liquid sludge, spent resin, spent filter cartridges, solid noncompactible and compactible trash, and miscellaneous materials from station and radwaste facility operation and maintenance. The Solid Waste Management System collects, controls, processes, packages, and temporarily stores solid radioactive waste and certain liquid radioactive waste generated as a result of normal plant operations. Concentrated liquid sludge is segregated by type, flushed to storage tanks, slurried into an appropriate container, and stored onsite before shipment offsite for disposal. Ion-exchange resins are sluiced into the spent resin tank or shipping container and dewatered. Filters are moved into shipping containers. Compressible waste is compacted if possible, or shipped offsite to a reduction facility for processing. Noncompressible waste is packaged in boxes or bags. All of these wastes are packaged and shipped offsite to an appropriate disposal or processing system (FPL 2000, 2001b).

In 2000, FPL made 21 shipments of solid waste from St. Lucie with a volume of 78.8 m^3 (2785.3 ft^3), and a total activity of 1.99×10^7 MBq (537 Ci) (FPL 2001b). These shipments are representative of the shipments made in the past several years and are not expected to change appreciably during the license renewal period.

2.1.5 Nonradioactive Waste Systems

When St. Lucie Units 1 and 2 were originally licensed, the sanitary waste system in use was a septic tank and associated leaching fields for treatment and disposal of onsite sewage. The flow of groundwater is predominately to the east towards the Atlantic Ocean. Because of the inherent problems with septic systems, the licensee anticipated tying into the municipal sewage facilities when a sewer line was installed on the island (AEC 1973, 1974). Since September 1997, upon completion of St. Lucie County's South Hutchinson Island Water Reclamation Facility, site sanitary wastewater has been discharged to the St. Lucie County system for treatment (FPL 2001a).

2.1.6 Plant Operation and Maintenance

Routine maintenance performed on plant systems and components is necessary for safe and reliable operation of a nuclear power plant. Maintenance activities at St. Lucie Units 1 and 2 include inspection, testing, and surveillance to maintain the current licensing basis of the plant and to ensure compliance with environmental and safety requirements. Certain activities can be performed while the reactor is operating. Others require that the plant be shut down. Long-term outages are scheduled for refueling and for certain types of repairs or maintenance, such as replacement of a major component. FPL refuels each of the St. Lucie nuclear units on an 18-month schedule, resulting in at least one refueling every year and two refuelings every third year (FPL 2001a). A third of the core is offloaded at each refueling. An additional 575 to 870 workers are temporarily onsite during a typical 30- to 40-day outage.

FPL provided its aging management review for each unit in its application to the NRC staff for renewed operating licenses for St. Lucie Units 1 and 2 (FPL 2001c). Chapter 3 and Appendix B of the St. Lucie Units 1 and 2 license renewal application outline the programs and activities that will manage the effects of aging during the license renewal period (FPL 2001c). FPL expects to conduct the activities related to the management of aging effects during plant operation or normal refueling and other outages, but plans no outages specifically for the purpose of refurbishment. FPL has no plans to add additional full-time staff (non-outage workers) at the plant during the period of the renewal licenses.

2.1.7 Power Transmission System

FPL constructed three 230-kV transmission lines to connect St. Lucie Units 1 and 2 to the transmission system (FPL 2001a). These three lines are all within a single transmission line right-of-way that runs west from the St. Lucie plant, crosses the Indian River, then runs over land for approximately 18 km (11 mi), terminating at the Midway substation (Figure 2-2). Most of the right-of-way is approximately 200 m (660 ft) wide, except for the last several miles where the three St. Lucie transmission lines share the right-of-way with other transmission lines that are not directly associated with St. Lucie Units 1 and 2. The last 2.4 km (1.5 mi) of the right-of-way is shared with four other 230-kV lines and one 500-kV line; the total right-of-way width along the majority of this leg is approximately 245 m (803 ft), with one short section of 330 m (1080 ft). In total, the right-of-way occupies approximately 310 ha (766 ac). FPL is the property owner for all of the transmission line right-of-way except for the last 2.4 km (1.5 mi), which is held in easement.

There are a variety of land uses and habitat types within the St. Lucie-to-Midway right-of-way including abandoned agricultural lands, pasture lands, sand pine scrub, dry prairie, pine

flatwoods, wet prairie, isolated marshes, and ruderal and disturbed sites (FPL 2001a). The right-of-way passes through a portion of the Savannas State Preserve, a nearly 2000-ha (4900-ac) environmental area managed by the Florida Department of Environmental Protection (FDEP) – Division of Parks.

FPL maintains the transmission right-of-way using a combination of trimming, mowing, and herbicide application. When required, FPL trims trees at a height of 4.3 m (14 ft) to maintain clearances below the conductors. Tree trimming is typically needed only at midspan. In open areas, FPL usually follows a 5-year mowing cycle. Herbicides are used both for spot treatment of individual trees and occasionally as broadcast applications to control exotic grasses. FPL uses only nonrestricted-use herbicides, which are applied under the supervision of licensed pesticide applicators.

2.2 Plant Interaction with the Environment

Sections 2.2.1 through 2.2.8 provide general descriptions of the environment as background information. They also provide detailed descriptions where needed to support the analysis of potential environmental impacts of refurbishment and operation during the renewal term, as discussed in Chapters 3 and 4. Section 2.2.9 describes the historic and archaeological resources in the area, and Section 2.2.10 discusses other potentially related Federal project activities and consultations with Federal agencies.

2.2.1 Land Use

St. Lucie Units 1 and 2 are located on Hutchinson Island in an unincorporated portion of St. Lucie County, Florida. The nearest municipalities are Fort Pierce, located approximately 11 km (7 mi) northwest of the plant; Port St. Lucie, located approximately 7 km (4.5 mi) west of the plant; and Stuart, located approximately 13 km (8 mi) south of the plant. Fort Pierce is the county seat of St. Lucie County. Port St. Lucie is the largest city within 80 km (50 mi) of the plant site.

St. Lucie Units 1 and 2 occupy approximately 457 ha (1130 ac) on the widest portion of Hutchinson Island. The plant site is zoned for utility use under the St. Lucie County Land Development Code.

Section 307(c)(3)(A) of the Coastal Zone Management Act [16 USC 1456(c)(3)(A)] requires that applicants for Federal licenses to conduct an activity in a coastal zone certify that the proposed activity is consistent with the enforceable policies of the State's coastal zone program. A copy of the certification is also to be provided to the State. The State is to notify the Federal agency whether the State concurs with or objects to the applicant's certification. This notification is to occur within 6 months of the State's receipt of the certification. The St. Lucie plant is within

Florida's coastal zone for purposes of the Act. Following submission of the FPL certification of consistency, the Florida Department of Community Affairs determined that renewal of the operating licenses for St. Lucie Units 1 and 2 would be consistent with the Florida Coastal Management Program (Collins 2002). A copy of the determination is in Appendix E of this Supplemental Environmental Impact Statement (SEIS).

2.2.2 Water Use

St. Lucie Units 1 and 2 receive water from the City of Fort Pierce and the Fort Pierce Utilities Authority for potable and service uses at the plant. This freshwater is derived from groundwater sources on the mainland, and plant operations do not involve any additional groundwater withdrawal. Current plant usage averages approximately 4.98×10^5 L (131,500 gal) per day with no restrictions on supply. Noncontact cooling water for St. Lucie Units 1 and 2 is withdrawn from the Atlantic Ocean. Additional minor amounts of ocean water are used to enhance the growth of mangroves, assist in mosquito control, and for mariculture and related projects.

2.2.3 Water Quality

In accordance with the Federal Water Pollution Control Act (also known as the Clean Water Act), the water quality of plant effluent discharges is regulated through the National Pollutant Discharge Elimination System (NPDES). FDEP is the agency in the State of Florida delegated by the U.S. Environmental Protection Agency (EPA) to issue discharge permits in Florida. The NPDES (FL0002208-Major) permit sets limitations on water quality in effluent discharges and establishes specific monitoring requirements and the reporting frequency. Discharge limitations for temperature are 45°C (113°F), or 16.7°C (30°F) above ambient conditions during routine operations. Discharge limits are also set for parameters such as total residual oxidants, free available oxidants, oil and grease, and total suspended solids. Additionally, the permit establishes requirements for management of industrial sludge generated by the facility, implementation of best management practices for pollution prevention, and record-keeping. The current NPDES permit expires on January 9, 2005.

Groundwater is generally very shallow at the site, and typically is just a few inches above mean sea level. Recharge of freshwater is via infiltration of rainfall, and the depth of freshwater is only a foot or so below the water table. No groundwater is withdrawn from the site as part of plant operations. Groundwater is withdrawn from the site to remediate a diesel fuel spill that occurred in 1992. The remediation is ongoing, with approximately 19,000 L (5000 gal) of spilled diesel fuel recovered to date. Approximately 760 L (200 gal) per year are still being recovered. Most of the diesel fuel has been filtered and reused onsite.

The current Industrial Wastewater Facility Permit (FDEP 2000) for St. Lucie Units 1 and 2 requires no groundwater monitoring at the site. Plant effluent is discharged to the Atlantic Ocean (a Class III marine water), the mangrove impoundment, and the intake canal. All discharges are monitored and regulated under the Industrial Wastewater Facility Permit (FDEP 2000).

An onsite package plant was originally used to treat the site sanitary wastewater. The treated wastewater was discharged to the discharge canal. Now the site's sanitary wastewater is discharged to St. Lucie County's South Hutchinson Island Water Reclamation Facility for treatment.

St. Lucie Units 1 and 2 have not had any significant NPDES compliance issues based on annual inspections the FDEP has conducted since 1993 (Davis 2002). Anticipated future operations at St. Lucie Units 1 and 2 suggest that compliance with NPDES regulations will continue.

2.2.4 Air Quality

The St. Lucie site has a subtropical climate with mild dry winters and long, warm summers with abundant rainfall. Climatological records for West Palm Beach, Florida, are generally representative of the St. Lucie site; the position of St. Lucie between the Indian River Lagoon and the Atlantic Ocean tends to moderate temperatures and alter precipitation amounts and timing.[(a)] Climatological records for West Palm Beach indicate that the dry season lasts from mid-November through April, and the wet season is from May through mid-November. Normal daily maximum temperatures for West Palm Beach range from about 24°C (75°F) in January to a high of about 32°C (90°F) in July and August. Normal minimum temperatures range from about 13°C (56°F) in January to about 24°C (75°F) in August. Normal monthly precipitation ranges from 5 to 8 cm (2 to 3 in.) in the dry season to 15 to 20 cm (6 to 8 in.) in the wet season.

