

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

The Florida Power & Light Company's (FPL's) Turkey Point Plant is located on the shore of Biscayne Bay in Florida's South Miami-Dade County. The plant consists of four units. Units 3 and 4 are nuclear reactors and are the subject of this action. Units 1 and 2 are fossil-fuel units and are not covered by this action. Each nuclear reactor is a pressurized light-water reactor (LWR) with three steam generators producing steam that turns turbines to generate electricity. In addition to the nuclear and fossil-fuel units, the site features a 2711-ha (6700-ac) system of closed, recirculating cooling canals that all four units use for heat rejection. 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

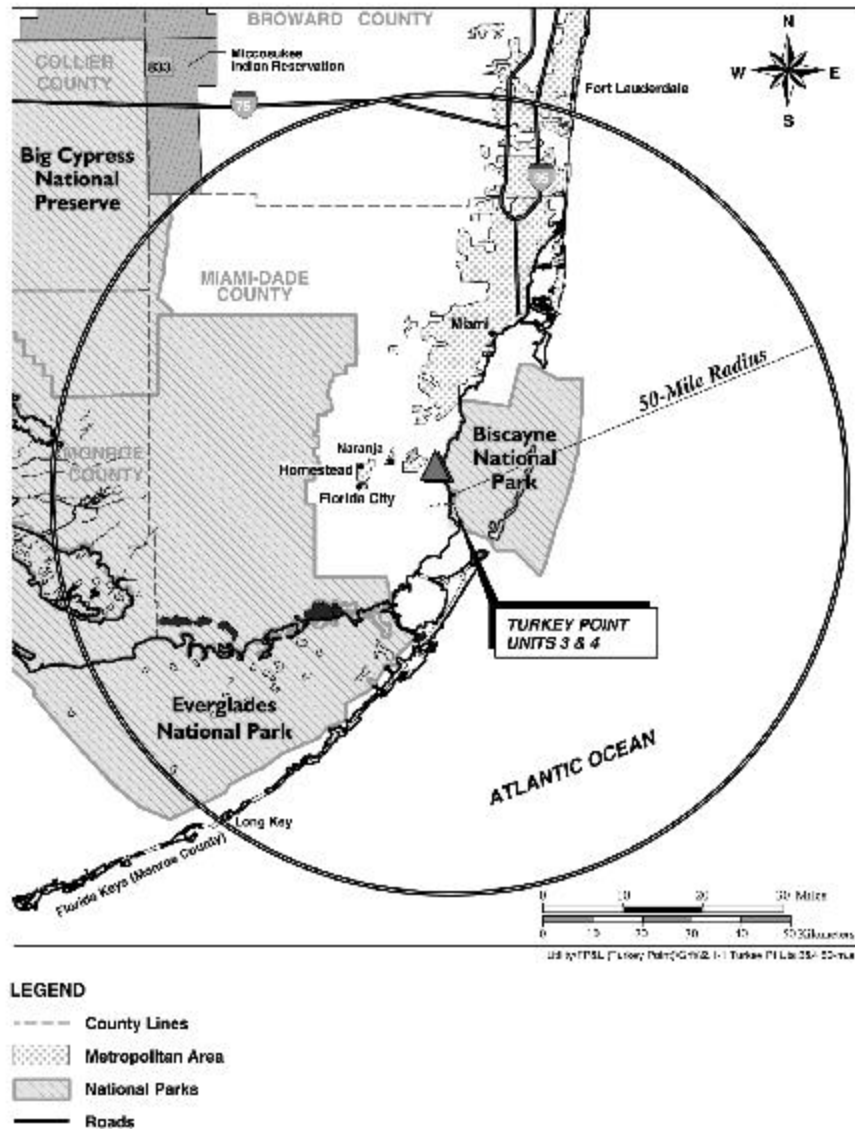
Turkey Point Units 3 and 4 are located on 9700 ha (24,000 ac) of FPL-owned land in southern Florida (FPL 2000a). Figures 2-1 and 2-2 show the site location and features within 80 km and 10 km (50 mi and 6 mi), respectively. The site is surrounded by an exclusion area whose radius measures 1.27 km (0.79 mi) (FPL 2000a).

The region surrounding Turkey Point Units 3 and 4 was identified in the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS), NUREG-1437, Volumes 1 and 2 (NRC 1996; 1999)<sup>(a)</sup> as having a high population density. FPL refuels each Turkey Point nuclear unit on an 18-month schedule, when site employment increases by as many as 800 to 900 workers for temporary duty (30 to 40 days). FPL employs a work force of 730 to 775 permanent employees and about 185 contractor employees at Turkey Point Units 3 and 4. The plant is located approximately 40 km (25 mi) south of Miami. The nearest city limits are Florida City, approximately 13 km (8 mi) to the west, and Homestead, approximately 15 km (9 mi) to the northwest of the site. Key Largo is approximately 16 km (10 mi) south of Turkey Point Units 3 and 4.

The Turkey Point site is on the shore of a part of Biscayne Bay that, together with several miles of the shoreline north of the plant, compose the Biscayne National Park. The Biscayne National Park headquarters is located approximately 3.2 km (2 mi) north of Turkey Point Units 3 and 4, adjacent to the metropolitan Miami-Dade County Homestead Bayfront Park. The Everglades

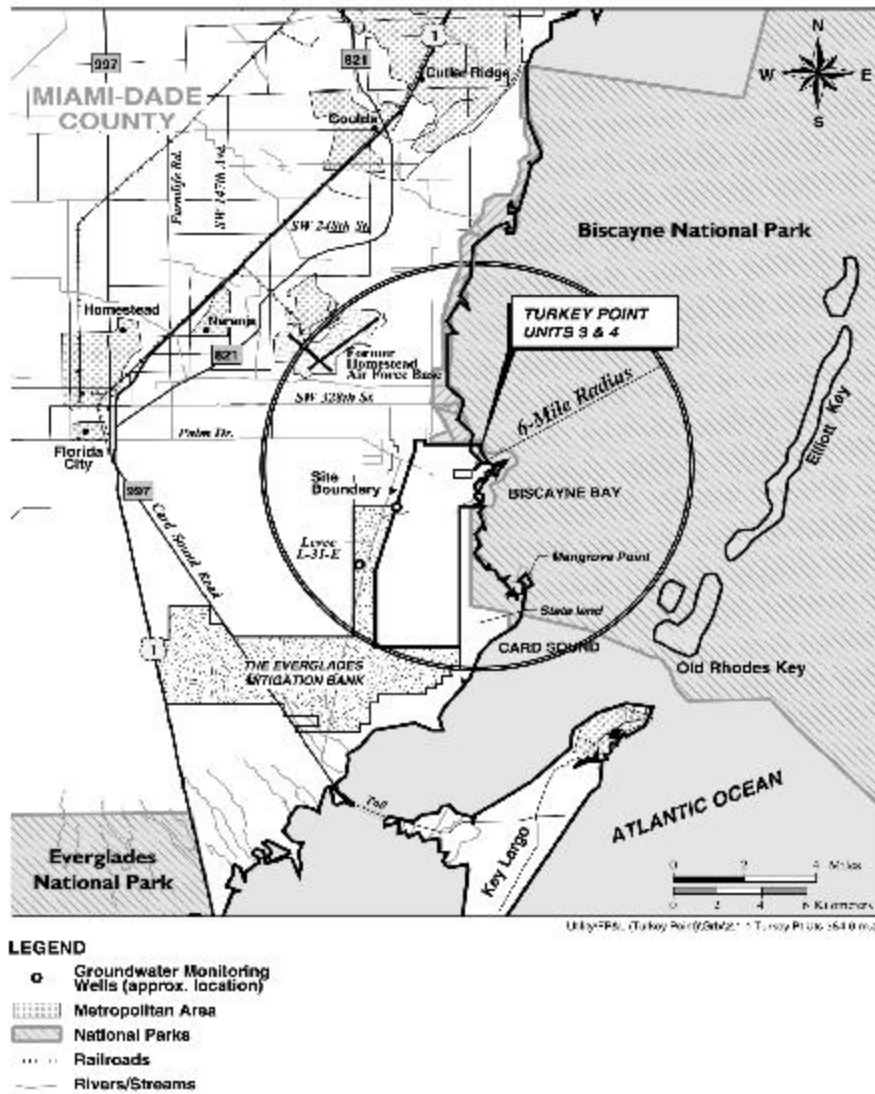
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(a) The GEIS was originally issued in 1996. Addendum 1 to the GEIS was issued in 1999. Hereafter, all references to the "GEIS" include the GEIS and its Addendum 1.



**Figure 2-1.** Location of Turkey Point Units 3 and 4, 80-km (50-mi) Region

National Park is approximately 24 km (15 mi) west of the site. Small portions of the Miccosukee Indian Reservation and the Big Cypress National Preserve are within 80 km (50 mi) of Turkey Point Units 3 and 4; portions of Broward and Monroe counties and a small portion of Collier County are also within 80 km (50 mi) of the plant. Monroe County encompasses portions of Everglades National Park and Big Cypress National Preserve as well as the Florida Keys.



**Figure 2-2.** Location of Turkey Point Units 3 and 4, 10-km (6-mi) Region

Mangrove Point forms the dividing line between Biscayne Bay and Card Sound. The northern half of Mangrove Point is part of Biscayne National Park, and the southern half is State-owned.

Turkey Point was built on mangrove-covered tidal flats adjacent to Biscayne Bay. The land is low and swampy. Mangrove swamps extend inland approximately 5 to 6.5 km (3 to 4 mi). Most undeveloped portions of the site remain under 2 to 8 cm (1 to 3 in.) of water, even during low tide. The terrain is flat and rises gently from sea level at the shore to about 3 m (10 ft) above

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mean sea level 13 to 15 km (8 to 10 mi) west of the site in Homestead. Across Biscayne Bay, about 8 to 13 km (5 to 8 mi) to the east, is a series of offshore barrier islands with a northeast-southwest orientation between the bay and the Atlantic Ocean.

The ground elevation at the site is typically less than 0.3 m (1 ft) above the mean sea level. The direction of surface drainage is to the east and south, toward Biscayne Bay and Card Sound. The area contains no lakes or perennial streams. Surface water runoff in the region is not naturally limited to confined watercourses such as rivers or streams; it also flows over the surface as a broad, shallow sheet called "sheet flow." Canal, levee, and road construction during this century has diverted much of this flow, thereby drying land areas for agricultural and other uses. Flood control levee L31-E, which has a crest elevation of approximately 2 m (7 ft) above sea level with a roughly north-south orientation, lies at the inland boundary of the FPL cooling canal system.

### **2.1.1 External Appearance and Setting**

The 120-m (400-ft) stacks for fossil fuel Units 1 and 2 are distinctive features of the Turkey Point site and can be seen from a considerable distance. Another distinctive feature of the site is the 2700-ha (3.2-km by 8-km) (6700-ac [2-mi by 5-mi]) system of closed recirculating cooling canals that all four units use for heat rejection.

FPL currently does not have an independent spent fuel storage installation (ISFSI) located on the Turkey Point site.

The geology around Turkey Point site is fairly simple. The site lies within the Floridian Plateau, a partly submerged peninsula of the continental shelf whose edge is about 29 km (18 mi) offshore to the east. This peninsula is underlain by a thick 1200- to 4600-m (4000- to 15,000-ft) series of sedimentary rocks consisting of limestones and associated formations and range in age from Paleozoic to Recent. These are underlain by igneous and metamorphic basement rocks, primarily Pre-Cambrian granites. Examination of geologic structures indicates a lack of tectonic activity during the past 500,000 years. Because of the absence of structural deformation, faults are uncommon and there is no evidence of bedrock faults in the site area (AEC 1972).

The predominant surface feature is bedrock outcrop of Miami oolite, a deposit of permeable limestone extending to about 6 m (20 ft) below sea level, overlain by organic swamp soils varying from approximately 1.2 to 2.4 m (4 to 8 ft) thick. Pockets of silt and clay separate the organic soils and bedrock in some locations (AEC 1972).

### 2.1.2 Reactor Systems

Turkey Point Units 3 and 4 are shown in Figure 2-3. Each unit is a pressurized LWR with three steam generators, which produce steam that turns turbines to generate electricity. Each unit, designed and fabricated by the Westinghouse Electric Corporation (AEC 1972), is capable of an output of 2300 MW(t), with a corresponding gross electrical output of approximately 795 MW(e). Onsite electrical power usage amounts to slightly more than 100 MW(e), leaving each unit with a reliable net summer rating of 693 MW(e) (FPL 2000a).

Each reactor containment structure is approximately 64 m (210 ft) tall and 39 m (124 ft) in diameter. Each is a dry containment structure designed to withstand environmental effects and the internal pressure and temperature accompanying a postulated loss-of-coolant accident or steam-line break. Together with its engineered safety features, each containment structure is designed to adequately retain fission products that escape from the reactor coolant system. Turkey Point Units 3 and 4 are licensed for fuel that is slightly enriched uranium dioxide, up to 4.5 percent by weight uranium-235 (FPL currently uses a maximum of 4.45 percent enrichment). FPL operates the reactors at an average fuel discharge burnup of approximately 45,000 megawatt-days per metric ton uranium (MWd/MTU).

### 2.1.3 Cooling and Auxiliary Water Systems

Turkey Point Units 3 and 4 use three-loop cooling systems for heat dissipation. The primary loop is a sealed system that carries heat from the reactors to the steam generators. The secondary loop, which is also sealed, carries heat from the steam generators through the turbines to the condensers. The tertiary system carries heat from the condensers to a recirculating canal system where the heat is released to the environment. The temperature rise in the water from the recirculating canals across the condenser is about 10 CE (18 FE) during full power operation. The primary and secondary loops use treated freshwater; the tertiary loop uses saltwater.

FPL obtains about 0.044m<sup>3</sup>/s (1.5 ft<sup>3</sup>/s) of water from the Miami-Dade public water supply system's Newton water-treatment plant for uses related to Turkey Point Units 3 and 4. Most of this water is used as demineralizer makeup water for use in the primary and secondary cooling loops. A small fraction of the water is used as potable water and for fire protection. FPL does not withdraw either groundwater or surface water for makeup or potable water uses. Makeup water for the canal system comes from used process water (which is treated and released to the canal system), incident rainfall, stormwater runoff, and possibly groundwater infiltration. Sanitary wastewater is treated and then released to the groundwater through an injection well.