Although thunderstorms occur in all months in the area, more than 80 percent of them occur from May through September. During July and August, thunderstorms occur on more than 50 percent of the days (FPL 2000). August and September are the height of the hurricane season. In any year, the probability of hurricane-force winds striking the site is about 1 in 15 (FPL 2000). Based on statistics for the 30 years from 1954 through 1983 (Ramsdell and Andrews 1986), the probability of a tornado striking the site is expected to be about 5×10^{-5} per year. Waterspouts, which are similar to weak tornadoes, occasionally occur along the Florida coast in the vicinity of St. Lucie. FPL estimates the probability of a waterspout striking a point offshore within 3.2 km (2 mi) of the coastline to be about 5×10^{-4} per year (FPL 2000).

(a) Climatological data for West Palm Beach are available at http://www.ncdc.noaa.gov/ol/climate/climatedata.html.

The wind energy resource in Florida is limited. The annual average wind power in most of Florida is rated 1 on a scale of 1 through 7; in coastal areas, the rating is 2 at best (Elliott et al. 1987). Areas suitable for wind turbine applications have a rating of 3 or higher. No area in Florida is rated 3 or higher.

Most of the year, the region is under the influence of the Bermuda high-pressure system. High-pressure systems are generally associated with low winds and increased potential for air pollution. However, because of its coastal location, meteorological conditions conducive to high air pollution are infrequent at St. Lucie. The St. Lucie site is located within the South Florida Intrastate Air Quality Control Region. In addition, the Central Florida Interstate Air Quality Control Region and the Southwest Florida Intrastate Air Quality Control Region are within 80 km (50 mi) of St. Lucie. These regions are designated as in attainment or unclassified for all criteria pollutants in 40 CFR 81.310.

The Everglades National Park is designated in 40 CFR 81.407 as a mandatory Class 1 Federal area in which visibility is an important value. The park, which is the closest Class 1 area to St. Lucie, is approximately 180 km (110 mi) from the St. Lucie site. The other Class 1 areas in Florida are more than 240 km (150 mi) from the site.

Diesel generators, boilers, and other activities and facilities associated with St. Lucie Units 1 and 2 emit various pollutants. Emissions from these sources are regulated under Air Permit 1110071-003-AO issued by the FDEP. The current air emissions permit expires on June 26, 2005.

2.2.5 Aquatic Resources

The St. Lucie Units 1 and 2 location on Hutchinson Island places it between two major aquatic ecosystems: the Atlantic Ocean to the east and the Indian River Lagoon to the west. The plant uses a once-through cooling-water system that withdraws from and discharges into the Atlantic Ocean via offshore intake and discharge structures. The plant is also equipped with an emergency cooling-water intake that can withdraw water from the Indian River Lagoon via Big Mud Creek, but this pathway is closed during normal operation (see Section 2.1.3). These areas contain markedly different habitats and biotic communities, as discussed below.

2.2.5.1 Atlantic Ocean

Submerged coquinoid rock formations parallel much of Hutchinson Island. A notable beach frontage feature at the plant site, just south of the St. Lucie Units 1 and 2 intake canal, is an intertidal coquina-rock formation that protrudes through the sand at Walton Rocks Park. The hard substrate is colonized extensively by encrusting tube-building marine polychaete worms

(family Sabellariidae). These worm reef communities in turn support a rich and diverse association of other invertebrates, algae, and fishes. The nearshore area has no reef structures, grass beds, or rock outcroppings. Seaward, the ocean floor consists of unconsolidated sediments composed of quartz and calcareous sands, broken shell fragments, and negligible amounts of silts and clays. The sea floor gently slopes into a trough with a maximum depth of about 11.9 m (39 ft) at about 1.9 km (1.2 mi) offshore. Continuing offshore, the sea floor rises to form the Pierce Shoal at about 3.2 km (2 mi).

The marine communities in the vicinity of St. Lucie Units 1 and 2 were studied in detail prior to startup of Unit 1 in 1976 (FPL 1973). Phytoplankton were collected at five locations offshore of Hutchinson Island. Densities ranged from 1 to over 35,000 cells/L during the study period, but varied little from location to location. The community was dominated by diatoms, the most common of which were the genera *Nitzschia*, *Bellerochea*, and *Chaetoceros*, and the species *Thalassionema nitzschioides* and *Skeletonema costatum*. The data indicated the possibility of two blooms per year, one during September-October and one during January. Chlorophyll *a* concentrations ranged from about 0.1 to 7.7 mg/m^3 and correlated well with the September-October phytoplankton bloom. The composition of the phytoplankton communities was typical of those described for other nearshore areas along the eastern seaboard of the United States.

Zooplankton were sampled at the same locations as phytoplankton, and ranged in density from about 250 to 12,000 organisms/m^3. The zooplankton community was characterized primarily by neritic holoplanktonic species (species that spend their entire life cycle in the water column). Copepods dominated the collections, with the genera *Acartia, Paracalamis, Oithona, Temora, Undinula, Corycaeus, Euterpina,* and *Labidocera* being common. Zooplankton density appeared to be broadly correlated with phytoplankton density.

Monitoring data indicates that there are three sub-tidal microhabitats offshore of the plant: shallow beach terrace, offshore shoal, and a deeper trough in between the two. Sediment composition differs among these zones. The biological composition of macroinvertebrate communities is largely influenced by sediment composition. Because of the sediment heterogeneity, the trough supports the most abundant fauna. It is characterized by high diversity and relatively rapid turnover of less abundant and more transient species. In the intertidal zone, the worm reef community provides yet another distinct habitat for macroinvertebrates. Patterns of fish abundance and diversity are also largely aligned along microhabitat boundaries. In addition to the habitats identified above, the surf zone harbors yet another distinct assemblage of fish.

Baseline data include 127 species of arthropods and nearly 300 species of mollusks. The diverse makeup of these groups, and to some extent their seasonal variability, was attributed to the transitional temperate, subtropical, and tropical mix of climate and water masses in the general vicinity of Hutchinson Island. Some estuarine affinities were also noted and attributed to water mass intrusions from the Indian River Lagoon by way of St. Lucie Inlet and prevailing

northerly coastal currents. Among species of direct commercial value, the Atlantic calico scallop (*Argopecten gibbus*) was the only mollusk recorded. Arthropods of potential commercial value included shrimp (of the family Penaeidae) and the blue crab (*Callinectes sapidus*). However, these species were generally collected infrequently and in small numbers.

Benthic studies conducted through 1984 produced remarkable databases for regional sediments, hydrology, and bottom-dwelling organisms. A total of 934 taxa of benthic macroinvertebrates, many species new to science, were identified.

The fish communities offshore are transitional assemblages of temperate and tropical forms. Since oceanic fishes are most diverse and abundant near reefs and other hard-bottom areas, FPL sited intake and discharge structures for St. Lucie Units 1 and 2 in areas devoid of these habitats.

Fisheries assessments were carried out in association with startup and operations of St. Lucie Units 1 and 2 (FPL 1973). Bottom trawls were used for several years, but collected few fish. For example, sampling every other month at five Hutchinson Island offshore locations from September 1971 to March 1972 resulted in 39 fish (13 species) collected. The sheepshead (*Archosargus probatocephalus*) was most abundant in these collections. Beach seines were deployed over this same time period. Ninety-eight percent of the catch of 11,598 fish was collected in November 1971, and consisted primarily of Cuban and longnose anchovies (*Anchoa cubana* and *A. nasuta*) and 20 other less abundant species. Ichthyoplankton were also sampled during the earlier monitoring (NRC 1982). Larvae of herring and anchovies were most common, and generally abundant during spring and summer. This monitoring yielded 5570 individuals distributed among 49 species. The five most abundant species accounted for nearly 70 percent of the catch: Atlantic bumper (*Chloroscombrus chrysurus*), Spanish mackerel (*Scomberomorus maculatus*), Atlantic croaker (*Micropogonias undulatus*), spot (*Leiostomus xanthurus*), and bluefish (*Pomatomus saltatrix*). Catches were higher in fall and winter than spring and summer. In comparing 8 years of monitoring data (1977-1984), investigators found temporal and spatial distributions to be highly variable (Applied Biology 1985).

Commercial and recreational fishing are important activities in the vicinity of St. Lucie Units 1 and 2. Commercial landing data for St. Lucie County were summarized for 1970-1972 (FPL 1973). Their evaluation focused on the three most abundant species in commercial catches at that time: bluefish, Spanish mackerel, and king mackerel (*Scomberomorus cavalla*). All are highly migratory, spawn in coastal waters from late summer into winter (depending on species), and migrate northward along the East Coast during the warmer seasons. These species are only seasonally abundant during migrations in spring and fall. For the 1971 season, landed weights of bluefish, Spanish mackerel, and king mackerel from St. Lucie County were about 104,000 kg (228,663 lb), 308,000 kg (679,110 lb), and 525,000 kg

(1,217,356 lb), respectively. These landings represented 10.7 percent, 6.8 percent, and 21.6 percent, respectively, of total Florida landings. These species were also prominent in the 1982 landings for St. Lucie County (Applied Biology 1985), ranging from about 107,000 kg (236,146 lb) of bluefish to about 408,000 kg (899,944 lb) of Spanish mackerel. However, several other species were quite abundant in 1982, including tilefish (*Caulolatilus* spp.) (267,000 kg [587,654 lb]) and swordfish (*Xiphias gladius*) (205,000 kg [451,503 lb]). Pre-operational studies revealed that bluefish, Spanish mackerel, and king mackerel occur farther offshore than where the intake and discharge lines now terminate, i.e., trough habitat (FPL 1973).

St. Lucie County is the northernmost county on Florida's east coast that has an extensive winter sport fishery (FPL 1973). Ladyfish (*Elops saurus*), common snook (*Centropomus undecimalis*), and various billfish species were common in recreational catches.

2.2.5.2 Indian River Lagoon

The Indian River Lagoon is a productive estuary that abuts the western edge of the St. Lucie Units 1 and 2 property. Environmental studies were conducted in the Lagoon from the late 1960s into the 1980s in association with siting, construction, and operation of St. Lucie Units 1 and 2 (FPL 1973; NRC 1982).

The lagoon is characterized by extensive growths of manatee grass (*Syringodium filiforme)* and red algae, such as the dominant form *Gracilaria* sp. In turn, the grass and algae are inhabited by a variety of gammarids, shrimp, isopods, crabs, and juvenile fish. A variety of microscopic organisms are supported by this vegetative community, including diatoms attached to the plant leaves. More than 90 phytoplankton species have been reported from the Lagoon. Benthic organisms are also abundant and include tube-dwelling worms and crustaceans, the latter including larger shellfish such as shrimp and blue crabs. Twenty-four decapod species (e.g., shrimp, crabs) were collected from Big Mud Creek near St. Lucie Units 1 and 2 in the early 1970s (FPL 1973).

Big Mud Creek, a backwater cove of the Indian River Lagoon, was dredged to a maximum depth of approximately 14 m (46 ft) during plant construction to provide deep-water access to the Intracoastal Waterway. Being some distance from both the Fort Pierce and St. Lucie inlets, Big Mud Creek receives little tidal influence and so has minimal water exchange with Indian River Lagoon. This results in water stratification in the summer and anoxic conditions on the bottom. During the winter months, the water masses turn over as the surface cools. A diverse and abundant fish community of over 300 species has been identified in the southern portion of the Indian River Lagoon (NRC 1982). Red drum (*Sciaenops ocellatus*), spotted seatrout (*Cynoscion nebulosus*), common snook, sheepshead, and gray snapper (*Lutjanus griseus*) were commonly reported. During the last 20 years, the increasing levels of human activities in

its watershed have impacted the lagoon's water, sediment, and habitat quality. As the construction of extensive agricultural and urban drainage projects have increased the watershed's size, the land-use changes associated with increased residential, commercial, agricultural, and industrial development have altered the freshwater inputs to the lagoon. Alteration of the normal patterns of freshwater inputs has contributed to changes in the biological communities in the lagoon. Reductions in abundance and distribution of sea grasses and oysters are evidence of these changes.

2.2.5.3 Threatened or Endangered Aquatic Species

Fifteen species of aquatic fauna and flora, observed on or near the St. Lucie Units 1 and 2 site, are listed as threatened, endangered, or State species of special concern (SSC) by Federal or State agencies (Table 2-2). Several species of sea turtle and the Florida manatee (*Trichechus manatus*) have been documented at the St. Lucie Units 1 and 2 site. The most common occurrences of threatened or endangered species at the site are the sea turtles.

Table 2-2. Federally Listed and State of Florida-Listed Aquatic Species Occurring in St. Lucie County

Scientific Name	Common Name	Federal Status[a,b]	State Status[a,b]
Caretta caretta	loggerhead sea turtle	T	T
Chelonia mydas	green sea turtle	E	E
Dermochelys coriacea	leatherback sea turtle	E	E
Eretmochelys imbricata	hawksbill sea turtle	E	E
Lepidochelys kempi	Kemp's ridley sea turtle	E	E
Balaenoptera borealis	sei whale	E	E
Balaenoptera phusalus	finback whale	E	E
Eubalaena glacialis	North Atlantic right whale	E	E
Megaptera novaeanliae	humpback whale	E	E
Physeter catodon	sperm whale	E	E
Trichechus manatus	Florida manatee	E	E
Acipenser oxyrhynchus	Atlantic sturgeon	-	SSC
Centropomus undecimalis	common snook	-	SSC
Rivulus marmoratus	mangrove rivulus	-	SSC
Halophila johnsonii	Johnson's seagrass	T	T

(a) Sources: FDACS 1998; FFWCC 2001
(b) E = endangered; T = threatened, - = no listing status, SSC = species of special concern.

Five species of sea turtle have been reported on Hutchinson Island. The threatened loggerhead sea turtle (*Caretta caretta*) has historically been most common. Between 5000 and 8000 loggerhead nests have been reported on Hutchinson Island over the last 10 years (Ecological Associates 2000). The endangered green sea turtle (*Chelonia mydas*) also nests on Hutchinson Island, but these nests are less abundant than those of the loggerhead. The endangered leatherback sea turtle (*Dermochelys coriacea*) infrequently nests on Hutchinson Island. Nest numbers have shown an upward trend in the last 20 years, though they have varied widely. During 1996 through 2000, the number of leatherback nests has ranged from 42 in 1997 to 143 in 1999 (FPL 2001d). The endangered Kemp's ridley sea turtle (*Lepidochelys kempi*) and hawksbill sea turtle (*Eretmochelys imbricata*) do not nest on Hutchinson Island and have only infrequently been reported from the area.

Six protected mammals (five species of whales and the Florida manatee) occur in the vicinity of the St. Lucie site. The whales are listed as endangered by the Federal government and the State of Florida. All occur in ocean waters off Hutchinson Island. Both humpback (*Megaptera novaeanliae*) and North Atlantic right whales (*Eubalaena glacialis*) have been observed in relatively close proximity to the shore in the immediate vicinity of the plant. These sightings occur between January and March. Waters of the southeastern United States are considered wintering and calving grounds for right whales (Waring et al. 1999). Three additional species of whale have been reported on rare occasions.

The Florida, or West Indian, manatee inhabits the Indian River Lagoon and Atlantic coastal waters off Hutchinson Island. Although preferred habitats are in the Indian River Lagoon and other inland waterways where food sources are abundant, they do occasionally travel up and down the coast near the shore. Manatees are known to congregate in the warm water effluents of power plants during winter months. There are abundant food resources near the facilities where they congregate.

None of the fish species In Table 2-2 are Federally listed, but all are designated as SSC by the State of Florida. The Atlantic sturgeon (*Acipenser oxyrhynchus*) inhabits salt or brackish water and may move into freshwater to spawn (Gilbert 1992). It has been collected along the Atlantic coast off Hutchinson Island and is listed as an occasional inhabitant of the neritic and surf zones over sand and shell bottoms (Gilmore et al. 1981). Atlantic sturgeon have not been collected in the intake canal or during operational monitoring offshore near St. Lucie Units 1 and 2.

The mangrove rivulus (*Rivulus marmoratus*) is listed as a rare inhabitant of mangroves, freshwater tributaries, canals, and mosquito impoundments (Gilmore et al. 1981).

The common snook is a highly prized recreational species common to the Indian River Lagoon and nearshore ocean water adjacent to the St. Lucie plant. Fishing for this species is regulated

by the State of Florida. Snook were taken in offshore trawls during operational studies, and they are regularly entrained with cooling water.

The only listed species of aquatic vegetation found in the vicinity of the St. Lucie plant is Johnson's seagrass (*Halophila johnsonii*). Johnson's seagrass is found in the Indian River Lagoon, most often near inlets.

2.2.6 Terrestrial Resources

Hutchinson Island is typical of the offshore sandbars that line the southern U.S. Atlantic coastline. It consists of a sandbar on the eastern side that rises to about 4.6 m (15 ft) above mean sea level and a broader, sloping swale on the western side. The seaward side of the dunes currently has no vegetation, and the inland side of the dunes is dominated by sea oats (*Unida paniculata*), sea grape (*Coccoloba uvifera*), salt marsh hay (*Spartina patens*), Australian pine (*Casuarina equisetifolia*), marsh ox-eye (*Barrichia frutescens*), beach sunflower (*Helianthus debilis*), marsh elder (*Iva frutescens*), bay bean (*Canaualia rosea*), and railroad vine (*Ipomoea pescaprae*) (Foster Wheeler 2001).

Before the 1930s, the mangrove swamps on the western side of the island were maintained by tidal and occasional storm-driven incursions of seawater as well as by rain (AEC 1973). The swales were dominated by red mangrove (*Rhizophora mangle*), with black mangrove (*Avicennia nitida*) and white mangrove (*Raguncularia racemosa*) established in the higher and less frequently flooded ground. These mangrove swamps are noteworthy for their high productivity and the rich animal communities they support. Much of the natural mangrove swamp area was destroyed during the 1930s and 1940s as part of a mosquito control program initiated by the Work Project Administration. The swamps were trenched, diked, and flooded with seawater, which greatly reduced mosquito breeding but also led to the loss of many trees, especially the black mangrove (AEC 1973). Since that time, there has been partial restoration of the swales, but much of the area continues to be maintained in an inundated state by the local mosquito control districts.

A few small tropical hammock habitats exist on Hutchinson Island near the St. Lucie site; the largest is found in the mangrove stands north of the discharge canal. These habitats are unusual this far north. Prominent species include gumbo-limbo (*Bursera simaruba*), paradise tree (*Simarouba glauca*), white and Spanish stoppers (*Eugenia axillaris and E. foetida*), wild lime (*Zanthoxylum fagara*), white indigo berry (*Randia aculeata*), mastic (*Mastichodendron foetidissimum*), and snow berry (*Chiococcoca alba*).

Habitat in the transmission line right-of-way is a mixture of human-altered areas, sand pine scrub, prairie/pine flatwoods, wet prairie, and isolated marshes. In the 1970s, much of the

right-of-way was used for agricultural purposes such as orange groves, row crops, and pastureland (AEC 1973). Most of that agricultural use has since been abandoned, except for the western portions used for grazing.

There are no designated critical habitat areas for any Federally listed threatened or endangered species at the St. Lucie site or along the transmission line right-of-way. However, the beach areas on the eastern side of Hutchinson Island are important nesting areas for the loggerhead sea turtle, and they are also used to a lesser extent by green and leatherback sea turtles. Critical habitat for the Everglades snail kite (*Rostrhamus sociabillis*) is located approximately 19 km (11.8 mi) northwest of the Midway substation.

At least 13 species listed as threatened or endangered under the Federal Endangered Species Act (ESA) are known to occur within St. Lucie County (Table 2-3). There are no species currently proposed for formal listing or considered candidates for listing in St. Lucie County. The status of the Federally listed species in the vicinity of the plant site and transmission line right-of-way is discussed in the following paragraphs.

The eastern indigo snake (*Drymarchon corias couperi*) has not been observed on the St. Lucie site or along the transmission line right-of-way, but it has been observed elsewhere on Hutchinson Island (FPL 2001a). Gopher tortoises (*Gopherus polyphemus*) are present on the site, especially on the leeward side of the dunes to the east of the St. Lucie site and intake/discharge canals in areas with soft soil not subject to flooding (FPL 2001a). Gopher tortoises also are known to occur within the St. Lucie-to-Midway transmission line right-of-way, at least in the strip between the Indian River and the eastern marshes of the Savannas State Preserve (Foster Wheeler 2001). Indigo snakes are known to seek out gopher tortoise burrows for shelter and denning (FWS 1999), and they have been observed elsewhere on Hutchinson Island and in St. Lucie County. Therefore, it is likely that there are eastern indigo snakes either onsite or in the near vicinity of the St. Lucie site or transmission line right-of-way.