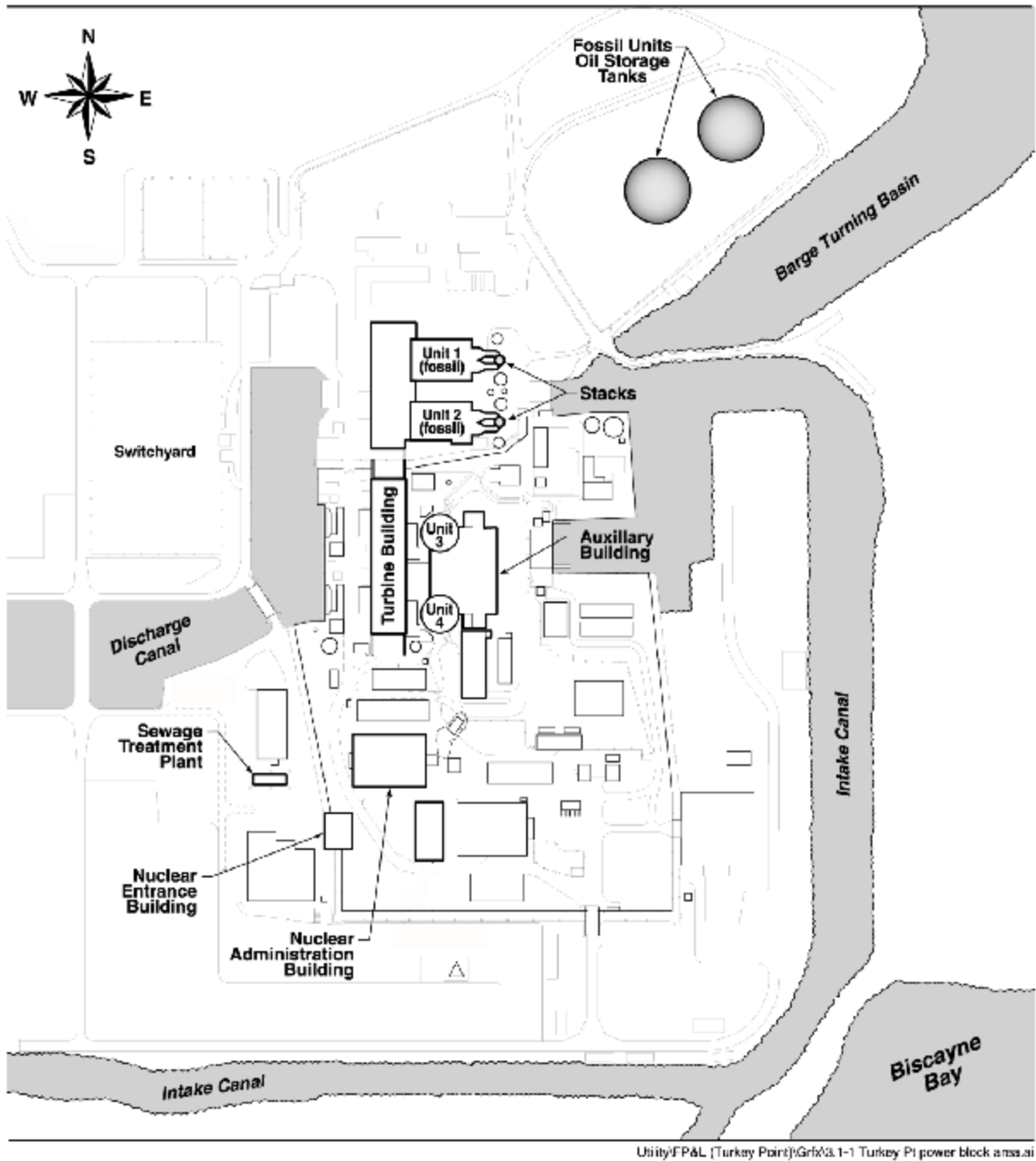


Figure 2-3. Turkey Point Site Powerblock Area

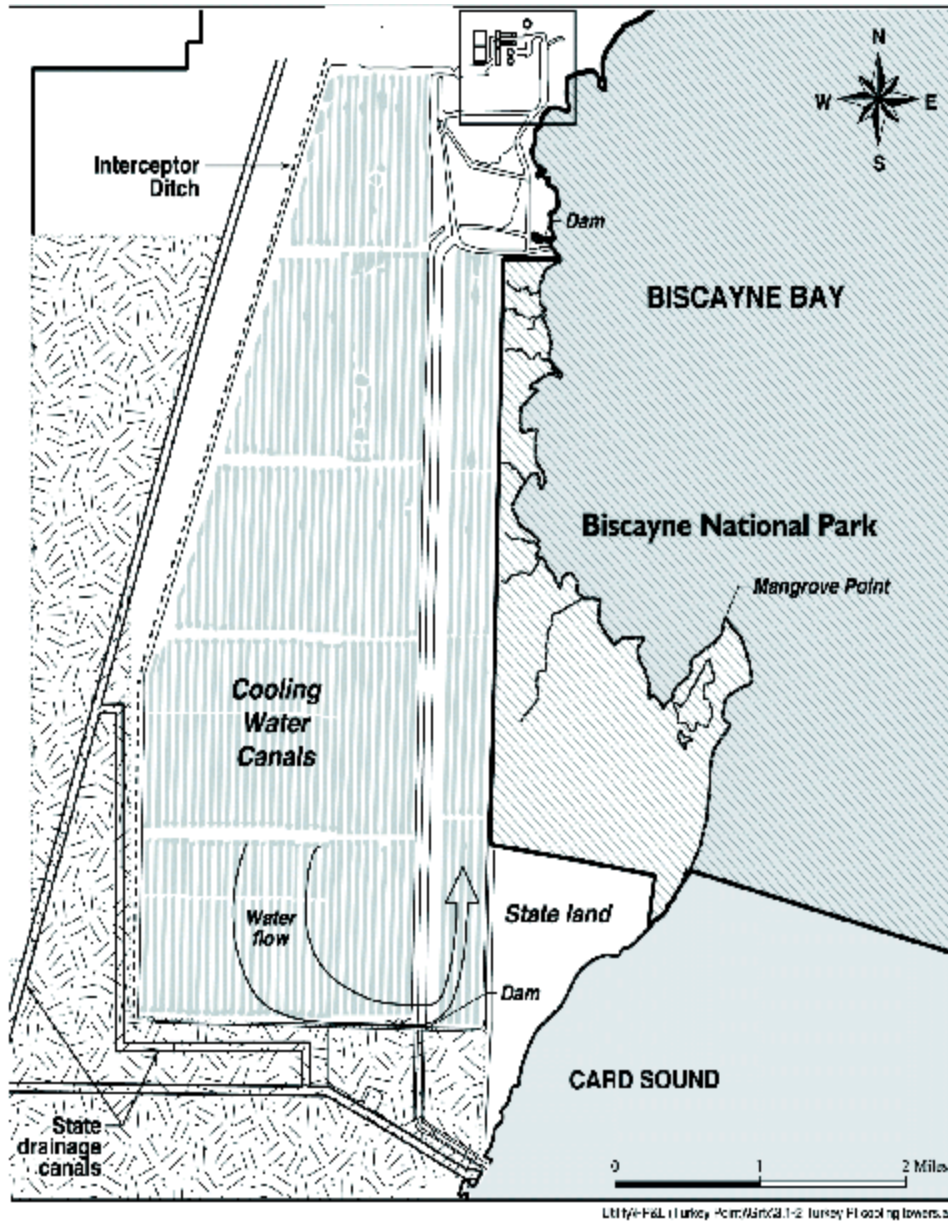
The cooling canal system, which services Turkey Point Units 1, 2, 3, and 4, covers about 2700 ha (6700 ac). It consists of 32 channels that carry warm water south from the plant and 8 channels that return water to the plant. The channels are about 60 m (200 ft) wide and have a water depth of 0.3 to 1 m (1 to 3 ft). They are separated by 27-m- (90-ft-) wide berms. In all, the total length of the channels is about 270 km (168 mi), and the effective water surface area is about 1560 ha (3860 ac). Flow in the cooling canal system attributable to Turkey Point Units 3 and 4 is about 82 m<sup>3</sup>/s (1.3 million gpm). The closed canal system is shown in Figure 2-4.

Cooling water for the condenser is withdrawn from the closed cooling canal system. Traveling screens and strainers remove debris from the cooling water inflow. Large objects are prevented from entering the condenser first by bars with 7- to 10-cm (3- to 4-in.) on-center. These are raked periodically to remove trapped material, which is carted off for disposal. The water then flows through vertical traveling screens with a 2-cm (3/8-in.) mesh size to remove debris, which is routed to a collection basket. FPL does not use biocontrol chemicals in the circulating water system.

The canal system does not discharge directly to fresh or marine surface waters. However, an exchange of water between the canal system and groundwater is likely because the canals are unlined. An interceptor ditch is located along the west side of the canal system. During the dry season, when the natural groundwater gradient is from Biscayne Bay and Card Sound toward the Everglades, water is pumped from the interceptor ditch to the canal system to create an artificial groundwater gradient from the Everglades into the ditch. This prevents flow of hypersaline water from the cooling canals toward the Everglades. Maintenance of the cooling canal system includes mechanical removal of submerged, rooted marine plants on about a 3-year cycle and removal of terrestrial woody vegetation from the canal berms on a 10-year cycle.

#### **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 Turkey Point Units 3 and 4 operation. These systems reduce radioactive liquid, gaseous, and solid effluents before they are released to the environment. The Turkey Point Units 3 and 4 waste disposal system meets the design objectives of 10 CFR Part 50, Appendix I, 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.



**Figure 2-4.** Turkey Point Site Cooling Canal System

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 and operations modifications and routine maintenance activities. Solid wastes may be shipped to a waste processor for volume reduction before disposal or they may be sent directly to the licensed burial site. Spent resins and filters are stored or packaged for shipment to an offsite processing or disposal facility.

Fuel rods that have exhausted a certain percentage of their fuel and are removed from the reactor core for disposal are called spent fuel. Turkey Point Units 3 and 4 currently operate on a staggered 18-month refueling cycle per unit, resulting in at least one refueling every year and two refuelings every third year. Spent fuel is stored onsite in the spent fuel pool in the Auxiliary Building (FPL 2000a).

The waste disposal system used for processing liquid, gaseous, and solid wastes is common to Units 3 and 4, with the exception of the reactor coolant drain tanks and reactor coolant drain tank pumps.

The Offsite Dose Calculation Manual (ODCM) describes the methods used for calculating radioactivity concentrations in the environment and the estimated potential offsite doses associated with liquid and gaseous effluents from Turkey Point Units 3 and 4 (FPL 1999a). The ODCM also specifies controls for release of liquid and gaseous effluents to ensure compliance with the following:

- c The concentration of radioactive liquid effluents released from the site to the unrestricted area will not exceed 10 times the concentration specified in 10 CFR Part 20, Appendix B, Table 2, Column 2, for radionuclides other than dissolved or entrained gases. For dissolved or entrained noble gases, the concentration shall not exceed 7.4 Bq/mL (2 E-04  $\mu$ Ci/mL).
- c The dose or dose commitment per reactor to a member of the public from any radioactive materials in liquid effluents released to unrestricted areas shall be limited to (1) less than or equal to 15  $\mu$ Sv (1.5 mrem) to the total body and less than or equal to 50  $\mu$ Sv (5 mrem) to any organ during any calendar quarter, and (2) less than or equal to 30  $\mu$ Sv (3 mrem) to the total body and less than or equal to 100  $\mu$ Sv (10 mrem) to any organ during any calendar year.
- c The dose rate due to radioactive materials released in gaseous effluents from the site to areas at and beyond the site boundary shall be limited to (1) less than or equal to 5 mSv/yr (500 mrem/yr) to the total body and less than or equal to 30 mSv (3000 mrem/yr) to the skin

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due to noble gases, and (2) less than or equal to 15 mSv/yr (1500 mrem/yr) to any organ due to iodine-131, iodine-133, tritium, and for all radioactive materials in particulate form with half-lives greater than 8 days.

- C The air dose per reactor to areas at and beyond the site boundary due to noble gases released in gaseous effluents shall be limited to (1) less than or equal to 50  $\mu$ Gy (5 mrad) for gamma radiation and less than or equal to 100  $\mu$ Gy (10 mrad) for beta radiation during any calendar quarter, and (2) less than or equal to 100  $\mu$ Gy (10 mrad) for gamma radiation and less than or equal to 200  $\mu$ Gy (20 mrad) for beta radiation during any calendar year.
- C The dose to any individual member of the public from the nuclear facility operations will not exceed the maximum limits of 40 CFR Part 190 (<0.25 mSv [25 mrem]) and 10 CFR Part 20 (#5 mSv [0.5 rem] in a year and #20  $\mu$ Sv [2 mrem] in any hour).

### 2.1.4.1 Liquid Waste Processing Systems and Effluent Controls

Potentially radioactive liquid wastes from the chemistry laboratory, containment sumps, floor drains, showers, and miscellaneous sources are collected in waste holdup tanks. Liquid from the reactor coolant loop drains, accumulators, and excess letdown are collected and transferred to the chemical and volume control system (CVCS). Liquids flow to the waste holdup tank by gravity, then are pumped to the waste monitor tank where the activity level of the liquid waste is determined and recorded prior to discharge through a radiation monitor (FPL 1999b).

Liquid requiring cleanup before being discharged to the environment is processed by the waste disposal demineralizer. The liquid from the waste disposal demineralizer is routed directly to one of the three radwaste facility waste monitor tanks. There are three discharge points from the units: steam generator blowdown from each unit and common radwaste monitor tank discharge. Liquid wastes in the waste monitor tanks are isolated and recirculated for at least one volume prior to sampling and discharge (FPL 1999b). Aliquots of representative pre-release samples from the waste disposal system are isotopically analyzed for gamma-emitting isotopes (FPL 2000b). The radiochemical analysis is the basis for recording the released activity; however, the radiation monitor provides surveillance over the operation by automatically closing the discharge control valve if the liquid activity level exceeds a preset value. The liquid effluents are a mixture from both Turkey Point Units 3 and 4. Therefore the measured releases from the common discharge point are apportioned equally to both Units 3 and 4. The dose limit per reactor is applied to the common discharge point when routine releases are made. This ensures that the dose limit of a single unit is not exceeded by the site (FPL 1999a).