American alligators (*Alligator mississippiensis*) are common in freshwater wetland areas throughout South Florida. They are not present at the St. Lucie site because all aquatic environments in the immediate vicinity of the site are either salty or brackish. Although not observed during field surveys (Foster Wheeler 2001), alligators are likely to occur occasionally in the freshwater marsh areas and along the St. Lucie River within or near the transmission line right-of-way.

The southeastern beach mouse (*Peromyscus polionotus niveiventris*) inhabits the sea oats zone of the primary coastal dunes (FWS 1999). In many cases, suitable habitat for the southeastern beach mouse may only be a few meters wide, and in most cases it is highly heterogeneous. They primarily feed on the seeds of sea oats and panic grass (*Panicum amarum*), although they will eat insects and seeds of other dune species.

The current distribution is severely limited by the modification and destruction of habitat along the Florida barrier islands. The largest populations are located at Canaveral National Seashore, while Brevard County and Indian River County have a number of populations. Populations have been reported from St. Lucie County at Pepper Beach County Park, Fort Pierce Inlet State Recreation Area, and Surfside Beach State Park, all located at least 13 km (8.1 mi) north of the St. Lucie plant. However, recent surveys have failed to detect any southeastern beach mice at these sites within St. Lucie County, and they may have been extirpated from the county. There have been no specific surveys for this species at the St. Lucie site; however, if it were present, the site would probably be a refuge for this species because of the limited disturbance and human interference.

Table 2-3. Terrestrial Species Listed as Threatened or Endangered by the U.S. Fish and Wildlife Service that Have Been Reported to Occur Within St. Lucie County, Florida

Scientific Name	Common Name	Federal Status[(a)]	State Status[(a)]
Reptiles			
Drymarchon corias couperi	eastern indigo snake	T	T
Alligator mississippiensis	American alligator	T(S/A)	SSC
Birds			
Aphelocoma coerulescens	Florida scrub jay	T	T
Haliaeetus leucocephalus	bald eagle	T	T
Mycteria americana	wood stork	E	E
Picoides borealis	red-cockaded woodpecker	E	T
Polyborus plancus audubonii	Audubon's crested caracara	T	T
Rostrhamus sociabilis	Everglades snail kite	E	E
Mammals			
Peromyscus polionotus niveiventris	southeastern beach mouse	T	T
Plants			
Asimina tetramera	four-petal paw paw	E	E
Dicerandra immaculate	Lakela's mint	E	E
Harrisia (Cereus) eriophorus	fragrant prickly apple	E	E
Polygala smallii	tiny milkwort	E	E

(a) E = endangered, T = threatened, T(S/A) = threatened due to similarity of appearance, SSC = species of special concern.

Sources: Based on U.S. Fish and Wildlife Service (FWS 2002a, 2002b); and the Internet sites of the Florida Natural Areas Inventory (FNAI) (FNAI 2002), Florida Fish and Wildlife Conservation Commission (FFWCC 2002), University of South Florida, Atlas of Florida Vascular Plants (2002); and Florida Geographic Data Library (2002).

Florida scrub jays (*Aphelocoma coerulescens*) are found in various forms of Florida scrub, including the coastal scrub found in eastern St. Lucie County. The largest populations of Florida scrub jays are located in the central portion of the Florida Peninsula in Polk and Highlands counties, but they are also found along both coasts and north of Orlando in Volusia, Lake, and Marion counties. Although it is fairly widespread throughout peninsular Florida, it has extremely specific habitat requirements (FWS 1999). It is endemic to the ancient dune ecosystems that are dominated by xeric oaks (*Quercus* spp.). Although scrub jays are not known from the St. Lucie plant site, they have been observed beneath the St. Lucie-to-Midway transmission lines within a narrow band of vegetation between the Indian River and the Savannas State Preserve that is suitable scrub jay habitat. There have been other periodic sightings of Florida scrub jays within the coastal scrub areas along the west shore of the Indian River within approximately 3 km (1.9 mi) of the St. Lucie transmission line (FGDL 2002). In general, the maintenance practices used by the applicant within the St. Lucie-to-Midway corridor may help to maintain the open scrub habitat required by the scrub jays.

Bald eagles (*Haliaeetus leucocephalus*) are known to nest approximately 2 km (1.2 mi) south of the St. Lucie transmission line corridor. They usually nest in tall trees near major waterways and feed on fish, waterfowl, and occasionally carrion. Bald eagles are occasionally observed along the Indian River and near the St. Lucie site, but they are not regular inhabitants of these areas.

The Audubon's crested caracara (*Polyborus plancus audubonii*) is a large, nonmigratory raptor. It occurs in south Texas, southwestern Arizona, and through Mexico from Baja California to Panama and Cuba. Only the Florida population is protected under the ESA (FWS 1999). In south Florida, the caracara occurs in dry or wet prairies with scattered cabbage palms (*Sabal palmetto*) or occasionally in lightly wooded areas. They usually build well-concealed nests within cabbage palms. Much of the historical habitat areas for the caracara have been greatly modified or destroyed, but there are indications that the caracara is able to use improved or semi-improved pastures (FWS 1999). Caracaras are opportunistic feeders and will consume both carrion and live prey. Although they may be present in the vicinity of the transmission line right-of-way, there are no known observations in the area, and they are primarily found in the western portions of St. Lucie County. Caracaras have not been observed at the St. Lucie site.

Wood storks (*Mycteria americana*) are large wading birds that rely on freshwater and estuarine habitats for nesting, roosting, and foraging. They build nests in colonies, usually in medium to tall trees that occur in either swamps or on islands surrounded by open water (FWS 1999), and they often share rookeries with other wading birds. The alterations of the natural hydrologic regime in south Florida have eliminated much of the seasonal variation on which wood storks historically relied—they exploited the fish that would become concentrated in alligator holes and other depressions during the dry season. Wood storks are observed occasionally in the vicinity

of the St. Lucie site and the transmission line right-of-way, but there are no known rookeries within many miles of the site or transmission line right-of-way.

The Everglades snail kite (*Rostrhamus sociabilis*) is a medium-sized raptor that feeds almost exclusively on apple snails (*Pomacea paludsa*) that are found in freshwater marshes and the shallow, vegetated edges of lakes. Most of the snail kite populations are located on the west side of Lake Okeechobee and in the Everglades west of Palm Beach, Fort Lauderdale, and Miami. However, there is one small area within St. Lucie County that has been designated as critical habitat for the snail kite. This area includes the Cloud Lake and Strazzulla reservoirs, approximately 19 km (12 mi) northwest of the Midway substation. This species has been observed within several kilometers of the transmission line right-of-way (FGDL 2002), and it might use the scattered freshwater marshes in the vicinity for foraging.

Red-cockaded woodpeckers (*Picoides borealis*) occur throughout the southeastern United States in pine stands or pine-dominated pine-hardwood stands with sparse understory and ample old-growth trees (FWS 1999). Population levels have drastically declined over the last century due to logging and conversion of habitat to other uses. The status of red-cockaded woodpeckers in south Florida, including St. Lucie County, is not well known (FWS 1999), but because of the requirements for old growth, pine-dominated forests, they are highly unlikely to occur at or near the St. Lucie site. Suitable habitat is very limited in or absent from the transmission line right-of-way (Foster Wheeler 2001).

The four-petal pawpaw (*Asimina tetramera*) is an aromatic shrub approximately 1 to 3 m (3 to 10 ft) tall. It occurs in sand pine scrub within the coastal dune system. Its historic range has been greatly reduced by habitat conversion, and it is now known from a few locations between Palm Beach Gardens and the Savannas State Preserve in Martin County, and a few locations in northern St. Lucie County (FWS 1999). This species is found in various seral stages of sand pine scrub and is adapted to infrequent, intense fires. This species is not likely to be found at the St. Lucie site or along the transmission line right-of-way; it would only be found near the west shore of the Indian River where suitable habitat is present. Field surveys have not detected this species within the transmission line right-of-way (Foster Wheeler 2001).

Lakela's mint (*Dicerandra immaculate*) is a small aromatic shrub that inhabits scrub areas of the Atlantic coastal ridge (FWS 1999). It occupies sites with varying amounts of organic litter, from partly covered to bare sand. This species is currently known from approximately six sites between Fort Pierce and Vero Beach, and at Hobe Sound National Wildlife Refuge, where it was introduced in 1991 and 1992 (FWS 1999). Although suitable habitat exists in the vicinity of the transmission line right-of-way at the western shore of the Indian River, this species was not found during field surveys (Foster Wheeler 2001).

The fragrant prickly apple (*Harrisia [Cereus] eriophorus*) is a solitary tree cactus that is endemic to St. Lucie County and is known only from approximately 11 small, disjunct sites, along the Atlantic Coastal Ridge on the western shore of the Indian River (FWS 1999). The St. Lucie-to-Midway transmission line right-of-way crosses this ridge between the Indian River and the marshes on the east side of the Savannas State Preserve. Several of the known populations are located within 2 to 3 km (1.2 to 1.9 mi) of this right-of-way, but none of the known populations is close enough to be affected by corridor maintenance. Field surveys of the corridor did not reveal any fragrant prickly apple (Foster Wheeler 2001).

The tiny milkwort (*Polygala smallii*) is a small, short-lived, herbaceous species that is restricted to sand pockets within pine rocklands, open sand pine scrub, slash pine, high pine, and well-drained coastal spoil (FWS 1999). It requires high light levels, and little to no organic litter accumulation. All known populations are within 9.7 km (6 mi) of the Atlantic coast between Miami-Dade County and St. Lucie County. The only known population in St. Lucie County is located approximately 6.9 km (4.3 mi) south of the St. Lucie-to-Midway transmission line. Field surveys of the transmission line right-of-way did not detect the presence of the tiny milkwort (Foster Wheeler 2001).

In addition to the species listed in Table 2-3, several other Federally listed species have been reported from the counties surrounding St. Lucie County. These conceivably could occur in the vicinity of the St. Lucie plant or associated transmission line right-of-way. These species include Atlantic salt marsh snake (*Nerodia fasciata taeniata*), Florida grasshopper sparrow (*Ammodramus savannarum floridanus*), piping plover (*Charadrius melodus*), Florida panther (*Felis concolor coryi*), perforate reindeer lichen (*Cladonia perforata*), and beach clustervine (*Jacquemontia reclinata*).