The ODCM prescribes the alarm/trip setpoints for the liquid effluent radiation monitors, which are derived from 10 times the effluent concentration limits provided in 10 CFR Part 20, Appendix B, Table 2, Column 2. 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 1999a).

During 1999, there were 160 batch releases of liquid effluents for the 2 units in a total volume of 3500 m<sup>3</sup> (9.25 E+05 gal) of liquid. The liquid waste holdup capacity is approximately 130 m<sup>3</sup> (34,300 gal) in two waste holdup tanks, one located in the auxiliary building and one in the radwaste facility. The actual liquid waste generated is reported in the *Turkey Point Units 3 and 4 Annual Radioactive Effluent Release Report* (FPL 2000b).

#### **2.1.4.2 Gaseous Waste Processing Systems and Effluent Controls**

Radioactive gaseous wastes at Turkey Point are created during plant operation from degassing reactor-coolant discharge to the CVCS, displacement of cover gases, miscellaneous equipment vents, relief valves, and sampling operation and gas analysis for hydrogen and oxygen in cover gases. Most of the gas received by the waste disposal system is cover gas displaced from the CVCS holdup tanks as they fill with liquid. Gaseous wastes are stored in decay tanks for natural decay and then released through the monitored plant vent. The cover gas is reused to minimize the number of tank releases. The wastes are monitored and released at a permissible rate and activity as prescribed by the ODCM (FPL 1999a).

The quantity of radioactivity contained in each gas decay tank is restricted (1) to ensure that if an uncontrolled release of the tank's contents were to occur, the resulting total body exposure to an individual at the exclusion area boundary would not exceed 5 mSv (0.5 rem), and (2) to control the concentration of potentially explosive gases to below flammability limits. There are six welded carbon steel tanks used to contain the compressed waste gases (hydrogen, nitrogen, and fission gases) until they decay and are ready to be vented to the atmosphere (FPL 1999b).

The radioactive gaseous wastes are released through four monitored release points: (1) a common plant vent via a stack above the containment building, (2) the Unit 3 spent fuel pit vent, and (3) the condenser air ejector vents from each unit. If primary-to-secondary leakage occurs, then there can also be unmonitored radioactive airborne releases from the secondary steam systems of each unit. The quantity of material released from these unmonitored releases is accounted for using specific procedures (FPL 1999a). Monitored releases employ the following techniques to determine the radioactivity in airborne releases: (1) gamma spectrum analysis for fission and activation gases, (2) removal of particulate material by filtration and subsequent gamma spectrum analysis for strontium-89 and -90 and gross alpha analysis, (3) absorption of

halogen radionuclides on a charcoal filter and subsequent gamma spectral analysis, and (4) analysis of water vapor in a gas sample for tritium using liquid scintillation techniques (FPL 2000b).

The ODCM prescribes alarm/trip setpoints for the monitor and control instrumentation to ensure that the alarm/trip will occur prior to exceeding the limits of 10 CFR Part 20 for gaseous effluents (FPL 1999a).

In 1999, there were 10 batch releases from Turkey Point Unit 3 and 11 batch releases from Unit 4 (FPL 2000b). The number of releases may vary from year to year, but this number of releases is representative of those releases. FPL does not anticipate any increase in gaseous releases during the renewal period.

#### **2.1.4.3 Solid Waste Processing**

Solid wastes from Turkey Point Units 3 and 4 consist of spent resin, filters, sludge, evaporator bottoms, dry compressible waste, irradiated components (control rods, etc.), and other noncompressible waste (FPL 1999b). Solid wastes are packaged in containers for removal to a disposal facility.

Solid waste from Turkey Point Units 3 and 4 is transported to Oak Ridge, Tennessee, and consigned to a licensed processing facility for volume-reduction and decontamination activities. The material that remains after volume reduction is transported by the processor to Barnwell, South Carolina, or Clive, Utah, depending on the activity limits. The material shipped directly to Barnwell is processed by Chem-Nuclear Services, Inc., and buried.

Disposal and transportation are performed in accordance with the applicable requirements of 10 CFR Part 61 and Part 71, respectively. There are no releases to the environment from radioactive solid wastes created at Turkey Point Units 3 and 4.

In 1999, Turkey Point Units 3 and 4 made 16 shipments of solid waste with a volume of 55 m<sup>3</sup> (1942 ft<sup>3</sup>) and a total activity of 31 TBq (834.3 Ci) (FPL 2000b). These shipments are representative of the shipments made in the past 5 years and are not expected to change appreciably during the license renewal period.

#### **2.1.5 Nonradioactive Waste Systems**

The FPL nonradioactive waste system consists of a contact stabilization treatment plant for sanitary waste (FPL 2000a) located west of the powerblock area. The treated wastewater is disposed of through an approximately 25-cm (10-in.)-diameter, 15-m- (50-ft-) deep underground

injection well located next to the treatment facility. The residual wet sludge is disposed of at the Miami-Dade Water and Sewer Department's South District Wastewater Treatment Facility. FPL reports the average daily flow, carbonaceous biological oxygen demand, total suspended solids, fecal coliform bacteria, pH, total residual chlorine, and nitrate concentrations to the Florida Department of Environmental Protection (FDEP).

### **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 conducted at Turkey Point 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 Turkey Point nuclear units on a staggered 18-month schedule, resulting in at least one refueling every year and two refuelings every third year (FPL 2000a). A third of the core is offloaded at each refueling. Up to an additional 800 to 900 workers are onsite during a typical 30- to 40-day outage. FPL provided an appendix in the Updated Final Safety Analysis Report (UFSAR) regarding the aging management review to manage the effects of aging on systems, structures, and components in accordance with 10 CFR Part 54 (FPL 1999b). Chapter 3 and Appendix B of the Turkey Point license renewal application describe the programs and activities that will manage the effects of aging during the license renewal period (FPL 2000c). 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 renewed licenses.

### **2.1.7 Power Transmission System**

Turkey Point Units 3 and 4 share a switchyard and transmission lines with Turkey Point Units 1 and 2. Eight transmission lines leave the Turkey Point site in two 101-m- (330-ft-) wide corridors. Seven of the lines leave the site in the transmission corridor going north to the Davis substation. These lines, which were placed in service in 1967 for Turkey Point Units 1 and 2, are listed in the Final Environmental Statement (FES; AEC 1972). The eighth line leaves the plant going west to Florida City. It was constructed in 1990. Four additional lines were constructed to connect the Davis substations at Doral, Levee, and Flagami.

The transmission lines are shown in Figure 2-5. The northbound transmission lines share a common corridor where possible. As a result, the total corridor length of about 92 km (57 mi) is shorter than the total transmission line length of about 320 km (200 mi). Statistics associated



with the transmission lines are listed in Table 2-1. The statistics for the three substations north of the Davis substation (Flagami, Levee, and Doral) are only for the portions of the corridors north of the Davis substation; they do not include the distance from the Turkey Point switchyard to the Davis substation. Similarly, the statistics for the Doral substation are only from the point where the Levee and Doral lines separate. The statistics for the Levee line include the information for the corridor north of the Davis substation shared by the Levee and Doral lines.

FPL controls the Turkey Point transmission line corridors through a combination of ownership and easements. The corridors are maintained by a combination of trimming, mowing, and herbicide application. In wet areas, such as mangrove swamps, FPL maintains clearances by trimming trees at the 4.3-m (14-ft) level. Typically, this is only done at mid-span. Open, undeveloped areas are generally mowed about five times a year. These are the most common maintenance practices in the Florida City corridor and in the first 8 km (5 mi) of the Davis corridor. The remainder of the transmission line corridors are in areas of extensive agricultural land use. In these areas maintenance is generally limited to mowing at road crossings. Herbicides are used primarily to control exotic species melaleuca (*Melaleuca leucodendron*) and Australian pine (*Casuarina equisetifolia*). FPL requires the use of State-licensed applicators for herbicides and only uses nonrestricted-use products.

**Table 2-1.** Turkey Point Transmission Line Corridors

Substation	Number of Lines	kV	Approximate Distance		Corridor	Corridor Width		Corridor Area	
			km	(mi)		m	(ft)	hectares (acres)	
Davis	7	230	31	(19)	N	101	(330)	313	(773)
Flagami	2	230	21	(13)	N	101	(330)	212	(524)
Levee	1	230	21	(13)	N	101	(330)	212	(524)
Doral	1	230	11	(7)	N	101	(330)	111	(274)
Florida City	1	230	8	(5)	W	101	(330)	81	(200)
Total			92	(57)				929	(2295)

Source: FPL 2000a.

## **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 describes possible impacts on other Federal project activities.

### **2.2.1 Land Use**

Turkey Point Units 3 and 4 are located on the shore of Biscayne Bay in Florida's South Miami-Dade County. The plant site is approximately 40 km (25 mi) south of Miami. The nearest incorporated city limits are Homestead, which is approximately 15 km (9 mi) northwest of the plant site, and Florida City, which is approximately 13 km (8 mi) west of the plant site. The nearest community to the south is Key Largo, which is in Monroe County and is approximately 48 km (30 mi) by road from the plant site.

Biscayne Bay is a shallow, subtropical lagoon. The bay is a fairly recent geological formation. Portions of the bay have been modified and dredged. Average depths range from approximately 2 to 3 m (6 to 10 ft), except in deeper dredged areas and main channels. The bay is elongated in shape and located in a north-south trending direction (FDEP 2000).

Turkey Point Units 3 and 4 and associated structures and features, including the cooling canal system, occupy approximately 3200 ha (8000 ac). Two fossil-fuel units, Turkey Point Units 1 and 2, are located adjacent to Units 3 and 4. The fossil-fuel units also use the cooling canal system.

The Miami-Dade County Comprehensive Development Master Plan (Miami-Dade County 2000a) classifies the plant site as being in Environmental Protection Subarea F (Coastal Wetlands and Hammocks). Electrical generation and transmission facilities are permitted in this subarea (Miami-Dade County 2000a).

The South Florida Regional Planning Council has stated that renewal of the Turkey Point Units 3 and 4 operating licenses (OLs) is generally consistent with the goals and policies of the Strategic Regional Policy Plan for South Florida, particularly those regarding land use, public facilities, emergency preparedness, and natural resources of regional significance (Hulsey 2000).



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 provide a certification that the proposed activity complies with the enforceable policies of the State's coastal zone program. All four Turkey Point Plant units are within the Florida coastal zone. The Florida Department of Community Affairs determined that renewal of the OLS for Turkey Point Units 3 and 4 is consistent with the Florida Coastal Management Program (Cantral 2000).

Land to the south and west of the site is in the Everglades Mitigation Bank where wetlands are created, restored, or enhanced to provide compensatory mitigation of wetland losses elsewhere. Under the joint Federally and State-operated mitigation bank program, lands can be publicly or privately owned. FPL owns the Everglades Mitigation Bank land, approximately 5300 ha (13,000 ac) of relatively undisturbed freshwater and estuarine wetlands. The U.S. Army Corps of Engineers, the U.S. Environmental Protection Agency (EPA), the Natural Resources Conservation Service, the U.S. Fish and Wildlife Service (FWS), and the National Marine Fisheries Service (NMFS) provide guidance on the use of the mitigation bank to satisfy mitigation requirements of Section 404 of the Federal Water Pollution Control Act (also known as the Clean Water Act [CWA]) permit program, the wetland conservation provisions of the Food Security Act, the National Environmental Policy Act (NEPA), and several other statutory provisions. The FDEP, the South Florida Water Management District (SFWMD), and Miami-Dade County guide the mitigation bank program within Florida pursuant to the Florida Mitigation Banking Rule and other State authorities.

### **2.2.2 Water Use**

The Newton water-treatment plant of the Miami-Dade Water and Sewer Department (MDWSD) provides Turkey Point Units 3 and 4 with approximately 0.044 m<sup>3</sup>/s (1.5 ft<sup>3</sup>/s) of process (primarily demineralizer water makeup), potable, and fire-protection water. This water comes from the Biscayne Aquifer, which occurs at or close to the ground surface and extends to a depth of about 21 m (70 ft) below the surface.

The Newton water-treatment plant has a treatment capacity of 9.5 m<sup>3</sup>/s (330 ft<sup>3</sup>/s). The treatment capacity can be increased to its permitted capacity of 10.9 m<sup>3</sup>/s (380 ft<sup>3</sup>/s) with additional supply wells. In 1998, the average daily demand for water from the Newton plant was 7.5 m<sup>3</sup>/s (260 ft<sup>3</sup>/s), and the peak demand was 8.2 m<sup>3</sup>/s (290 ft<sup>3</sup>/s).

Treated waste-process water is discharged into the cooling canal system. Sanitary wastewater is processed in an onsite treatment plant and is discharged to groundwater through a 25-cm- (10-in.-) diameter, 15-m (50-ft) injection well. The average flow to the injection well is about 0.0015 m<sup>3</sup>/s (0.053 ft<sup>3</sup>/s).

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No water is withdrawn by FPL from surface water or groundwater for use as makeup water for the cooling canal system and no surface water flows into the canals. Evaporative losses from the cooling canal system are replenished by rainfall, plant storm water runoff, and treated process wastewater, which ultimately comes from the municipal supply. There also may be exchange of water between the cooling canal system and the groundwater beneath the canal. The Environmental Report (ER; FPL 2000a) suggests that groundwater may contribute to replenishing the evaporative losses from the canal, while the FES (AEC 1972) considered the impacts of a flow from the canals to Card Sound via the Biscayne Aquifer of 4.3 m<sup>3</sup>/s (150 ft<sup>3</sup>/s). FPL maintains an interceptor ditch to the west of the cooling canal system to control the westward movement of water seeping from the cooling canal system at times when the natural seaward groundwater gradient does not exist.

### 2.2.3 Water Quality

In accordance with the CWA, the water quality of plant effluent discharges is regulated through the National Pollution Discharge Elimination System (NPDES). The FDEP is the State of Florida agency delegated by the EPA to issue discharge permits in Florida.

Recharge of groundwater at the Turkey Point site varies seasonally between surface recharge during the rainy season and saline recharge from the ocean during the dry season. As a result, there is a large seasonal variation in the salinity of the groundwater near the surface at the Turkey Point site. However, below about 12 m (40 ft) into the aquifer, relatively high salinity (greater than 28 ppt) exists year round. Florida classifies the groundwater in this area as G-III based on its salinity. This classification is used to identify groundwater that has no reasonable potential as a future source of drinking water due to high total dissolved solids (FAC 62-520.430).

The current NPDES permit No. FL0001562 (FPL 2000a, Appendix E) issued by the FDEP authorizes discharges from the Turkey Point Plant of anything other than sanitary waste to the closed-cycle cooling canal system and from the cooling canal system to Class G-III groundwater. The NPDES permit does not authorize FPL's Turkey Point Plant to discharge to surface waters of the State. Discharges of other waste water, other than sanitary wastes, are either discharged directly into the closed cooling canal system or indirectly through settling basins. The closed cooling canal system, contained entirely on the FPL site, is not considered a surface water of the State. The NPDES permit requires periodic monitoring of discharges to the cooling canal system, but the permit does not place discharge limits on any parameter related to water quality.

FPL also has a permit issued by the FDEP to operate its sewage treatment facility and discharge treated effluent directly to Class G-III groundwater through an injection well. The permit limits average daily flow to the well to 0.0015 m<sup>3</sup>/s (0.053 ft<sup>3</sup>/s), sets effluent limitations, and specifies monitoring requirements. An application has been submitted to renew this permit.

## 2.2.4 Air Quality

Turkey Point site has a subtropical climate with mild dry winters and long warm summers with abundant rainfall. Climatological records for Miami are generally representative of the Turkey Point site, although the proximity of Turkey Point to Biscayne Bay tends to moderate temperatures and alter precipitation amounts and timing.<sup>(a)</sup> The record for Miami indicates that the dry season lasts from November through April, and the wet season from May through October. Normal daily maximum temperatures for Miami range from about 24EC (75EF) in January to a high of about 32EC (89EF) in July and August. Normal minimum temperatures range from about 15EC (59EF) in January to about 25EC (77EF) in August. Normal monthly precipitation ranges from 5 to 8 cm (2 to 3 in.) in the dry season to 15 to 23 cm (6 to 9 in.) in the wet season.

Thunderstorms occur on almost half of the days from June through September. Sustained hurricane winds are expected at the site about once every 6 to 7 years, and gale force winds can be expected to affect the area about twice as often (FPL 1999b). 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  $6 \times 10^{-5}$  per year.

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. 1986). 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. Turkey Point site is located within the South Florida Intrastate Air Quality Control Region. This region is designated as in attainment or unclassified for all criteria pollutants in 40 CFR 81.310, although Miami-Dade and Broward counties are maintenance areas for ozone. The Everglades National Park is designated in 40 CFR 81.407 as a mandatory Class I Federal

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(a) Climatological data for Miami and Key West are available at <http://www.ncdc.noaa.gov/ol/climate/climatedata.html>

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area in which visibility is an important value. The park comes to within about 16 km (10 mi) from the Turkey Point site. The other Class I areas in Florida are more than 80 km (50 mi) from the site.

| Diesel generators, and other activities and facilities associated with Turkey Point Units 3 and 4 emit various pollutants. Emissions from these sources are regulated under Air Operation Permit 0250003-002-AV issued by the FDEP. The current air emissions permit expires on December 31, 2003.

### 2.2.5 Aquatic Resources

Aquatic resources in the vicinity of the Turkey Point site are associated with portions of Biscayne Bay and Card Sound adjacent to the plant site and with the closed cooling canal system. Biscayne Bay and Card Sound are used for a variety of purposes, including navigation, recreation, tourism, and conservation. The cooling canal system is wholly within the owner-controlled area and is not open to public access. It is used solely for the purpose of heat dissipation from cooling water for the nuclear power facilities and adjacent fossil power facilities.

Biscayne Bay and Card Sound are shallow, subtropical marine waters located between the mainland and a parallel line of north-south trending islands that form the northern-most Florida Keys. These waters contain a rich variety of marine life, including seagrasses, sponges, mollusks, crustaceans (including crabs and lobsters), fish, sea turtles, and marine mammals. Biscayne Bay adjacent to the Turkey Point site is included in the Biscayne National Park, which includes the mainland shore, the bay, the keys, and offshore coral reefs (NPS 2000). The Intracoastal Waterway traverses Biscayne Bay and Card Sound, and a barge channel is maintained from the Intracoastal Waterway to the fossil-fuel power units at Turkey Point site.

Important species in Biscayne Bay and Card Sound include the mangrove forest on its eastern edge—one of the longest continuous stretches of mangroves left on the east coast of Florida. The lush seagrass beds provide food and refuge for approximately 70 percent of the area's recreationally and commercially important marine species. Seagrass beds are also a food resource for sea turtles and West Indian manatee (*Trichechus manatus*). Important seagrass species are shoal grass (*Halodule wrightii*), turtle-grass (*Thalassia testudinum*), and manatee-grass (*Syringodium filiforme*). Biscayne Bay and Card Sound are nursery areas for the spiny lobster (*Panulirus argus*), and the area from Cape Florida south through Card Sound is designated a Lobster Sanctuary by the State of Florida (FAC 68B-11). Highly desired game fish in Biscayne Bay and Card Sound include tarpon (*Megalops atlanticus*), snook (*Centropomus* spp.), red drum (redfish) (*Sciaenops ocellatus*), permit (*Trachinotus falcatus*), and sea trout (*Cynoscion* spp.) (NPS 2000; Cantillo et al. 2000).

The 2700-ha (6700-ac) cooling canal system supports a variety of aquatic species typical of a shallow, subtropical, hypersaline environment, including phytoplankton, zooplankton, marine algae, rooted plants, crabs, and estuarine fish. The applicant reports that the most abundant fish in the cooling canals are killifish (Family Cyprinodontidae) and other live-bearers (FPL 2000a). FPL employees also reported seeing game species, such as the common snook (*Centropomus undecimalis*) and tarpon (*Megalops atlanticus*), in the cooling canals. Although recreationally important in other areas, none of the fish or other marine life in the cooling canal system are available for recreational or commercial fishing. However, marine life in the cooling canal system supports a variety of wading birds and a resident population of the American crocodile (*Crocodylus acutus*) (FPL 2000a).

Within southern Biscayne Bay and Card Sound are 11 aquatic species that are protected under the Endangered Species Act (ESA) or are candidates for listing (Table 2-2). An additional species that historically occurred in this area has been proposed for listing as endangered (NMFS 2001). Of these, 10 are found in Biscayne Bay and Card Sound, but are not known or expected to be in the Turkey Point cooling canal system. These are Johnson’s seagrass (*Halophila johnsonii*), the mangrove rivulus (*Rivulus marmoratus*) the small-toothed sawfish (*Pristis pectinata*), five species of sea turtles, the American alligator (*Alligator mississippiensis*), and the West Indian manatee. Johnson’s seagrass occurs along the Florida coast from

**Table 2-2.** Federally Listed and Florida State-Listed Aquatic Species Potentially Occurring in Miami-Dade and Monroe Counties

Scientific Name	Common Name	Federal Status <sup>(a)</sup>	State Status <sup>(a)</sup>
<i>Halophila johnsonii</i>	Johnson’s seagrass	E	E
<i>Rivulus marmoratus</i>	mangrove rivulus	C	S
<i>Pristis pectinata</i>	small-toothed sawfish	C	--
<i>Centropomus undecimalis</i>	common snook	--	S
<i>Chelonia mydas</i>	green sea turtle	E	E
<i>Erytmochelys imbricata</i>	hawksbill sea turtle	E	E
<i>Dermochelys coriacea</i>	leatherback sea turtle	E	E
<i>Lepidochelys kempii</i>	Kemp’s ridley sea turtle	E	E
<i>Caretta caretta</i>	loggerhead sea turtle	T	T
<i>Trichechus manatus</i>	West Indian manatee	E	E
<i>Alligator mississippiensis</i>	American alligator	T(S/A)	S
<i>Crocodylus acutus</i>	American crocodile	E	E

a) E = endangered, T = threatened, T(S/A) = threatened due to similarity of appearance, C = candidate for federal listing, S = Florida species of special concern, -- = no listing.

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Sebastian Inlet to central Biscayne Bay at Virginia Key, Key Biscayne. This seagrass is not known to occur as far south as Turkey Point site (NMFS 2000). The mangrove rivulus (*Rivulus marmoratus*) is a fish that inhabits crab burrows in mangrove areas, and it could be present in mangrove areas fringing the plant site, but is unlikely to be present in the cooling canal system due to lack of habitat. The small-toothed sawfish inhabits inshore bars, seagrass beds, and mangrove areas, and is unlikely to occur in the cooling canals due to lack of habitat. The sea turtles are found in marine habitats that open to the sea, such as Biscayne Bay and Card Sound; but the cooling canal system is not a suitable habitat, and the shoreline adjacent to the plant site and cooling canal system lacks the beach habitats preferred by sea turtles for nesting. The American alligator, which is listed because of its similarity of appearance to the American crocodile, inhabits freshwater, such as the drainage canals and marshes to the east and south of the Turkey Point cooling canal system. The hypersaline environment of the cooling canal system is not suitable habitat for the American alligator.

The road and berm encircling the cooling canal system close the system to the entry of the West Indian manatee, although the SFWMD drainage canals to the south of the cooling canal system could provide potential habitat. Critical habitat for the West Indian manatee includes Biscayne Bay and Card Sound adjacent to Turkey Point site.

The cooling canal system is the home of a breeding population of American crocodiles. This population was discovered in the mid- to late-1970s soon after completion of the canal system in 1974. FPL manages the cooling canal system to provide suitable habitat for all life stages of the crocodile and maintains an active research and monitoring program. The crocodiles nest on the berms between the canals, and freshwater ponds on the berms are important juvenile rearing areas. Both juveniles and adults forage on the aquatic life in the canals. Crocodiles prefer the southern and southwestern portions of the cooling canal system. Crocodiles move freely between the cooling canal system and other suitable habitat on Key Largo and Florida Bay. The Turkey Point site is within the boundaries of the area designated as critical habitat of the American crocodile.

### 2.2.6 Terrestrial Resources

Prior to site construction, the eastern portion of the site was primarily dominated by red mangroves (*Rhizophora mangle*). The western portion of the site, where the canals are now located, was dominated by sawgrass (*Cladium jamaicensis*), cattails (*Typha latifolia*), and dwarf red mangrove, with scattered islands of black and white mangroves (*Avicennia germinans* and *Laguncularia racemosa*, respectively) and buttonwood (*Conocarpus erectus*) (AEC 1972). The areas immediately west of the cooling canal system are presently characterized as sawgrass marsh or wet prairie with islands of mangrove and hardwood hammocks (FPL 1995). Portions

of the site that were included in the original FES are now part of the Everglades Mitigation Bank that is owned and maintained by FPL under guidance from several Federal, State, and local governmental agencies.

The transmission lines are in two sets of corridors (Figure 2-5). The first runs west from the Turkey Point site for approximately 8 km (5 mi) then turns north to the Florida City substation along Palm Drive. The vegetation along this corridor is primarily sawgrass marsh and wet prairie that has been heavily invaded by Australian pine (*Casuarina equisetifolia*) and Brazilian pepper (*Schinus terebinthifolius*) (FPL 2000a). The other transmission corridor runs north from the Turkey Point site, through a tidal mangrove community, then primarily through agricultural and otherwise developed lands. Portions of the northern corridors pass through or near remnant patches of pine rockland, which was the dominant community type along the Miami ridge prior to European settlement and subsequent development. Pine rockland habitat is now extremely rare and harbors several Federally listed threatened or endangered plant species (FWS 1999).

Within Miami-Dade County, there are 16 terrestrial species protected under the ESA, and 7 species that are currently candidates for listing as endangered or threatened (Table 2-3). The candidate species do not have legal protection under the ESA, but because they could become listed prior to the end of the proposed license renewal term, they will be treated the same as the listed species in this Supplemental Environmental Impact Statement (SEIS).

In addition to the species protected under the Federal ESA, there are a very large number of species that are listed by the State of Florida as endangered, threatened, or of special concern. These include 84 species that are reported by the Florida Geographic Data Library (FGDL 2000), the applicants' field survey (Maus and Barlow 2001), or other documentation as occurring within approximately 8 km (5 mi) of the Turkey Point site or associated transmission lines (Table 2-4), and an additional 61 species reported by FGDL as occurring within Miami-Dade County but more than 8 km (5 mi) from the site or transmission lines (Table 2-5). None of the species listed in Table 2-4 or Table 2-5 are listed under the Federal ESA.

Of the Federally protected animal species, several are known to occur on or near the Turkey Point site. Eastern indigo snakes (*Drymarchon corais couperi*) have been observed on the Turkey Point site property, are occasionally observed in the surrounding areas, and are likely to occur within the transmission corridors (USAF 2000). These snakes are found in a variety of habitats, including pine flatwoods, scrubby flatwoods, high pine, dry prairie, tropical hardwood hammocks, edges of freshwater marshes, agricultural fields, coastal dunes, and human-altered habitats. Eastern indigo snakes appear to prefer areas that consist of a mosaic of habitat types (FWS 1999).