In addition to the Federally listed species, at least 72 species listed by the State of Florida as threatened, endangered, or of special concern occur in St. Lucie County (Table 2-4). Florida-State-listed animal species that have been observed at the site include a number of wading birds common to the region such as white ibis (*Eudocimus albus*), little blue heron (*Egretta caerulea*), tri-colored heron (*Egretta tricolor*), snowy egret, (*Egretta thula*) and roseate spoonbill (*Ajaia ajaja*), as well as the brown pelican (*Pelacanus occidentalis*) and southeastern American kestrel (*Falco sparverius paulus*). Black skimmers (*Rynchops niger*) and American oystercatchers (*Haematopus palliatus*) are known to nest along the intake canal shoreline, and the least tern (*Sterna antillarum*) has been found to nest atop buildings on the St. Lucie site (FPL 2001a). As described above, gopher tortoises are common within the stabilized dune system on the east side of the St. Lucie site and in the ancient dune system between the Indian River and the marshes of the Savannas State Preserve. State-listed plant species that have been observed at the St. Lucie site include the inkberry (*Scaevola plumieri*), common prickly pear (*Opuntia stricta*), burrowing four-o'clock (*Okenia hypogaea*), and coastal vervain (*Verbena [Glandularia] maritima*). Several additional State of Florida plant species of concern have been observed within the St. Lucie-to-Midway transmission line right-of-way, including the yellow

Table 2-4. Additional Terrestrial Species Listed by the State of Florida as Threatened, Endangered, or of Special Concern that Have Been Reported in St. Lucie County

Scientific Name	Common Name	State Status[(a)]
Reptiles		
Gopherus polyphemus	gopher tortoise	SSC
Pituophis melanoleucus mugitus	Florida pine snake	SSC
Amphibians		
Rana capito aesopus	Florida gopher frog	SSC
Birds		
Ajaia ajaja	roseate spoonbill	SSC
Aramus guarauna	limpkin	SSC
Egretta caerulea	little blue heron	SSC
Egretta rufescens	reddish egret	SSC
Egretta thula	snowy egret	SSC
Egretta tricolor	Louisiana heron	SSC
Eudocimus albus	white ibis	SSC
Falco peregrinus	peregrine falcon	E
Falco sparverius paulus	southeastern American kestrel	T
Grus canadensis pratensis	Florida sandhill crane	T
Haematopus palliatus	American oystercatcher	SSC
Pelacanus occidentalis	brown pelican	SSC
Rynchops niger	black skimmer	SSC
Speotyto cunicularia	burrowing owl	SSC
Sterna antillarum	least tern	T
Mammals		
Podomys floridanus	Florida mouse	SSC
Sciurus niger shermani	Sherman's fox squirrel	SSC
Plants		
Acanthocereus (Cereus) pentagonus	barbed wire cactus	T
Argusia gnaphalodes	sea lavender	E
Asclepias curtissii	Curtiss' milkweed	E
Caesalpinia major	yellow nickerbean	E
Calopogon multiflorus	many-flowered grass pink	E
Chamaesyce cumulicola	sand dune spurge	E
Chrysophyllum oliviforme	satinleaf	T
Coelorachis tuberculosa	piedmont jointgrass	T

Table 2-4. (cont'd)

Scientific Name	Common Name	State Status[(a)]
Plants (cont'd)		
Conradina grandiflora	large-flowered false rosemary	T
Drypetes lateriflora	guina plum	T
Encyclia boothiana	dollar orchid	E
Erithalis fruticosa	black torch	T
Ernodea littoralis	beach creeper	T
Eulophia (Pteroglossaspis) ecristata	non-crested coco	T
Harrisia (Cereus) gracilis var. *simpsonii*	prickly applecactus	E
Lantana depressa	pineland lantana	E
Lechea cernua	nodding pinweed	T
Lechea divaricata	pine pinweed	E
Lilium catesbaei	Catesby's lily	T
Linum carteri var. *smallii*	south Florida flax	E
Myrcianthes fragrans	Simpson's stopper	T
Nemastylis floridana	celestial lily	E
Nephrolepis biserrata	giant sword fern	T
Okenia hypogaea	burrowing four-o'clock	E
Oncidium bahamensis	dancing lady orchid	E
Ophioglossum palmatum	hand fern	E
Opuntia stricta	common prickly pear	T
Peperomia humilis	pepper	E
Pinguicula caerulea	blue butterwort	T
Pinguicula lutea	yellow butterwort	T
Pithecellobium keyense	blackbead	T
Platanthera nivea	snowy orchid	T
Pogonia ophioglossoides	rose pogonia	T
Polypodium (Pecluma) dispersa	polypoda fern	E
Polypodium (Pecluma) plumula	plume polypoda fern	E
Polypodium (Pecluma) ptilodon	swamp plume polypoda fern	E
Polystachya concreta	pale-flowered polystachya	E
Pteris bahamensis	Bahama brake	E
Remirea maritima	beach star	E
Scaevola plumieri	inkberry	T
Spermacoce terminalis	false buttonweed	T
Spiranthes lacinata	lace-lipped ladies' tresses	T

Table 2-4. (cont'd)

Scientific Name	Common Name	State Status[(a)]
Plants (cont'd)		
Spiranthes tuberosa	little pearl-twist	T
Stenorrhynchos lanceolatus	leafless beaked orchid	T
Tephrosia angustissima var. *curtissii*	hoary pea	E
Tillandsia balbisiana	inflated wild pine	T
Tillandsia flexuosa	twisted and banded airplant	T
Tillandsia valenzuelana	soft leaved wild pine	T
Vanilla mexicana	unscented vanilla	E
Verbena (Glandularia) maritima	coastal vervain	E
Verbena (Glandularia) tampensis	Tampa vervain	E
Zephyranthes simpsonii	Simpson's zephyr lily	T

(a) State status: E = endangered, T = threatened, SSC = species of special concern.

Sources: Based on FNAI, FFWCC, Atlas of Florida Vascular Plants, and Florida Geographic Data Library Internet sites as of March 2002.

butterwort (*Pinguicula lutea*), satinleaf (*Chrysophyllum oliviforme*), and the large-flowered false rosemary (*Conradina grandiflora*) (Foster Wheeler 2001).

2.2.7 Radiological Impacts

FPL began conducting a radiological environmental monitoring program (REMP) at St. Lucie in 1971 (AEC 1973, 1974). The radiological impacts to workers, the public, and the environment have been carefully monitored, documented, and compared to the appropriate standards. The twofold purpose of the REMP is to

- provide representative measurements of radiation and radioactive materials in those exposure pathways for those radionuclides that lead to the highest potential radiation exposures of members of the public

- supplement the radiological effluent monitoring program by verifying that the measurable concentrations of radioactive materials and levels of radiation are not higher than expected on the basis of the effluent measurements and the modeling of the environmental exposure pathways.

Radiological releases are summarized in two annual reports: *Annual Radiological Environmental Operating Report* (e.g., FPL 2001e) and *Annual Radioactive Effluent Release Report* (e.g., FPL 2001b). The limits for all radiological releases are specified in the St. Lucie ODCM and the *Annual*

Radioactive Effluent Release Report, and these limits are designed to meet Federal standards and requirements (FPL 2002, 2001b). The REMP includes monitoring of the airborne exposure pathway, direct exposure pathway (i.e., ambient radiation), water exposure pathway (i.e., surface water), aquatic exposure pathway (i.e., shoreline sediments), and ingestion exposure pathway (i.e., fish, invertebrates, and broadleaf vegetables). Radiological environmental monitoring for the St. Lucie plant is conducted by the State of Florida, Department of Health (DOH), Bureau of Radiation Control. Samples are collected and analyzed by DOH personnel (FPL 2001e).

Review of historical data on releases and the resultant dose calculations revealed that the doses to maximally exposed individuals in the vicinity of the St. Lucie plant were a small fraction of the limits specified in the EPA's environmental radiation standards in 40 CFR Part 190 as required by 10 CFR 20.1301(d). For 2000 (the most recent year that data were available), dose estimates were calculated based on actual liquid and gaseous effluent release data (FPL 2001c). Calculations were performed using the plant effluent release data, onsite meteorological data or historical data, and appropriate pathways identified in the ODCM.

According to the 2000 *Annual Radioactive Effluent Release Report* for St. Lucie Units 1 and 2 (FPL 2001b), assessment of radiation dose from radioactive effluents to members of the public assumes a visitor is onsite 6 hours per day, 312 days per year, and is located 1.6 km (1 mi) southeast of the plant. The visitor is assumed to have received exposure from both Unit 1 and 2 gaseous effluents released during 2000. The total beta and gamma air dose from noble gases was estimated to be 2.4×10^{-7} mGy (2.4×10^{-5} mrad) and total body dose from gases, particulate, and iodine of 0.017 μSv (0.0017 mrem). The air dose due to noble gases in gaseous effluents was 1.1×10^{-7} mGy (1.1×10^{-5} mrad) gamma radiation (5.5×10^{-5} percent of the 0.20 mGy [20 mrad] gamma dose limit[a]), and 1.3×10^{-5} mGy (0.0013 mrad) beta radiation (0.003 percent of the 0.40 mGy [40 mrad] beta dose limit[a]) (FPL 2001b).

Total body dose from liquid effluents was 0.34 μSv (0.034 mrem), which is 0.6 percent of the 0.06 mSv (6 mrem) dose limit.(a) The critical organ doses to the gastrointestinal tract and thyroid from liquid effluents were 1 μSv (0.1 mrem) and 0.024 μSv (0.0024 mrem), respectively. These doses were 0.5 percent and 0.01 percent of the respective 0.20-mSv (20-mrem) dose limit(a) (FPL 2001b).

The applicant does not anticipate any significant changes to the radioactive effluent releases or exposures from St. Lucie Units 1 and 2 operations during the renewal period and, therefore, the impacts to the environment are not expected to change.

(a) The design objective is twice the 10 CFR Part 50, Appendix I, dose limit because the limit is per unit and St. Lucie has two operating units.

2.2.8 Socioeconomic Factors

The staff reviewed the applicant's ER (FPL 2001a) and information obtained from several county, city, and economic development staff during a site visit to St. Lucie and Martin counties from April 1 through 5, 2002. The following sections describe the economy, population, and communities near St. Lucie Units 1 and 2.