**Table 2-3.** Terrestrial Species Listed as Endangered or Threatened by the FWS and Species that Are Candidates for FWS Listing as Threatened or Endangered that Occur or Potentially Occur Within Miami-Dade County, Florida

Scientific Name	Common Name	Federal Status <sup>(a)</sup>	State Status <sup>(a)</sup>
<b>Reptiles</b>			
<i>Drymarchon corais couperi</i>	eastern indigo snake	T	T
<b>Birds</b>			
<i>Ammodramus maritimus mirabilis</i>	Cape Sable seaside sparrow	E	E
<i>Charadrius melodus</i>	piping plover	T	T
<i>Haliaeetus leucocephalus</i>	bald eagle	T	T
<i>Mycteria americana</i>	wood stork	E	E
<i>Rostrhamus sociabilis plumbeus</i>	snail kite	E	E
<i>Sterna dougallii dougallii</i>	roseate tern	T	T
<b>Mammals</b>			
<i>Felis concolor coryi</i>	Florida panther	E	E
<b>Insects</b>			
<i>Heraclides arisodemus ponceanus</i>	Schaus swallowtail butterfly	E	E
<b>Plants</b>			
<i>Amorpha herbacea</i> var. <i>crenulata</i>	crenulate lead-plant	E	E
<i>Chamaesyce deltoidea</i> ssp. <i>adhaerens</i>	hairy deltoid spurge	E	E
<i>Chamaesyce deltoidea</i> ssp. <i>deltoidea</i>	deltoid spurge	E	E
<i>Chamaesyce garberi</i>	Garber's spurge	T	E
<i>Galactia smallii</i>	Small's milk pea	E	E
<i>Jacquemontia reclinata</i>	beach jacquemontia	E	E



Table 2-3. (contd)

Scientific Name	Common Name	Federal Status <sup>(a)</sup>	State Status <sup>(a)</sup>
<i>Polygala smallii</i>	tiny polygala	E	E
<i>Argythamnia blodgettii</i>	Blodgett's wild-mercury	C	E
<i>Brickellia eupatorioides</i> var. <i>floridana</i> (= <i>B. mosieri</i> )	Florida thoroughwort brickell-bush	C	E
<i>Chamaesyce pinetorum</i>	pinelands spurge	C	E
<i>Dalea carthagenensis</i> var. <i>floridana</i>	Florida prairie clover	C	E
<i>Digitaria pauciflora</i>	few-flowered crabgrass	C	E
<i>Linum carteri</i> var. <i>carteri</i>	Carter's small-flowered flax	C	E
<i>Linum arenicola</i>	sand flax	C	E

(a) E = endangered, T = threatened, T(S/A) = threatened due to similarity of appearance, C = candidate for Federal listing, S = Florida species of special concern.

Sources: Based on FWS [<http://verobeach.fws.gov>] and FNAI [<http://www.fnai.org>] Internet Sites as of January 2001, and FGDL 2000.

Florida panthers (*Felis concolor coryi*) have been tracked via radio collars in the vicinity of the Turkey Point site at least as recently as the late 1980s (FPL 1995; USAF 2000). However, most of the existing very small population is located well to the northwest of the Turkey Point site in Big Cypress National Preserve. There are occasional unsubstantiated reports by transmission line maintenance workers of Florida panthers in the vicinity of FPL transmission lines in Miami-Dade County.

Wood storks (*Mycteria americana*) are common winter visitors to the cooling canal system and surrounding wetland areas, although they do not breed on the Turkey Point site itself. Wood stork rookeries are not located on the Turkey Point site or near the associated transmission lines. Bald eagles (*Haliaeetus leucocephalus*) are occasionally observed in the vicinity of the Turkey Point site, and were reported to nest on Arsenicker Keys in Biscayne Bay near the cooling canal system prior to Hurricane Andrew in 1992. Because the nest trees were destroyed during that hurricane, the eagles now occur primarily in Card Sound and Florida Bay south and southwest of the Turkey Point site.

**Table 2-4.** Terrestrial Species Listed by the State of Florida as Endangered, Threatened, or of Special Concern that Have Been Reported Within 8 km (5 mi) of the Turkey Point Site or Transmission Lines

Scientific Name	Common Name	State Status <sup>(a)</sup>
<b>Reptiles</b>		
<i>Gopherus polyphemus</i>	gopher tortoise	S
<i>Pituophis melanoleucus mugitus</i>	Florida pine snake	S
<i>Tantilla oolitica</i>	rim rock crowned snake	T
<b>Birds</b>		
<i>Ajaia ajaja</i>	roseate spoonbill	S
<i>Aramus guarauna</i>	limpkin	S
<i>Columba leucocephala</i>	white-crowned pigeon	T
<i>Egretta caerulea</i>	little blue heron	S
<i>Egretta rufescens</i>	reddish egret	S
<i>Egretta thula</i>	snowy egret	S
<i>Egretta tricolor</i>	tricolored heron	S
<i>Eudocimus albus</i>	white ibis	S
<i>Falco peregrinus</i>	peregrine falcon	E
<i>Falco sparverius paulus</i>	southeastern American kestrel	T
<i>Haematopus palliatus</i>	American oystercatcher	S
<i>Pelecanus occidentalis</i>	brown pelican	S
<i>Rynchops niger</i>	black skimmer	S
<i>Speotyto cunicularia floridana</i>	Florida burrowing owl	S
<i>Sterna antillarum</i>	least tern	T
<b>Mammals</b>		
<i>Mustela vison mink</i>	southern mink	T
<i>Ursus americanus floridanus</i>	Florida black bear	T
<b>Plants</b>		
<i>Acrostichum aureum</i>	golden leather fern	E

Table 2-4. (contd)

Scientific Name	Common Name	State Status <sup>(a)</sup>
<i>Adiantum melanoleucum</i>	fragrant maidenhair fern	E
<i>Adiantum tenerum</i>	brittle maidenhair fern	E
<i>Alvaradoa amorphoides</i>	Everglades leaf lace	E
<i>Basiphyllaea corallicola</i>	rockland orchid	E
<i>Bourreria cassinifolia</i>	little strongbark	E
<i>Bletia purpurea</i>	pink pine orchid	T
<i>Byrsonima lucida</i>	locustberry	E
<i>Catopsis floribunda</i>	many-flowered catopsis	E
<i>Chamaecrista lineata</i> var. <i>keyensis</i>	big pine partridge pea	E
<i>Chamaesyce porteriana</i> var. <i>porteriana</i>	Porter's broad-leaved spurge	E
<i>Coccothrinax argentata</i>	silver palm	E
<i>Colubrina cubensis</i> var. <i>floridana</i>	Cuban snake-bark	E
<i>Crossopetalum ilicifolium</i>	Christmas berry	E
<i>Crossopetalum rhacoma</i>	rhacoma	E
<i>Eltroplectris calcarata</i>	spurred neottia	E
<i>Encyclia boothiana</i> var. <i>erythronioides</i>	dollar orchid	E
<i>Encyclia cochleata</i> var. <i>triandra</i>	clamshell orchid	E
<i>Eugenia confusa</i>	tropical ironwood	E
<i>Eupatorium villosum</i>	villose fennel	E
<i>Galeandra beyrichii</i>	galeandra	E
<i>Glandularia maritima</i>	coastal vervain	E
<i>Ilex krugiana</i>	Krug's holly	E
<i>Indigofera mucronata</i> var. <i>keyensis</i>	decumbent indigo	E
<i>Ipomoea microdactyla</i>	wild potato morning glory	E
<i>Ipomoea tenuissima</i>	rocklands morning glory	E
<i>Jacquemontia curtissii</i>	pineland jacquemontia	E
<i>Lantana canescens</i>	small-headed lantana	E

Table 2-4. (contd)

Scientific Name	Common Name	State Status <sup>(a)</sup>
<i>Lantana depressa</i> var. <i>depressa</i>	Florida lantana	E
<i>Lantana depressa</i> var. <i>floridana</i>	Atlantic Coast Florida lantana	E
<i>Leiphaimos parasitica</i>	ghost plant	E
<i>Linum carteri</i> var. <i>smallii</i>	Carter's large-flowered flax	E
<i>Lomariopsis kunzeana</i>	holly vine fern	E
<i>Microgramma heterophylla</i>	climbing vine fern	E
<i>Peperomia obtusifolia</i>	blunt-leaved peperomia	E
<i>Picramnia pentandra</i>	bitter bush	E
<i>Prunus myrtifolia</i>	West Indian cherry	T
<i>Pteris bahamensis</i>	Bahama brake	E
<i>Roystonea elata</i>	Florida royal palm	E
<i>Sachsia polycephala</i>	Bahama sachsia	E
<i>Schaefferia frutescens</i>	yellowwood	E
<i>Selaginella eatonii</i>	Eaton's spikemoss	E
<i>Sphenomeris clavata</i>	wedgelet fern	E
<i>Spiranthes costaricensis</i>	Reichenbach's orchid	E
<i>Spiranthes elata</i>	tall neottia	E
<i>Spiranthes torta</i>	southern ladies' tresses	E
<i>Stylosanthes calcicola</i>	Everglade Key pencil-flower	E
Y <i>Suriana maritima</i>	bay cedar	E
<i>Swietenia mahagoni</i>	West Indies mahogany	E
<i>Tectaria fimbriata</i>	fringed halberd fern	E
<i>Tephrosia angustissima</i> var. <i>corallicola</i>	rockland hoary-pea	E
<i>Thelypteris reptans</i>	creeping fern	E
<i>Thelypteris sclerophylla</i>	hard-leaved shield fern	E
<i>Thrinax radiata</i>	Florida thatch palm	E
Y <i>Tillandsia balbisiana</i>	inflated wild pine	T

Table 2-4. (contd)

Scientific Name	Common Name	State Status <sup>(a)</sup>	
<i>Tillandsia fasciculata</i>	common wild pine	E	✓
<i>Tillandsia flexuosa</i>	banded wild pine	E	
<i>Tillandsia valenzuelana</i>	soft-leaved wild pine	E	✓
<i>Tragia saxicola</i>	pineland noseburn	E	
<i>Trichomanes krausii</i>	Kraus' bristle fern	E	
<i>Tournefortia gnaphaloides</i>	sea lavender	E	✓
<i>Tripsacum floridanum</i>	Florida gama grass	E	
<i>Vanilla phaeantha</i>	brown-flowered vanilla	E	
<i>Veronia blodgettii</i>	Blodgett's ironweed	E	

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

Several species are occasional transients in the vicinity of the Turkey Point site, but are unlikely to use the area extensively or remain in the area for long because of the lack of suitable habitat. The Everglades snail kite (*Rostrhamus sociabilis plumbeus*) generally occurs farther inland, and critical habitat has been designated to the northwest of Miami (FWS 1999). This species feeds on specific species of freshwater snails that do not occur near the shore of Biscayne Bay or in the hypersaline conditions within the cooling canal system. Cape Sable seaside sparrows (*Ammodramus maritimus mirabilis*) are restricted to the vicinity of Shark River Slough and Taylor Slough within the Everglades to the west of the Turkey Point site. Designated critical habitat for the Cape Sable seaside sparrow is located approximately 8 km (5 mi) west of Homestead, Florida. Piping plovers (*Charadrius melodus*) winter on the beaches, sandflats, and mudflats of the Atlantic and Gulf coasts of Florida as well as the Florida Keys (FWS 1999). Critical wintering habitat for the piping plover has been proposed in the Keys south of the Turkey Point site and in Martin County north of the Turkey Point site (FWS 2000). Roseate terns (*Sterna dougallii dougallii*) are another strictly coastal species. They normally forage in shallow surf and nest on isolated beaches, rubble and spoil outcrops, or small islands (FWS 1999). Neither the piping plover nor the roseate tern are often seen very far inland from the ocean shore.

The Schaus swallowtail butterfly (*Heraclides arisodemus ponceanus*) historically occurred in hardwood hammocks from south Miami to lower Matacumbe Key. It is now primarily restricted to the upper and middle keys, especially between Elliot Key in Biscayne National Park and Key

**Table 2-5.** Additional Terrestrial Species Listed by the State of Florida as Endangered, Threatened, or of Special Concern that Have Been Reported in Miami-Dade County Beyond 8 km (5 mi) from the Turkey Point Site or Transmission Lines

Species	Common Name	State Status <sup>(a)</sup>
<b>Birds</b>		
<i>Grus canadensis pratensis</i>	Florida sandhill crane	T
<b>Amphibians</b>		
<i>Rana capito</i>	gopher frog	S
<b>Mammals</b>		
<i>Eumops glaucinus floridanus</i>	Florida mastiff bat	E
<i>Podomys floridanus</i>	Florida mouse	S
<b>Plants</b>		
<i>Acacia choriophylla</i>	tamarindillo	E
<i>Actinostachys pennula</i>	ray fern	E
<i>Anemia wrightii</i>	Wright's anemia	E
<i>Argusia gnaphalodes</i>	sea lavender	E
<i>Aristolochia pentandra</i>	Dutchman's pipe	E
<i>Asplenium auritum</i>	auricled spleenwort	E
<i>Asplenium serratum</i>	bird's nest spleenwort	E
<i>Asplenium trichomanes-dentatum</i>	slender spleenwort	E
<i>Brassia caudata</i>	spider orchid	E
<i>Calyptranthes zuzygium</i>	myrtle-of-the-river	E
<i>Campyloneurum angustifolium</i>	narrow-leaved strap fern	E
<i>Catopsis berteroniana</i>	powdery catopsis	E
<i>Cheilanthes microphylla</i>	southern lip fern	E
<i>Cheiroglossa palmata</i>	hand fern	E
<i>Conradina grandiflora</i>	large-flowered rosemary	E
<i>Ctenitis sloanei</i>	Florida tree fern	E
<i>Cyrtopodium punctatum</i>	cow-horned orchid	E

Table 2-5. (contd)

Species	Common Name	State Status <sup>(a)</sup>
<i>Eleocharis rostellata</i>	beaked spikerush	E
<i>Epidendrum nocturnum</i>	night-scented orchid	E
<i>Eugenia rhombea</i>	red stopper	E
<i>Gossypium hirsutum</i>	wild cotton	E
<i>Govenia utriculata</i>	sheathing govenia	E
<i>Guaiaacum sanctum</i>	lignum-vitae	E
<i>Guzmania monostachia</i>	Fuch's bromeliad	E
<i>Harrisia simpsonii</i>	Simpson's prickly apple	E
<i>Hippomane mancinella</i>	manchineel	E
<i>Hypelate trifoliata</i>	white ironwood	E
<i>Ionopsis utricularioides</i>	delicate ionopsis	E
<i>Jacquinia keyensis</i>	joewood	T
<i>Lechea divaricata</i>	pine pinweed	E
<i>Licaria triandra</i>	Gulf licaria	E
<i>Matelea floridana</i>	Florida spiny-pod	E
<i>Myrcianthes fragrans</i> var. <i>simpsonii</i>	twinberry	T
<i>Nephrolepis biserrata</i>	giant sword fern	T
<i>Okenia hypogaea</i>	burrowing four-o'clock	T
<i>Oncidium floridanum</i>	Florida oncidium	E
<i>Passiflora multiflora</i>	whitish passionflower	E
<i>Peperomia humilis</i>	terrestrial peperomia	E
<i>Phoradendron rubrum</i>	mahogany mistletoe	E
<i>Polyrrhiza lindenii</i>	ghost orchid	E
<i>Ponthieva brittoniae</i>	Bahama shadow-witch	E
<i>Prescotia oligantha</i>	small-flowered prescotia	E
<i>Pseudophoenix sargentii</i>	Florida cherry-palm	E
<i>Pteroglossaspis ecristata</i>	wild coco	T

Table 2-5. (contd)

Species	Common Name	State Status <sup>(a)</sup>
<i>Rhipsalis baccifera</i>	mistletoe cactus	E
<i>Spiranthes polyantha</i>	green ladies' tresses	E
<i>Tectaria coriandrifolia</i>	Hattie Bauer halberd fern	E
<i>Tephrosia angustissima</i> var. <i>angustissima</i>	devil's shoestring	E
<i>Thelypteris augescens</i>	abrupt-tipped maiden fern	T
<i>Thrinax morrisii</i>	brittle thatch palm	E
<i>Tillandsia utriculata</i>	giant wild pine	E
<i>Trichomanes punctatum</i>	Florida bristle fern	E
<i>Vallesia antillana</i>	pearl berry	E
<i>Vanilla barbellata</i>	worm-vine orchid	E
<i>Vanilla mexicana</i>	scentless vanilla	E
<i>Zanthoxylum coriaceum</i>	Biscayne prickly ash	E
<i>Zephyranthes simpsonii</i>	rain lily	T

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

Largo. The species has been released at the Deering Estate in Miami, but is otherwise not known to occur on the Florida mainland (FWS 1999) and suitable habitat is not known to occur in the vicinity of the Turkey Point site.