2.2.8.1 Housing

The full-time work force at St. Lucie is approximately 791 FPL and 138 contract employees. Approximately 46 percent of these employees (FPL and contract) live in St. Lucie County, 37 percent in Martin County, 8 percent in Indian River County, 6 percent in Palm Beach County, with the remainder living in other locations (see Table 2-5). Since approximately 83 percent of the St. Lucie employees live in St. Lucie and Martin counties, and St. Lucie is where the plant is located, the focus of the socioeconomic analysis is on these two counties.

FPL refuels St. Lucie Units 1 and 2 on an 18-month cycle. Typically, this means that at least one unit is refueled every year, and both units would be refueled every third year. During refueling, the number of employees increases by as many as 575 to 870 temporary workers for a period of 30 to 40 days. These temporary employees stay at hotels, motels, and temporary rental housing available in Fort Pierce, Port St. Lucie, and Stuart.

Table 2-6 provides the number of housing units and housing unit vacancies for St. Lucie and Martin counties for 1990 and 2000. Of interest is the fact that not only has the stock of housing increased, but the number of vacant units in both counties has declined over the decade. This could reflect the very high population growth in the counties and the resultant increase in demand for available housing.

Table 2-5. St. Lucie Units 1 and 2, Employee and Contract Employee Residence by County

County	Number of Personnel	Percent of Total Personnel
St. Lucie	427	46
Martin	344	37
Indian River	74	8
Palm Beach	56	6
Other	28	3
Total	929	100

Source: FPL 2001a

Table 2-6. Total Occupied and Vacant (Available) Housing Units by County, 1990 and 2000

	1990	2000	Approximate Percentage Change
ST. LUCIE COUNTY			
Housing Units	73,843	91,262	23.6
Occupied Units	58,174	76,933	32.2
Vacant Units	15,669	14,329	-8.6
MARTIN COUNTY			
Housing Units	54,199	65,471	20.8
Occupied Units	43,022	55,288	28.5
Vacant Units	11,177	10,183	-8.9

Sources: U.S. Census Bureau (USCB) 2000 and USCB 1990a.

Planning agencies in both Martin and St. Lucie counties require that urban development be confined to areas of the county where public services and facilities are already provided or planned to be made available. In addition, neither county has growth-control measures in place restricting the development of new housing, and both counties have programs in place to promote the development of affordable housing.

Table 2-7 contains data on population, estimated population, and annual population growth rates for St. Lucie and Martin counties. Both counties saw similar growth in population during the 1990s.

Table 2-7. Population Growth in St. Lucie and Martin Counties, 1970 to 2020

	Martin County		St. Lucie County	
	Population	Annual Growth Percent[(a)]	Population	Annual Growth Percent
1970	28,033	--	50,837	--
1980	64,014	8.6	87,182	5.5
1990	100,900	4.7	150,171	5.6
2000	126,731	2.3	192,695	2.5
2010	152,701 (estimated)	1.9	234,383 (estimated)	2.0
2020	178,511 (estimated)	1.6	276,886 (estimated)	1.7

(a) Annual percent growth rate is calculated over the previous decade.
-- = No data available.
Sources: Florida Legislature 2001 (population for the years 1970 to 1990 and estimates for 2010 and 2020); and USCB 2000 (populations for year 2000 that are actual accounts from the 2000 census).

2.2.8.2 Public Services

Public services include water supply, education, and transportation.

- **Water Supply**

The South Florida Water Management District (SFWMD) estimated that in 1990, approximately 42 percent of St. Lucie County and 46 percent of Martin County residents obtained potable water from private wells (SFWMD 1998). The remaining residents receive their water from 107 and 139 water supply systems in St. Lucie and Martin counties, respectively, many of which are privately owned (FPL 2001a). The primary source of potable water supplies in the two counties is the shallow, unconfined surficial aquifer (SFWMD 1998).

Table 2-8 summarizes the daily consumption and areas served by the major (those permitted at over 3.8×10^3 m^3/d [1 million gallons/day [MGD]) public water supply districts. The primary

Table 2-8. Major[a] Public Water Supply Systems in St. Lucie and Martin Counties[b]

Water System	County	Source	Permitted Capacity m^3/d (MGD)	Average Daily Demand m^3/d (MGD)	Peak Demand Per Day m^3/d (MGD)	Area Served
City of Stuart	Martin	Surficial Aquifer	2.3×10^4 (6.0)	1.2×10^4 (3.2)[b]	2.0×10^4(5.4)	City of Stuart
Port Salerno	Martin	Surficial Aquifer	1.1×10^4 (3.0)	6.1×10^3 (1.6)	1.1×10^4(2.8)	Port Salerno
Hobe Sound	Martin	Surficial Aquifer	1.1×10^4 (3.0)	N/A	N/A	Hobe Sound
North Martin County	Martin	Surficial Aquifer	1.1×10^4 (3.0)	N/A	N/A	North Martin County
Fort Pierce Utilities Authority	St. Lucie	Surficial Aquifer	7.6×10^4(20)	3.2×10^4(8.5)	4.2×10^4(11)	City of Ft. Pierce and part of St. Lucie County
Port St. Lucie	St. Lucie	Surficial Aquifer	2.6×10^4 (6.9)	2.2×10^4(5.8)	3.1×10^4(8.2)	Port of St. Lucie and portions of St. Lucie County
		Floridan Aquifer	1.5×10^4 (4.0)			
St Lucie West Utilities	St. Lucie	Surficial Aquifer	3.8×10^3(1)	2.3×10^3(0.6)	N/A	City of Port St. Lucie

(a) Only permitted plants with a treatment capacity greater than 3.8×10^3 m^3/day (1 MGD) are listed in the table.
(b) SFWMD 1998; City of Port St. Lucie 1997; FPL 2001a

public water service providers in St. Lucie County are Fort Pierce and Port St. Lucie. In addition, Port St. Lucie is expanding its water and sewage treatment systems.

- **Transportation**

There are nine counties wholly or partially within the 80-km (50-mi) radius of St. Lucie (FPL 2001a). The nine-county area is served by one interstate freeway (Interstate 95 [I-95]) and the Florida Turnpike (see Figures 2-1 and 2-2). State Road 70 comes in from the west, transects Highlands and Okeechobee counties before entering St. Lucie County, crosses both I-95 and the Florida Turnpike, and ends in downtown Fort Pierce. U.S. Route 1 (US-1) is the coastal highway through Port St. Lucie, Fort Pierce (St. Lucie County), and Stuart in Martin County. US-1 serves as a major north-south thoroughfare through these cities and carries mostly local and regional traffic. Access to the St. Lucie site is via State Road A1A, a two-lane road running the length of Hutchinson Island.

The St. Lucie County International Airport is located north of Fort Pierce. It is a general aviation airport with several flight schools, an airplane manufacturer, and several businesses ancillary to the airport and flight operations (St. Lucie County 2001).

The Port of Fort Pierce is the region's only deep-water port. The port is approximately 35 ha (86 ac) and is largely undeveloped, except for a privately owned cargo operation at the southern end. The majority of the 35 ha (86 ac) is privately owned. The channel from the ocean leading to the port is 8.5 m (28 ft) deep. The port is mainly used for transport of agricultural commodities (St. Lucie County 2001).

2.2.8.3 Offsite Land Use

The following is a discussion of land use in St. Lucie and Martin counties (Table 2-9).

- **St. Lucie County**

St. Lucie County can be divided into three major land-use areas: the largely undeveloped coastal area, the developed area, and the agricultural area. The coastal area consists of the barrier islands and areas that front the Atlantic Ocean, and is approximately 34 km (21 mi) long. Approximately 11 km (7 mi) of the 34 km (21 mi) are under public ownership. About 3 km (2 mi) are owned by FPL and are the site of St. Lucie Units 1 and 2. These lands are largely undisturbed. The remaining oceanfront property is privately owned, and approximately 45 percent of that has been developed (St. Lucie County 2001). The major land uses within the coastal area are residential, commercial, and recreational (see Table 2-9).

Table 2-9. Land Use in St. Lucie and Martin Counties, Florida

	St. Lucie County[a]			Martin County[b]		
Land Use	Square Kilometers	Square Miles	% of Total	Square Kilometers	Square Miles	% of Total
Agriculture	945	365	56.9	1000	386	71.7
Residential	357	138	21.5	220	85	15.8
Commercial	41	16	2.5	13	5	0.9
Industrial	10	4	0.6	21	8	1.5
Recreation	86	33	5.2	5	2	0.4
Other	221	85	13.3	134	52	9.7
Total	1660	641	100.0	1393	538	100.0

(a) Existing unincorporated land use as of 2002. Personal communication Janet Merkt, April 29, 2002.
(b) Unincorporated Martin County only. Existing land use as of 1995.
Sources: Martin County 1999.

The developed area of the county lies generally between the Indian River Intracoastal Waterway, I-95, and the Florida Turnpike. This area establishes an Urban Service Boundary (USB) for which the county will provide services. Growth is targeted to take place within the USB. This area comprises the cities and towns of Port St. Lucie, St. Lucie West, Lakewood Park, St. Lucie Village, and Fort Pierce. The major land uses within this area are residential, commercial, and industrial.

To the west of the I-95/Florida Turnpike corridor is the agricultural area. The current county administration intends to restrict development and preserve agricultural lands. St. Lucie County does not have growth management restrictions in place; however, it does require that new development activities be authorized only in conjunction with the availability of the required public services to support the development. These services are generally provided only within the USB. Development west of the USB can occur, but it is limited to densities that range from one dwelling unit per 0.4 ha (1 ac) or one dwelling unit per 2 ha (5 ac). While greater densities can be approved, they require an amendment to the land-use map for the area, and any approval of the amendment requires the developer to provide the necessary infrastructure services at no cost to the local government. In addition, the conversion of agricultural land to residential or small farm use must maintain the viability of agricultural uses and activities on adjacent lands.

- **Martin County**

As with St. Lucie County, most urban development in Martin County occurs within the coastal area between the Florida Turnpike and I-95 and the Atlantic Ocean. The most intense urbanization is occurring around Stuart, the county seat of government and urban core of Martin County.

The part of the county west of the Turnpike is mainly for agricultural use. There are scattered, older residential and mobile home developments, and a developing western urban core in the Indiantown area. Indiantown contains a high percentage of minority and low-income populations.
Agriculture is one of the county's major exporting industries. As population growth in Martin County continues and the availability of land for development near the coast declines, development pressure on interior agricultural lands will increase. Such growth could increase the pressure for urbanization at the possible expense of agricultural and environmental quality. However, it is the policy of the county administrators that agricultural land is not vacant land. Agricultural activities are viewed as important for the economic diversity and health of the county and, as such, lands used for agricultural purposes are to be protected for future benefits and community identity (Martin County 1999).

2.2.8.4 Visual Aesthetics and Noise

St. Lucie Units 1 and 2 are located on Hutchinson Island, a barrier island separating mainland St. Lucie County from the Atlantic Ocean. The plant is bordered by the Atlantic Ocean on the east and the Indian River Intracoastal Waterway on the west. The topography of the site is flat with low sand dunes on the ocean side of the island.

The most prominent topographic feature on the island is State Road A1A, which runs almost the entire island's length and passes through the eastern portion of the St. Lucie site. Between the dunes on the Atlantic side of the island and State Road A1A, the principal feature is a series of mangrove-dominated mosquito impoundments interspersed with islands of natural, stranded coastal vegetation.

Approaching from the south on State Road A1A, the St. Lucie plant is not visible until approximately 1.2 km (0.75 mi) from the main entrance of the site. The view is blocked by vegetation along the west side of the road and is obscured as the main entrance is reached. However, the transmission lines from the plant are visible from greater distances due to their elevation. Approaching the plant from the north, the units are not visible until approximately 0.8 km (0.5 mi) from the site entrance.

From across Indian River, on the Fort Pierce and Port St. Lucie side, the plant is visible from the north and south from Indian River Drive. Many upscale homes ($280,000 and up [The Real Estate Book, not dated]) abut Indian River Drive and look out over Indian River toward the plant. Noise from the St. Lucie plant, at locations on the plant site, is barely noticeable except very close to the reactor containment vessels. From offsite, approaching from the north or south along State Road A1A or across Indian River, no noise is heard from the plant.

The nearest municipalities to the St. Lucie site are Fort Pierce, located approximately 11 km (7 mi) northwest of the plant, and Port St. Lucie, located approximately 7 km (4.3 mi) west of the plant across Indian River. Stuart, in neighboring Martin County, is approximately 13 km (8 mi) south of the plant.

2.2.8.5 Demography

- **Resident Population Within 80 km (50 mi)**

Population was estimated from the St. Lucie site out to 80 km (50 mi) in 16-km (10-mi) annular rings (FPL 1999, 2000). An estimated 345,000 people live within 32 km (20 mi) of St. Lucie, and 1,180,000 live within 80 km (50 mi) (FPL 2001a).

The largest population center within the 80-km (50-mi) area is Port St. Lucie (population 88,769 [USCB 2000]). The next largest town is Fort Pierce (population 37,516 ([USCB 2000]). It is followed by Stuart, which serves as the county seat for Martin County and has a population of 14,633 (USCB 2000). St. Lucie and Martin are two of the fastest growing counties in Florida. Over the decade between 1990 and 2000, the St. Lucie County population grew by approximately 2.5 percent per year (USCB 1990b, 2000), and the Martin County population grew by 2.3 percent per year.

Table 2-10 presents information on the major employment sectors and number of employees for St. Lucie and Martin counties.

- **Migrant Labor**

Migrant farm workers are individuals whose employment requires travel to harvest agricultural crops. These workers may or may not have a permanent residence. Some migrant workers may follow the harvesting of crops through Florida, Georgia, the Carolinas, and Virginia. Others may be permanent residents near the St. Lucie site who travel from farm to farm harvesting crops.

Table 2-10. Major Employment Sectors in St. Lucie and Martin Counties (2000)

	Number of Employees	
Employment Sector	**St. Lucie**	**Martin**
Services	21,145	27,537
Retail trade	12,981	13,864
Government & government enterprises	10,549	5,500
Finance, insurance, and real estate	5,581	7,149
Construction	5,225	6,308
Total jobs – full- and part-time	71,795	73,216

Source: Bureau of Economic Analysis (BEA) 2000

Migrant workers can be members of minority or low-income populations. Because migrant workers travel and can spend a significant amount of time in an area without being actual residents, they may be unavailable for census takers to count. If this occurs, these workers would be "underrepresented" in U.S. Census Bureau minority and low-income population counts (FPL 2001a).

Approximately 57 percent of St. Lucie County and 72 percent of Martin County are used for agriculture (see Table 2-9). In addition to St. Lucie and Martin counties, seven counties are wholly or partially within the 80-km (50-mi) radius of the St. Lucie site. All of the counties have agricultural production and farms that hire migrant or other labor (USDA 1997). In 1997, St. Lucie and Martin counties contained 359 farms that hire migrant or other labor (USDA 1997). While many follow the crop cycle, they maintain their permanent residence in the counties, where they may spend as much as 50 to 70 percent of their time.[(a)]

In 1997, approximately 20,800 farm workers worked in the seven-county area[(b)] around St. Lucie Units 1 and 2 (USDA 1997). In July 2001, approximately 11 percent of hired farm workers (at the national level) were classified as migrant labor (USDA 2001).[(c)] Using this 11-percent figure, approximately 2290 of the farm workers may have been migrant workers for the seven-county area. Given the large geographic area and the small number of migrants, FPL did not expect the migrant farm worker population to materially change the population

(a) Ms. Anita Neal (County Extension Director, St. Lucie County Extension), personal interview April 5, 2002, and Ms. Carol Bailey (County Extension Director, Martin County Extension), personal interview April 3, 2002.
(b) Specifically the following: St. Lucie, Martin, Indian River, Brevard, Okeechobee, Palm Beach, and Glades counties.
(c) State of Florida data on migrant farm workers were not available.

characteristics of any particular census tract in the seven-county area (FPL 2001a). FPL's conclusion is based on the assumption that the migrant laborers would be located throughout the seven-county agricultural area and not clustered in a single location.

2.2.8.6 Taxes

The St. Lucie plant is the largest source of tax revenue for St. Lucie County. Table 2-11 presents information on the total real and personal property taxes FPL paid to St. Lucie County for St. Lucie Units 1 and 2 and the relationship of taxes paid to total tax revenues of the county. The percentage of taxes paid by FPL for the St. Lucie site to the total amount collected by the county ranged between 7.9 and 10.3 percent.

Table 2-11. Property Taxes Paid to St. Lucie County by FPL for St. Lucie Units 1 and 2

Year	Real and Personal Property Tax Paid to St. Lucie County for St. Lucie 1 and 2	Total St. Lucie County Property Tax Revenues	Percent of Total County Property Taxes
1996	$19,449,952	$196,823,727	9.9
1997	$16,717,273	$211,942,795	7.9
1998	$19,766,291	$210,294,416	9.4
1999	$22,807,970	$221,893,569	10.3
2000	$18,888,240	$222,310,596	8.5

Source: Personal communication provided by the office of Mr. Robert Davis, St. Lucie County Tax Collector, April 23, 2002

2.2.9 Historic and Archaeological Resources

This description of the cultural background and the known historic and archaeological resources at the St. Lucie site and in the surrounding area is based on information from the ER (FPL 2001a), archives and records stored at the Florida Master File in the Florida Division of Historical Resources, and published literature on the history of southern and central Florida.

2.2.9.1 Cultural Background

The St. Lucie plant is located in St. Lucie County, about 45 km (28 mi) northeast of Lake Okeechobee in south-central Florida. The plant is located on Hutchinson Island, a barrier island that protects the lengthy shallow estuary known as Indian River Lagoon.

The archaeological site of Fort Pierce near the juncture of Fort Pierce Creek with the Indian River Lagoon is the nearest established and developed cultural or historic park. The developed reservation lands of the nearest Federally recognized Native American tribes are those of the Brighton Seminole, located about 76 km (47 mi) to the southwest of the St. Lucie plant and northwest of Lake Okeechobee. Also nearby are the Big Cypress Seminole and the Miccosukee, located about 109 km (68 mi) southwest of the plant and directly south of Lake Okeechobee. However, in 1996, the U.S. Bureau of Indian Affairs purchased 20 ha (50 ac) of land in St. Lucie County to be held in trust for the Seminole Tribe for the purpose of becoming the Fort Pierce Reservation. As of April 2002, development of housing for tribal members on this area had not begun.

The archaeological sequence of central and eastern Florida began at least 12,000 years ago (Rouse 1951; McGoun 1993; Bense 1994; Milanich 1994, 1998; Milanich and Proctor 1994; MacCauley 2000). The cultural history of the area can be divided into four major periods: (1) Paleoindian (10,000 B.C., and perhaps as early as 13,000 B.C., to around 8000 B.C.); (2) Archaic (8000 to 500 B.C.); (3) various regional cultural traditions, including that of the Indian River culture in the vicinity of the St. Lucie plant (500 B.C. to around A.D. 1500); and (4) Historic/Modern (A.D. 1500 to the present).

During the Paleoindian period, the native people apparently were organized into small mobile bands with economies based on hunting and fishing. The environment of the Paleoindian period was significantly different from the environment today. The last ice age was ending at that time, and glaciers covered much of the northern portion of North America. The presence of the glaciers also meant that ocean levels were much lower than present levels, perhaps on the order 23 to 30 m (75 to 100 ft) lower. Thus, many of the archaeological sites dating from this time period would be under water today or situated in and around wetlands.

The transition between the Paleoindian and Archaic periods was accompanied by substantial environmental change; most notable was the rise in sea level as the glaciers melted. These changing conditions led to the disappearance of megafauna such as the mammoth that traditionally had been quarry for the indigenous inhabitants of the region. In response, the Native Americans adapted by becoming more dependent on river systems and beginning the domestication of plants. The greatest cultural change occurred during the middle Archaic period when ocean levels reached or even slightly exceeded current levels. Evidence (e.g., the presence of storage pits, extensive refuse middens, and large quantities of fire-cracked rock) from middle and late Archaic period archaeological sites indicates that during that period the cultures of the Native Americans became more sedentary.

In the Indian River period (named for the Indian River Lagoon), Native American cultures along the east-central coast of Florida reached their modern configurations as observed and noted at the time of the initial European contact in the 16th and 17th centuries. The Indian River period is

subdivided into two phases: the Malabar I phase (500 B.C. to A.D. 750) and the Malabar II phase (A.D. 750 to around 1550). The Native American culture that existed during the Indian River period mirrors the better known St. Johns I and II period culture of the people immediately to the north of St. Lucie and Indian River counties, although the Indian River people had their own distinct economy and material culture.