None of the Federally listed endangered or threatened plant species have been reported to occur on the Turkey Point site. However, at least one species (Garber's spurge [*Chamaesyce garberi*]) has been reported within the Everglades Mitigation Bank south of the Turkey Point site (FPL 2000a), and another (beach jacquemontia [*Jacquemontia reclinata*]) was also reported by FPL to inhabit the Everglades Mitigation Bank. However, other information indicates that the beach jacquemontia is normally only known from coastal barrier islands from Biscayne Bay to Palm Beach County.

A number of the Federally listed and candidate plant species in Table 2-3 occur primarily in pine rockland habitats. These species include the crenulate lead plant (*Amorpha herbacea* var. *crenulata*), deltoid spurge (*Chamaesyce deltoidea* ssp. *adhaerens* and ssp. *deltoidea*), Small's



milkpea (*Galactia smallii*), and tiny polygala (*Polygala smallii*). In addition, most of the Federal candidate plant species (Blodgett's wild mercury [*Argythamnia blodgettii*], Florida brickell-bush [*Brickellia eupatorioides* var. *floridana*], pinelands spurge [*Chamaesyce pinetorum*], few-flowered crabgrass [*Digitaria pauciflora*], Carter's small flowered flax [*Linum carteri* var. *carteri*], and sand flax [*Linum arenicola*]) reported in the vicinity of the Turkey Point site and associated transmission lines occur in pine rockland communities. Some of these species occur in other habitat types as well, such as wet prairies, freshwater marshes, dry prairies, and tropical hardwood hammocks.

Pine rockland communities primarily occurred along the Miami ridge from the Homestead area to what is now downtown Miami. Very few examples of this plant community remain because of agricultural and urban development. However, several of the small surviving patches that are known to harbor remnant populations of some of these species are located adjacent to or relatively near the Turkey Point site transmission corridors.

### 2.2.7 Radiological Impacts

FPL has conducted a Radiological Environmental Monitoring Program (REMP) around the Turkey Point site since 1969 (AEC 1972). The radiological impacts to workers, the public, and the environment have been carefully monitored, documented, and compared to the appropriate standards. The two-fold purpose of the REMP is to do the following:

- c Provide representative measurements of radiation and radioactive materials in the exposure pathways and for the radionuclides that have the highest potential for radiation exposures of members of the public.
- c 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.

In addition to the REMP description in the Annual Radiological Environmental Operating Report, the ODCM discusses a supplemental REMP sampling program that is agreed upon by the State of Florida Department of Health and Rehabilitative Services and FPL. This supplemental sampling program is not required by regulation, but is performed to provide a broader database for the REMP (FPL 1999b). The sampling under this supplemental program provides additional data, including data from sampling in the discharge canal.

Radiological releases are summarized in the annual reports titled *Annual Radiological Environmental Operating Report Turkey Point Plant – Units 3 & 4* (FPL 2000a) and *Annual*

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*Radioactive Effluent Release Report* (FPL 2000b). The limits for all radiological releases are specified in the Turkey Point ODCM, and these limits are designed to meet Federal standards and requirements (FPL 1999b). The REMP includes monitoring of the aquatic environment (fish, invertebrates, and shoreline sediment), atmospheric environment (airborne radioiodine, gross beta, and gamma), and terrestrial environment (vegetation) and direct radiation.

Review of historical data on releases and the resultant dose calculations revealed that the doses to maximally exposed individuals in the vicinity of Turkey Point site were a small fraction of the limits specified in the EPA's environmental radiation standards 40 CFR Part 190 as required by 10 CFR 20.1301(d). For 1999, dose estimates were calculated based on actual 1999 liquid and gaseous effluent release data (FPL 2000b). Calculations were performed using the plant effluent release data, onsite meteorological data, and appropriate pathways identified in the ODCM.

During 2000, Turkey Point Units 3 and 4 did not release any strontium-90 in the gaseous effluents. Liquid effluents containing radioactive materials, including strontium-90 and strontium-89 were released into the closed system cooling canals. The only time that strontium was released in the liquid effluents was during the second quarter: 0.12 MBq (3.2 E-06 Ci) of strontium-90 and 0.37 MBq (10 E-06 Ci) of strontium-89 (FPL 2001). For the second quarter of 2000, the total radioactive effluents were about 150 times **below** NRC regulatory limits (6.63 E-03 percent of applicable limits). The quantities of materials released in all effluents during 2000 are comparable to the quantities released in the past 5 years and the expected quantities in years to come, including the license renewal period.

FPL performs an assessment of radiation dose to the general public from radioactive effluents, assuming a visitor was at the child development center/fitness center for 10 hours a day, 5 days each week, for 50 weeks of the year, inhaling the gaseous effluents from both Turkey Point Units 3 and 4 (FPL 2000b). For 1999, the total body dose to an adult from inhalation was estimated to be 1.1 E-8 mSv (1.1 E-6 mrem) or 2.2E-7 percent of the annual limit of 5 mSv (500 mrem). For dose due to liquid effluents, FPL assumes a teenager stands on the bank of the cooling canal for 67 days per year and is exposed to direct radiation from the cooling canal sediments, which have deposits of radioactive materials from the effluent releases from both Turkey Point Units 3 and 4. For 1999, the estimate of dose to a teenager from this shoreline deposition was 5.9 E-6 mSv (5.9 E-4 mrem) or 0.04 percent of the annual limit of 0.03 mSv (3 mrem). Evaluation of doses from gaseous effluent releases from the two units for the same year resulted in an annual dose due to noble gases of 8.6 E-8 mGy (8.6 E-6 mrad) for gamma radiation and 2.9 E-7 mGy (2.9 E-5 mrad) from beta air dose. These are 8.6 E-5 percent and 1.4 E-4 percent, respectively, of the annual limit (see Section 2.1.4) (FPL 2000b). These

doses, which are representative of the doses from the past 5 years, are provided to demonstrate that the impact to the environment from radioactive releases from Turkey Point is small.<sup>(a)</sup>

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

## 2.2.8 Socioeconomic Factors

The staff reviewed the applicant's ER and information obtained from several county, city, and economic development staff during a site visit to Miami-Dade County from December 4 through 8, 2000. The following information describes the economy, population, and communities near the Turkey Point site.

### 2.2.8.1 Housing

Approximately 960 employees work at Turkey Point Units 3 and 4 (about 185 contract employees and approximately 775 permanent employees). Approximately 85 percent of these employees live in Miami-Dade County, seven percent live in Monroe County, seven percent live in Broward County, and the rest live in other locations (see Table 2-6). Table 2-7 presents a further breakdown of the residency, by city and county, of 730 permanent employees<sup>(b)</sup> at Turkey Point Units 3 and 4. Table 2-7 does not contain the residences of the contract employees. Given the predominance of FPL employees living in Miami-Dade County, the focus of this analysis is on Miami-Dade County.

FPL refuels each nuclear unit at the Turkey Point site on an 18-month cycle. During these refueling outages, site employment increases by as many as 800 to 900 temporary workers for 30 to 40 days. Most of these temporary workers are located in Homestead and Florida City.

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(a) The doses are very small fractions of the 40 CFR Part 190 limits, i.e., annual dose equivalent not to exceed 0.25 mSv (25 mrem) to the whole body, 0.75 mSv (75 mrem) to the thyroid, and 0.25 mSv (25 mrem) to any other organ of any member of the public.

(b) Although there are approximately 775 permanent employees for Turkey Point Units 3 and 4, FPL provided addresses for only 730.

**Table 2-6.** Turkey Point Units 3 and 4—Employee and Contract Employee Residence Information by County

<b>County</b>	<b>Number of Personnel</b>	<b>Percent of Total Personnel</b>
Miami-Dade	816	85
Monroe	67	7
Broward	67	7
Other	10	1
<b>Total</b>	<b>960</b>	<b>100</b>

Source: FPL 2000a.

**Table 2-7.** Turkey Point Units 3 and 4—Permanent Employee Residence Information by County and City

<b>County and City<sup>(a)</sup></b>	<b>Florida Power &amp; Light Employees</b>
<b>MIAMI-DADE COUNTY</b>	
Homestead	233
Florida City	30
Miami	327
Hialeah	3
Miami Beach	2
Opa Locka	1
Total Miami-Dade County	596
<b>BROWARD COUNTY</b>	
Hollywood	27
Fort Lauderdale	24
Other	4
Total Broward County	55
<b>MONROE COUNTY</b>	
Key Largo	45
Tavernier	17
Total Monroe County	62
Other Counties	17
<b>Grand Total</b>	<b>730</b>

(a) Addresses are for both unincorporated (counties) and incorporated (cities and towns) areas.  
Source: NRC 2001.

Table 2-8 provides the number of housing units and housing unit vacancies for Miami-Dade, Broward, and Monroe counties for 1980 and 1990, the latest years for which information is available. Miami-Dade County has an urban development boundary (UDB) within which development is to take place, but otherwise does not have growth-management controls.

Table 2-9 contains data on population, estimated population, and annual growth rates for Miami-Dade, Broward, and Monroe counties. Monroe County contains the Florida Keys.

**Table 2-8.** Housing Units and Housing Units Vacant (Available) by County During 1980 and 1990

	1980	1990	Approximate Percentage Change
<b>MIAMI-DADE COUNTY</b>			
Housing Units	665,000	771,000	15.9
Occupied Units	610,000	692,000	13.4
Vacant Units	55,000	79,000	43.6
<b>BROWARD COUNTY</b>			
Housing Units	486,000	629,000	29.4
Occupied Units	418,000	528,000	26.3
Vacant Units	68,000	101,000	48.5
<b>MONROE COUNTY</b>			
Housing Units	38,000	46,000	21.1
Occupied Units	26,000	34,000	30.8
Vacant Units	12,000 <sup>(a)</sup>	12,000 <sup>(a)</sup>	0.0
(a) Values are the same due to rounding to the nearest thousands. Sources: GEOSTAT 2001a and GEOSTAT 2001b.			

**Table 2-9.** Population Growth in Miami-Dade, Broward, and Monroe Counties, Florida, 1980 to 2020

	Miami-Dade County		Broward County		Monroe County	
	Population	Annual Growth Percent <sup>(a)</sup>	Population	Annual Growth Percent	Population	Annual Growth Percent
1970	1,268,000	--	620,000	--	53,000	--
1980	1,626,000	2.5	1,018,000	5.1	63,000	1.9
1990	1,937,000	1.8	1,255,000	2.1	78,000	2.1
2000	<b>2,253,000</b>	1.5	1,623,000	2.6	80,000	0.25
2010	2,385,000	1.0	1,758,000	1.4	97,000	1.0
2020	2,587,000	0.9	1,927,000	1.2	106,000	0.9

(a) Annual percent growth rate is calculated over the previous decade.

-- = No data available.

Sources: Florida Legislature 2001a (population for the years 1970 to 1990 and 2010); FPL 2000a (population projections for 2020); and U.S. Census Bureau (USCB) 2001a (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.

### c Water Supply

Potable water for Miami-Dade County comes from the Biscayne Aquifer. The county sets strict criteria for maintaining the integrity of the aquifer (FPL 2000a). The MDWSD operates regional water supply systems that serve both incorporated and unincorporated areas of the county. MDWSD water-treatment plants produce 85 percent of the county's public water supply. In addition to MDWSD's regional system, 15 municipalities are franchised to operate water-distribution systems (including the cities of Homestead, Florida City, North Miami, and North Miami Beach) within a designated service area. The Hialeah/Preston, Alexander Orr, Jr., Florida City, and Homestead water-treatment systems provide about 87 percent of Miami-Dade County's water-treatment capacity. The remaining approximately 13 percent is provided by other suppliers within the county (Miami-Dade County 2000a). Table 2-10 summarizes the daily consumption and areas served by each water system within the county.

**Table 2-10.** Major Public Water Supply Systems in Miami-Dade County in December 1999

<b>Water System</b>	<b>Source</b>	<b>Maximum Daily Capacity m<sup>3</sup>/s (ft<sup>3</sup>/s)</b>	<b>Average Daily Capacity m<sup>3</sup>/s (ft<sup>3</sup>/s)</b>	<b>Area Served</b>
Hialeah/Preston	Biscayne Aquifer	7.6 (268)	7.1 (251)	North of Flager Street, Miami-Dade County
Alexander Orr, Jr.	Biscayne Aquifer	7.9 (277)	7.4 (263)	South of Flager Street, Miami-Dade County
Florida City	Biscayne Aquifer	0.14 (4.9)	0.12 (4.2)	Florida City
Homestead	Biscayne Aquifer	0.45 (15.9)	0.36 (12.7)	Homestead
Other	Biscayne Aquifer	2.15 (75.9)	1.89 (66.7)	Parts of South Miami- Dade County, North Miami and North Miami Beach

Source: Miami-Dade County 2000a.