During the Malabar I phase, groundwater and sea levels were lower than present levels; therefore, the environment in and around the Indian River Lagoon was dominated by prairies, pine flatwoods, and cabbage palm hammocks. That kind of environment would not be particularly productive, so Native American population levels in the Indian River region probably were lower than in surrounding regions, such as the St. John's Basin.

In the Malabar II phase, estuaries such as the Indian River Lagoon would have become wetter and more biologically productive, and thus more capable of sustaining larger populations of Native Americans. However, Indian River period coastal settlements were probably used only seasonally as bases for collecting shellfish (mainly oysters) and fishing (mainly marine catfish). The Indian River period people probably were primarily foragers rather than full-time sedentary agriculturalists as was the case for the Native Americans in neighboring regions. Indeed, most of the regions surrounding the Indian River Lagoon area, with the possible exception of Lake Okeechobee, apparently participated in the widespread and complex Mississippian culture phenomenon that resulted in the development of a number of chiefdoms throughout the Southeast. Even the Lake Okeechobee area, although not directly linked with the Mississippian culture, might have been an important center of ceremonial activities.

An example of a large Indian River period archaeological site is the King's Mound located immediately west of the St. Lucie plant on the west side of the Indian River Lagoon. This site contains a ramped sand mound, approximately 4 m (13.1 ft) in height and 30 m (97.6 ft) in diameter, along with an associated refuse midden that covers an area of about 5000 m^2 (5980 yd^2).

At the beginning of the 16th century, the area around Indian River Lagoon was occupied by the Ais Indians, who probably were descendants of the earlier Indian River period populations. The historic Ais were linguistically related to the better known Muskogean-speaking Tekesta (Tequesta) of the southern tip of Florida and the Calusa of southeastern Florida. All three groups relied on foraging to a much greater extent than did the tribes of northern Florida.

The Historic period in Florida began in 1513 when the first European explorers arrived. In that year, the Spanish explorer Ponce de León explored the southern coasts of Florida from the Gulf coast area around Fort Myers to the Atlantic coast south of Cape Canaveral (Rouse 1951; Bense 1994; Milanich 1998; Cumming 1998). An attempt to colonize a portion of the Calusa

territory led to the death of Ponce de León in 1521 and the subsequent abandonment of the colony. In 1564, the French established Fort Caroline at the mouth of the St. James River about 300 km (186 mi) north of the modern St. Lucie site. The French colonists were slaughtered in 1565 by a Spanish force under Pedro Menéndez de Avilés, who subsequently established the colony of St. Augustine at this location. The English buccaneer Sir Francis Drake sacked and burned St. Augustine in 1586, but the Spanish reoccupied, rebuilt, and fortified the colony.

After an unsuccessful attempt at establishing a mission by the Jesuit Order in the middle of the 16th century, the Catholic Church supported the Franciscan mission in Florida during the 17th and early 18th centuries (McEwan 1993). However, disease, slave raids, European warfare, and enforced removal to Cuba decimated the Ais, Calusa, and Tekesta tribes during the latter half of the 16th century and throughout the 17th century. By the mid-1600s most of the original Florida tribes were represented by a few hundred people, mostly attached to the Spanish missions. By the mid-18th century the Ais, Calusa, and Tekesta tribes had disappeared from the historic record and are now considered extinct.

One other notable event associated with the colonial history of the region occurred during the 18th century. During a hurricane on July 31, 1715, a 12-ship Spanish treasure fleet was lost on the reefs along the coast of the modern St. Lucie and Indian River counties. The 1500 survivors of this shipwreck established a camp and salvors station located about 60 km (37 mi) north of the modern St. Lucie plant.

During the period of the early to mid-1700s, Creek Indians began moving into northern and central Florida and by the 1760s were beginning to be recognized by the name Seminole. In 1817, Andrew Jackson attacked Seminole villages in Spanish Florida as a continuation of earlier warfare with the Creek Indians in Alabama and Georgia. This action is known as the First Seminole War.

In 1819, after a period of more than 100 years of contested colonization in the Southeast among France, England, and Spain, the United States annexed Florida. In 1830, then President Andrew Jackson was successful in convincing Congress to pass the Indian Removal Act. Under this Act, the Southeastern Indian tribes, including the Seminoles, were to be forcibly removed to lands west of the Mississippi River in what was to become the State of Oklahoma. The Seminoles refused to go, and in 1835, they launched what became known as the Second Seminole War. Two years later, 400 Seminole warriors and 800 Federal troops fought a pitched battle just north of Lake Okeechobee. After this battle, U.S. Army Lt. Col. Benjamin Kendrick Pierce established a fort to be used as the army headquarters for the duration of the Second Seminole War. After five more years of warfare, the Seminoles took refuge in the Everglades in 1842.

With the diminished threat of warfare, Fort Pierce began to develop rapidly into a civilian community that continues to exist. St. Lucie County was formally established from a portion of Mosquito County in 1844. The name of the county was changed to Brevard during the 1850s, but the name reverted to St. Lucie in 1905.

In 1845, Florida became the 27th State to join the United States of America, and in January 1861, it seceded from the Union and joined the Confederacy. Although no major Civil War battles were fought in southern or central Florida, Florida was involved in supplying people, materials, and food to the Confederate war effort. The physical effects of the Civil War and the abolishment of slavery fundamentally changed the economic basis of the Southeast between 1865 and 1917 (Bense 1994). While plantations were typically returned to their former owners, plant operations became dependent on voluntary contracts or tenant farming with their labor force. Over time, plantations became smaller; the average size was less than 40 ha (100 ac) by 1920. Expansion of the railroads, rebuilding of basic infrastructure, and the Industrial Revolution all led to major cultural changes.

The City of Fort Pierce was incorporated in 1901. The Fort Pierce economy at the end of the 19th and beginning of the 20th centuries was based on water transportation, fishing and the canning of fish, and cash crops dominated by pineapple and later by citrus fruit. The period between World War I and World War II saw the continued growth of small towns, small plantations, and independent farms. The railroad system allowed Fort Pierce to become the economic and commercial hub of Florida's so-called Treasure Coast.

2.2.9.2 Historic and Archaeological Resources at St. Lucie Site

As previously noted, historic and archaeological site file searches were conducted at the Florida Master File in the Florida Division of Historical Resources to identify specific historic cultural resources that might be present at the St. Lucie plant. In addition, record searches were conducted for nearby locations to gain perspective on the types of historic resources that may be present in the previously undeveloped and unsurveyed portions of the St. Lucie site.

An archaeological survey apparently was not conducted at the St. Lucie site prior to construction. However, an archaeological survey conducted in 1973 of the proposed transmission line right-of-way found no historic properties (Morrell 1973). Recent record searches revealed five known archaeological sites located on or immediately adjacent to the property boundaries for the St. Lucie Plant. Archaeological Site 8SL13 ("Blind Creek I") and Site 8SL44 ("Blind Creek II") are north of Blind Creek and situated immediately adjacent to, but outside, the northern property line of the plant. These sites represent Malabar I and possibly Malabar II mounds and middens, including a burial mound with a surface area of approximately 4 ha (10 ac). Archaeological Site 8SL26 is a historic shipwreck (a side-wheeler of

undetermined origin) situated on sand and dead reef fragments about 610 m (2000 ft) offshore from Hutchinson Island, which is immediately north and east of the eastern end of Blind Creek and outside the St. Lucie plant property boundary. Archaeological Site 8SL33 ("Swamp Wreck") is a buried shipwreck of undetermined origin (but more than 50 years old) situated in mangroves immediately inside of the southern property boundary of the St. Lucie plant. Archaeological Site 8SL55, a 19th century shipwreck of undetermined origin, is located along the shoreline of Hutchinson Island in the vicinity of and immediately south of Site 8SL33. Archaeological Site 8SL22, the remains of an undetermined vessel from the 1715 Spanish treasure fleet, is located in the vicinity of and immediately south of Site 8SL55. No structures or buildings at or near the St. Lucie plant are 50 years in age or older.

As previously mentioned, the original Native American inhabitants of the Indian River Lagoon area, the Ais and their predecessors from the Indian River period, became extinct as a tribe during the 18th century. However, the modern Seminole and Miccosukee Tribes have taken on tribal responsibilities for cultural resource issues pertaining to the archaeology of the Ais culture and their predecessors.

2.2.10 Related Federal Project Activities and Consultations

The staff reviewed the possibility that activities of other Federal agencies might impact the renewal of the OLs for St. Lucie Units 1 and 2. Any such activities could result in cumulative environmental impacts, and the possible need for a Federal agency to become a cooperating agency for preparation of this SEIS [10 CFR 51.10(b)(2)].

The closest Federal lands to the St. Lucie plant are (1) Hope Sound National Wildlife Refuge located approximately 35 km (22 mi) south of the plant site, (2) Pelican Island National Wildlife Refuge located approximately 51 km (32 mi) north of the plant site, and (3) Loxahatchee National Wildlife Refuge located approximately 77 km (48 mi) south of the plant site. The U.S. Air Force Avon Park bombing and gunnery range is located approximately 95 km (59 mi) northwest of the plant. Patrick Air Force Base is located approximately 103 km (64 mi) north of the St. Lucie site.

The closest Native American land to the St. Lucie plant is the Brighton Seminole Indian Reservation located approximately 76 km (47 mi) southwest of the plant.

After reviewing the Federal activities in the vicinity of the St. Lucie plant, the staff determined that there were no Federal project activities that would make it desirable for another Federal agency to become a cooperating agency for preparation of this SEIS.

NRC is required under Section 102(C) of National Environmental Policy Act of 1969 (NEPA 1969) to consult with and obtain the comments of any Federal agency that has jurisdiction by

law or special expertise with respect to any environmental impact involved. During the preparation of this SEIS, NRC consulted with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service. Consultation correspondence is included in Appendix E.

2.3 References

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10 CFR 50. Code of Federal Regulations, Title 10, *Energy*, Part 50, "Domestic Licensing of Production and Utilization Facilities."

40 CFR 81. Code of Federal Regulations, Title 40, *Protection of the Environment*, Part 81, "Designation of Areas for Air Quality Planning Purposes."

40 CFR 190. Code of Federal Regulations, Title 40, *Protection of Environment*, Part 190, "Environmental Radiation Protection Standards for Nuclear Power Operations."

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