MDWSD provides water to Turkey Point Units 3 and 4. The Miami-Dade system's Alexander Orr, Jr., Water Treatment Plant services the south and central parts of Miami-Dade County (the area south of Flager Street) except for the Florida City and Homestead areas. The Alexander Orr, Jr., plant is applying to treat up to approximately 10.86 m<sup>3</sup>/s (383.7 ft<sup>3</sup>/s), although its current (2000) permitted treatment capacity is capped at 9.51 m<sup>3</sup>/s (335.7 ft<sup>3</sup>/s) until additional supply wells are completed. The plant has a reserve treatment capacity of 1.67 m<sup>3</sup>/s (58.83 ft<sup>3</sup>/s). Plant staff do not consider the Alexander Orr, Jr., plant to be near its capacity at this time.

The Hialeah/Preston System (HPS) is the other, large regional water-treatment system. It serves the area north of Flager Street and is permitted to treat up to 9.83 m<sup>3</sup>/s (345.9 ft<sup>3</sup>/s). The plant has a reserve treatment capacity of 2.25 m<sup>3</sup>/s (79.4 ft<sup>3</sup>/s) (Miami-Dade County 2000a). The Florida City municipal water-treatment plant can treat up to 0.118 m<sup>3</sup>/s (4.17 ft<sup>3</sup>/s). The plant is rated as having no additional treatment capacity available (Miami-Dade County 2000a).

In Homestead, the municipal water-treatment plant is permitted to treat up to 0.44 m<sup>3</sup>/s (15.5 ft<sup>3</sup>/s). In 1997, the plant had approximately 8.1 percent of its treatment capacity available (FPL 2000a). By 1999, the plant was operating at maximum treatment capacity (Miami-Dade 2000a).

### C Education

In October 1999, there were 338,000 students attending Miami-Dade County's 292 mainstream public schools. This represents an increase of approximately 5600 students since October 1998. There was a total "enhanced"<sup>(a)</sup> program capacity of approximately 326,000 in October 1999, resulting in a system-wide enhanced utilization rate of 104 percent (Miami-Dade County 2000a).

There are 212 elementary schools (including 13 primary learning centers) in Miami-Dade County. These schools had an enrollment population of approximately 173,300 (October 1999) and an enhanced program capacity of approximately 171,400 for a system-wide enhanced program utilization rate of 101 percent (Miami-Dade County 2000a).

There are 51 middle schools in Miami-Dade County. They had an enrollment of approximately 77,000 (in October 1999) and an enhanced program capacity of approximately 75,000, resulting in a system-wide enhanced program utilization rate of 104 percent. Thirty-five, or approximately 69 percent, of the 51 middle schools were operating at or above their enhanced program capacity (Miami-Dade County 2000a).

There are 29 senior high schools in the county. In October 1999 the enrollment in the schools numbered approximately 87,000 students. The enhanced program capacity was approximately 80,000, resulting in a system-wide enhanced program utilization rate of approximately 109 percent. Twenty-two of the 29 high schools (or 76 percent) were operating at or above their enhanced program capacity (Miami-Dade County 2000a).

Among the county's 292 public schools, 189, or 65 percent, have enhanced program utilization rates in excess of 100 percent. There are 20 elementary schools, 6 middle schools, and 3 senior high schools in the south end of the county (generally the area south of Eureka Drive or South West 184<sup>th</sup> Street, which is an east-west road approximately 17 km [11 mi] north of the Turkey Point Plant) (Miami-Dade County 2000a). In terms of the areas surrounding the Turkey Point site (Florida City, Homestead, and surrounding Miami-Dade County south of Eureka Drive), enhanced program capacity rates for schools located to the east of U.S. Highway 1 and south of Eureka Drive are 96 percent each for elementary, middle, and senior high schools. For the area west of U.S. Highway 1 and south of Eureka Drive the enhanced program capacity rates are 100 percent (elementary),

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(a) Enhanced program capacity is a measure of crowding. Generally, but not always, an enhanced program value greater than 100 percent is indicative of crowding, and the higher the percent, the greater the crowding. Optimally, the number of students enrolled at a particular school facility should not exceed the number of permanent student stations (Miami-Dade County 2000a).



107 percent (middle) and 115 percent (senior) (Miami-Dade County 2000a). The higher enhanced program capacity rates, while not the highest in the county as a whole, may reflect the increased growth pressures in South Miami-Dade County<sup>(a)</sup> and potentially of re-building as a result of Hurricane Andrew (1992).

### **C Transportation**

Miami-Dade County is served by Interstate 95 (I-95), which enters the county from the north and ends in downtown Miami. U.S. Highway 1 and the Florida Turnpike are also major highways that traverse the length of the county from north to south. U.S. Route 41 is a major east-west highway that traverses the middle of the county.

Road access to the Turkey Point site is via East Palm Drive (SW 344 Street). East Palm Drive is a two-lane road for approximately half of its length from the plant to Florida City, where it intersects with U.S. Highway 1 approximately 14 km (9 mi) from the Turkey Point site. Both East Palm Drive and U.S. Highway 1 are four-lane roads in the vicinity of the intersection.

There is a rail line through the Florida City/Homestead city limits, but there is no rail service to the Turkey Point site. Planned improvements include constructing the remaining portions of the South Miami-Dade Busway between SW 112<sup>th</sup> Avenue and SW 344<sup>th</sup> Street in Homestead between 2001 and 2005 (Miami-Dade County 2000a). Additional improvements (bus lane on U.S. Highway 1, new interchange on Florida Turnpike, east-west connector to the National Association for Stock Car Auto Racing [NASCAR] racetrack, and upgrade of Krome Avenue) are also planned.

#### **2.2.8.3 Offsite Land Use**

Miami-Dade County has a Comprehensive Development Master Plan and an accompanying land-use plan map (Miami-Dade County 2000b). The plan and map include an urban development boundary where urban development may occur through the year 2005. The cities of Florida City and Homestead and the former Homestead Air Force Base are within the UDB. The plan and map also include an urban expansion area where urban development between 2005 and 2015 is likely to be warranted. The plan and map designate various land-use categories including residential, industrial, agricultural, parks and recreation, open land, and environmental protection.

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(a) South Miami-Dade County is defined as the portion of the county that is located south of 184<sup>th</sup> Street or Eureka Drive.

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The cities of Florida City and Homestead are the only incorporated areas in South Miami-Dade County. Both cities have land-use plans and zoning codes.

Land use in South Miami-Dade County as of 1994 is shown in Table 2-11. The table covers the area south of Eureka Drive to the southern county boundary at the beginning of the Florida Keys. National park land is not included in the table.

All property within approximately an 8-km (5-mi) radius of the plant site is in unincorporated Miami-Dade County. Land immediately to the west of the plant site extending to U.S. Highway 1 is designated "Environmental Protection Subarea E (Southeast Wetlands)" in the Miami-Dade County Master Plan. The plan states that this area is low lying, poorly drained, flood prone, and is characterized predominantly by high-quality wetland communities. Accordingly, any land use or site alteration proposal will be carefully evaluated on a case-by-case basis by Federal, State, regional, and County agencies.

**Table 2-11.** Land Use in South Miami-Dade County, 1994

Land Use	Hectares	Acres	Percent of Total
Residential	6730	16,630	4.7
Commercial	532	1315	0.4
Industrial	361	893	0.2
Institutional	1676	4141	1.2
Recreation	718	1774	0.5
Transportation and utilities	4503	11,128	3.1
Agriculture	25,978	64,192	18.0
Open lands designated for environmental protection and not available for development	27,080	66,914	18.7
Open lands available for development	12,562	31,040	8.7
Water	64,265	158,798	44.5
<b>Total</b>	<b>144,405</b>	<b>356,825</b>	<b>100.0</b>

Source: USAF 2000.

There are two national parks and a national wildlife refuge close to the plant site. Biscayne National Park is immediately north and east of the Turkey Point site. Ninety five percent of the park's 73,450 ha (181,500 ac) are under water. The Biscayne National Park headquarters building is approximately 3.2 km (2 mi) north of the site. Everglades National Park is approximately 24 km (15 mi) west of the plant site. Everglades National Park consists of 610,660 ha (1,509,000 ac), including most of Florida Bay. The Crocodile Lake National Wildlife Refuge is approximately 16 km (10 mi) south of the plant site. The Big Cypress National Preserve is approximately 56 km (35 mi) northwest of the plant site.

The portions of Biscayne Bay north and south of Biscayne National Park are part of the Biscayne Bay Aquatic Preserve. The southern portion of the preserve includes Card Sound. The preserve was established by the Florida legislature in 1974 because it met the criteria established by the legislature for aquatic preserves. The criteria specify that state-owned submerged lands in areas that have exceptional biological, aesthetic, and scientific value be set aside forever as aquatic preserves or sanctuaries for the benefit of future generations (FDEP 2000).

The former Homestead Air Force Base is approximately 8 km (5 mi) northwest of the plant site. The base was realigned to Homestead Air Reserve Station in 1994. The base consisted of 1189 ha (2938 ac) at the time of realignment. The U.S. Air Force (USAF) recently determined that it will make available 290 ha (717 ac) at the former base to Miami-Dade County for mixed economic uses that could include commercial development as well as residential or recreational uses (66 FR 12930; March 1, 2001 [DOD 2001]). The USAF rejected a proposal for a civilian commercial airport at the former base (USAF 2000).

Land south and west of the plant site is in the Everglades Mitigation Bank. A mitigation bank is a wetland area that is created, restored, or enhanced for the purpose of providing compensatory mitigation of wetland loss elsewhere. The bank comprises approximately 5300 ha (13,000 ac) of relatively undisturbed freshwater and estuarine wetlands. FPL owns the land in the bank. The bank is independent of Turkey Point Units 3 and 4; continuation of the bank is not tied to renewal of the Turkey Point Units 3 and 4 OLS.

The Miccosukee Indian Reservation is approximately 76 km (48 mi) northwest of the plant site. The Big Cypress Seminole Indian Reservation is approximately 102 km (64 mi) northwest of the plant site.

#### **2.2.8.4 Visual Aesthetics and Noise**

The Turkey Point units, including Units 3 and 4 and supporting structures, can be seen and heard from the Biscayne National Park visitor center complex and from waters and lands within the park boundary. Visitors to the park would likely have difficulty separating the visual and

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noise impacts originating from Units 3 and 4 from those originating from Units 1 and 2, which are fossil-fired units that are not being considered in this SEIS. The most visible features of the Turkey Point units are the emission stacks from Units 1 and 2.

All units are also visible from the park at night because of outside lighting used at the Turkey Point site and lighting used on the Units 1 and 2 emission stacks and the meteorological tower. There is no visible plume from Unit 3 and 4 operations because cooling towers are not used.

Noise from the Turkey Point units is detectable at some times by visitors in Biscayne National Park. Noise transmission is facilitated by the location of the Turkey Point units on Biscayne Bay (NPS scoping comments). The noise is most noticeable under calm wind conditions or when the wind is blowing lightly in a direction from the Turkey Point site to the park.

Vegetation and trees largely screen Turkey Point Units 3 and 4 and supporting structures from public view from locations west of the plant site. Noise from Turkey Point Units 3 and 4 is generally not an issue at locations to the west of the plant because of the setback from non-FPL property and because of intervening vegetation and trees.

### **2.2.8.5 Demography**

Population was estimated from the Turkey Point site out to 80 km (50 mi) in 16-km (10-mi) annular rings. Population estimates for the 80-km (50-mi) area surrounding the site are based on information from the Updated Final Safety Analysis Report (FSAR) for Units 3 and 4 (FPL 1999b). NRC Guidance calls for the use of the most recent USCB decennial census data, which in the case of the Turkey Points site, was the 1990 census (USCB 1991).

#### **c Resident Population Within 80 km (50 mi)**

Table 2-12 presents the population distribution within 80 km (50 mi) of the Turkey Point site for population estimates in 10-year increments starting with 1990 and ending with 2010.

The largest population centers within the 16-km (10-mi) area are the towns of Homestead and Florida City. The population of Homestead and Florida City for 2000 is 27,800 and 6900, respectively (Florida Legislature 2001b). Approximately 90 percent of Florida City's land area lies within 16 km (10 mi) of the plant. Most of the new, residential development within the 16-km (10-mi) radius occurs in sectors W and N within the 8-km to 16-km (5-mi to 10-mi) radius, principally on either side of U.S. Highway 1 from Homestead and Florida City to the south part of Miami's suburbs (FPL 1999b).

**Table 2-12.** Population Distribution in 1990, 2000, and 2010 Within 80 km (50 mi) of the Turkey Point Site

	<b>0 to 16 km (0 to 10 mi)</b>	<b>16 to 32 km (10 to 20 mi)</b>	<b>32 to 48 km (20 to 30 mi)</b>	<b>48 to 64 km (30 to 40 mi)</b>	<b>64 to 80 km (40 to 50 mi)</b>	<b>Total</b>
Total 1990	105,679	391,800	902,461	707,175	506,393	2,613,535
Total 2000	123,552	457,188	1,052,786	827,329	597,954	3,058,809
Total 2010	139,617	516,459	1,189,978	929,218	657,706	3,432,978

Source: FPL 1999b.

Miami is located generally to the north of the Turkey Point site beyond the 16-km (10-mi) radius from the plant site. Between 1980 and 1990, Miami experienced a population growth increase from approximately 347,000 (in 1980) (GEOSTAT 2001b) to 359,000 (in 1990)—an approximately 3 percent increase over the decade. The population increased to 369,000 by 2000, or by approximately 3 percent over 1990 (Florida Legislature 2001b).

Between 1990 and 2000 the greatest population growth (18.1 percent), within the 80-km (50-mi) radius around the Turkey Point site occurred in the 64-km (40-mi) to 80-km (50-mi) annulus. Growth in the rest of the area was approximately 17 percent.

The county planning department projects increased population growth for Miami south to the vicinity of Homestead and Florida City. This area of the county has relatively less expensive housing than other parts. There are several residential developments that have started in the vicinity of Homestead/Florida City, including Keys Gate, which was started in 1988 with 6200 units planned over a 12-year period. This development is located in the WNW sector within the 0- to 16-km (0- and 10-mi) annulus.

Between 2000 and 2010, the population increase in the 64-km to 80-km (40-mi to 50-mi) annulus is projected to be 10.0 percent, and 12.3 percent for the 48-km (30-mi) to 64-km (40-mi) annulus. The population in the remaining area is estimated to grow at approximately 13.0 percent.

Table 2-13 lists the projected age distribution of Miami-Dade County in 1999 compared to Florida's population. Miami-Dade County has a higher percentage of population in the 18- to 44-year age bracket and a lower percentage of population in the 65+ age bracket, with the remaining age brackets being slightly higher or lower percentages than Florida as a whole.

**Table 2-13.** Estimated Age Distribution of Population in 1999

Age Group	Miami-Dade County		Florida	
	Number	Percentage	Number	Percentage
Under 4	149,900	6.9	952,400	6.3
5-17	390,200	17.9	2,617,500	17.3
18-44	849,400	39.0	5,474,300	36.2
45-64	475,600	21.9	3,325,200	22.1
65 and over	310,600	14.3	2,741,800	18.1
Total	2,175,700	100.0	15,111,200	100.0

Sources: USCB 2001b.

**C Transient Population**

The transient population in the vicinity of the Turkey Point site can be identified as daily or seasonal. Daily transients are associated with places where a large number of people gather regularly, such as local businesses, industrial facilities, and schools. Table 2-14 presents information on the major employers and number of employees for facilities located within 16 km (10 mi) of the Turkey Point site.

Seasonal transients result from part-time residents who may reside in southern Florida during the winter months or pursue recreational activities there throughout the year. The daily and seasonal population associated with selected recreation within 16 km (10 mi) of the Turkey Point site is listed in Table 2-15.

**Table 2-14.** Major Employment Facilities Within 16 km (10 mi) of the Turkey Point Site

Firm	Number of Employees
City of Homestead	370
Homestead Air Reserve Station	623
Homestead Hospital	580
Florida Rock and Sand	175

Source: FPL 1999b and USAF 2000.

**Table 2-15.** Visitors to Major Events Within 16 km (10 mi) of the Turkey Point Site

Facility/Event	Peak One-Day Attendance		
	1988 Study	1990 Estimate <sup>(a)</sup>	1995 Estimate <sup>(a)</sup>
Biscayne National Park	1600	1680	1880
Homestead Bayfront Park and Marian	860	900	1015
Coral Castle	100	105	120
Homestead Frontier Days	16,500	17,340	19,440
Homestead MotorSports Complex	--	--	65,000

(a) Estimates based on the 1988 study (FPL 1999b).  
Source: FPL 1999b.

The largest influx of seasonal residents is at Ocean Reef Club in Key Largo in Monroe County. The club is a private resort with 1200 single-family, multi-family, and tourist accommodations (FPL 1999b). There are a number of motel and private campground accommodations in and around Homestead/Florida City.

The Homestead MotorSports Complex, located approximately 8 km (5 mi) west of the Turkey Point site, hosts a number of events throughout the year. The complex has seating for 65,000 people. During early winter (January/February) the Homestead Frontier Days attracts about 19,440 visitors (FPL 1999b). In addition, as noted in Section 2.2.8.1, 800 to 900 temporary workers are associated with refueling at Turkey Point Unit 3 and 4 for 30 to 40 days once or twice a year.

### C Migrant Farm Labor

Migrant farm workers are individuals whose employment requires travel to harvest agricultural crops. These employees may or may not have a permanent place of residence. Some migrant workers may follow the harvesting of crops through Florida, Georgia, and the Carolinas. Others may be permanent residents within the 80-km (50-mi) radius from the Turkey Point site, but travel from farm to farm harvesting crops.

Migrant workers can be members of minority or low-income populations. Migrant workers' travels, and the fact they can spend a significant amount of time in an area without being an actual resident, means they may be unavailable for census takers to count. If this occurs, these workers would be "under-represented" in minority and low-income population counts undertaken by the USCB (FPL 2000a).

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The main agricultural crops grown within the 80-km (50-mi) radius of the Turkey Point site are citrus, row, and nursery crops. Migrant workers are frequently at these locations working or harvesting the crops. The U.S. Department of Agriculture (USDA) estimates that there were approximately 8700 hired farm workers (permanent and migrant) in Miami-Dade County (USDA 2001a). Approximately 12 percent of the total number of hired farm workers is migrant labor (USDA 2001b). As such, around 1040 migrant farm workers are present at any one time in Miami-Dade County, which is almost entirely within the 80-km (50-mi) circle.

There are 1576 farms in Miami-Dade County and 347 in Broward (USDA 2001b). Given the large geographic area of the two counties and the small number of estimated migrant workers, FPL concluded that migrant workers would be located throughout the counties at any given time and would not be concentrated in a single location. Hence, FPL did not expect the migrant farm worker population to materially change the population characteristics of any particular census tract (FPL 2000a).

### 2.2.8.6 Economy

From a historical perspective, two economic drivers have materially impacted the economy of southern Florida—tourism and in-migration of people to the area. More specifically, focusing on Miami-Dade County (all within the 80-km [50-mi] radius of the Turkey Point site), further breakdown and disparity of the economy of the county becomes more apparent. North of Eureka Drive (184<sup>th</sup> Street) is Miami and its suburbs. This area is largely developed. The area to the south of Eureka Drive is known as “South Miami-Dade County.” This area is still relatively rural, agricultural, and largely undeveloped.

For Miami-Dade County as a whole, services and trade (wholesale and retail) in 1998 were the two largest contributing sources of employment in the county at approximately 33 and 26 percent, respectively. The third largest employment sector is government at approximately 14 percent (Beacon Council 2000a). Of the 10 largest employers in Miami-Dade County, FPL ranks sixth with approximately 3800 employees (Beacon Council 2000b), of which approximately 960 (permanent and contract) work at Turkey Point Units 3 and 4 (FPL 2000a). It is the second largest employer in South Miami-Dade County (USAF 2000) with an estimated annual economic impact of over \$60 million.<sup>(a)</sup> In 1997, the latest year for which data were available, Miami-Dade County had a net out-migration of people of approximately 24,000 (Enterprise Florida 2000).

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(a) Comment by Liz Thompson, FPL-Turkey Point Nuclear Plant at Scoping Meetings held December 6, 2000, Homestead, Florida.



South Miami-Dade County's economy cannot be discussed without recognizing the devastating impacts of Hurricane Andrew in September 1992. Hurricane Andrew was a Category 5 hurricane (Saffir-Simpson Scale) whose path went through South Miami-Dade County. The Turkey Point site and the cities of Florida City and Homestead were in its direct path. Homestead Air Force Base (located near Florida City/Homestead) was largely destroyed and not rebuilt. This cost approximately 6700 jobs. It is now an Air Force Reserve and Florida National Guard Station employing approximately 1100 full-time equivalent workers (USAF 2000).

The major economic impact of Hurricane Andrew, besides the tremendous physical damage, was the severe loss of the middle- and upper-income jobs in South Miami-Dade County. Most of the jobs now in the Florida City/Homestead area offer minimum to very low wages. With the closure of Homestead Air Force Base, FPL's Turkey Point site is the only employer providing higher-paying jobs in the immediate area. As such, it is a major contributor to the economic stability of the south part of the county. The payroll of Turkey Point Units 3 and 4 is \$50 million annually and it purchases \$3 to \$4 million annually in local goods and services.<sup>(a)</sup>

The unemployment rate in 1999 for the county averaged 5.8 percent (Enterprise Florida 2000) compared to the Florida rate that averaged 3.9 percent (U.S. Department of Labor 2001). In South Miami-Dade County, the unemployment rate is approximately 9 percent at the end of 2000, down from 15 percent after Hurricane Andrew.<sup>(b)</sup>

In 1995, the percentage of persons below the poverty limit in Miami-Dade County was 23.6 percent, compared to 15.2 percent for Florida as a whole. For children the rate was 36.0 percent for the county, versus 24.1 percent for the State (USCB 2001c).

In 1993, the estimated percent of households in Homestead that were below the poverty level was 24.6 percent for Homestead.<sup>(c)</sup> This compares to Miami-Dade County at 25.4 percent and Florida at 16.0 percent (USCB 2001d). The median household income was approximately \$25,500 (in 1993 dollars). This compares to the county at approximately \$26,700 (in 1993 dollars) and the State at approximately \$28,200 (1993 dollars) (USCB 2001e).

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(a) Personal communication with Mary Finlan, Executive Director, Greater Homestead/Florida City Chamber of Commerce, December 5, 2000.

(b) Personal communication from Otis T. Wallace, Mayor, City of Florida City, December 8, 2000.

(c) Personal communication and data from Alicia M. Schreiber, Assistant City Manager, Homestead, Florida, December 2000.

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Agriculture is declining in Miami-Dade County. There are approximately 1580 farms on 34,400 ha (85,100 ac) in Miami-Dade County (USDA 2001a). Most of this is concentrated in the southern part of the county. Farm income for Miami-Dade County declined from \$175 million in 1994, to around \$167 million in 1998 (about 4.4 percent). Agricultural income declined from about 0.42 percent of personal income in Miami-Dade County in 1994 to around 0.32 percent in 1998 (Bureau of Economic Analysis 2000). The number of farm proprietors declined from approximately 1700 in 1994, to around 1450 in 1998, or approximately 14.7 percent (Bureau of Economic Analysis 2000).

County planning officials expect the future area of growth for Miami-Dade County to be in the southern part (south of Eureka Drive). The southern part of the county is expected to be the growth area because it is largely undeveloped, mainly rural, and has the open spaces for economic development to occur. The costs of new development would be expected to be lower when compared to the northern, already-developed part of the county. In addition, Homestead has received an Empowerment Zone designation by the Federal government that is expected to aid in business development and job recruitment.<sup>(a)</sup>

Moderate growth forecasts for jobs in South Miami-Dade County predict an increase in jobs from approximately 42,000 (1995) to about 68,000 (2015), or a projected increase of approximately 28,000 jobs (or 61.9 percent) over the 20-year period. Employment in Miami-Dade County as a whole is projected to increase by about 156,000 jobs under the same moderate growth forecast. Population in the county (moderate growth forecast) is projected to increase from approximately 2.1 million (1995)<sup>(b)</sup> to around 2.5 million (2015), or approximately 19 percent over the 20-year period. South Miami-Dade County is projected to increase from approximately 163,000 (1995) to around 240,000 (2015) or approximately 47 percent. High growth forecasts for South Miami-Dade County show projected employment and population gains to be five times as large (USAF 2000).

The significance of these projections, if they materialize, is that the importance of Turkey Point Units 3 and 4 to South Miami-Dade as an employer may decline over time. The southern part of the county is slated to potentially achieve significant economic, population, and job growth over the next 15 years relative to the rest of the county. Even so, the disparity between the large population growth and somewhat smaller employment growth (although still significant in percentage terms when compared to the rest of the county) may be indicative of a trend for

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(a) The purpose of the zone is to encourage business development and job creation in impoverished areas. Businesses locating to the zone receive special tax benefits.

(b) Approximately 2.25 million in 2000 (see Table 2-9).

South Miami-Dade County to become more of a bedroom community for the central and northern portions of the county (USAF 2000).

FPL is a property taxpayer in Miami-Dade County. FPL pays the tax on Turkey Point Units 3 and 4 to the county, public schools, SFWMD, and the Florida Inland Waterways Navigation System. Table 2-16 shows the total Miami-Dade County property tax revenues and the FPL contributions between 1995 and 1998 (FPL 2000a). Over the 4-year period, FPL contributions averaged 1.7 percent of the total property taxes collected in the county (FPL 2000a). Approximately 45 percent of the total property taxes in 1998 of Units 3 and 4 went in support of public schools.<sup>(a)</sup>

**Table 2-16.** Turkey Point Units 3 and 4 Contribution to County Property Tax Revenues and Operating Budget

Year	Total Miami-Dade County Property Tax Revenues (\$)	Property Tax Paid to Miami-Dade County for Turkey Point Units 3 and 4 (\$)	Percent of Total Property Taxes
1995	611,518,000	12,931,000	2.1
1996	608,922,000	9,951,000	1.6
1997	627,268,000	8,979,000	1.4
1998	653,096,000	10,140,000	1.6

Source: FPL 2000a.

## 2.2.9 Historic and Archaeological Resources

This section discusses the cultural background and the known historic and archaeological resources at the site of Turkey Point Units 3 and 4 and in the surrounding area.

### 2.2.9.1 Cultural Background

The region around the Turkey Point site is rich in prehistoric and historic Native American and historic Euroamerican resources. The southern Florida region has an archaeological sequence that extends back between about 12,000 to 13,000 years based on findings of fragmentary

(a) Personal communication with Herbert Parlato, Deputy Property Appraiser, Property Appraisal Office, Miami-Dade County, April 23, 2001.

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human remains at a site in Sarasota County (Griffen 1988; Carr 1981). At that time, southern Florida's climate was markedly drier than it is today; it is estimated that the water table was as much as 26 m (85 ft) lower than it is now (Griffen 1988). During the Paleo-Indian era (from about 12,000 B.C. to 6500 B.C), inhabitants of southern Florida were probably low in numbers and were concentrated around scarce water resources that provided food and transportation routes. During the early Archaic period, southern Florida's climate began to be more mesic, and occupation of the area expanded. The earliest evidence of human occupation in the southeast Florida area may be from as long ago as 8000 B.C. based on fossils and artifacts from the Cutler Fossil Site (Milanich 1994; Leynes and Cullison 1998). By the Late Archaic period, human occupation of Miami-Dade County indicates a well-developed culture (Carr 1981). The Glade periods (500 B.C. to 1750 A.D.) were characterized by an extensive use of pottery and reliance on marine food resources, including marine mammals, turtles, shellfish, with some use of terrestrial plants and animals (Milanich and Fairbanks 1980). Agriculture was apparently practiced on a limited basis (Griffen 1988).

The first recorded European contact with aboriginal people of southern Florida occurred in 1513 when Spanish explorer Ponce de Leon landed on Florida's eastern coast. It is presumed that he encountered the Tequesta at a location near the mouth of the Miami River (Leynes and Cullison 1998). The Tequesta and other aboriginal peoples of Florida were severely impacted by fighting and diseases resulting from European contact. Diseases and direct conflict substantially reduced the Tequesta population, and the last of the Tequesta reportedly left southern Florida for Cuba in 1770 (Carr 1981).

After the disappearance of the Tequesta, Native American tribes and others began moving into southern Florida. Pressed by advancing colonization and other pressures, members of the Oconee and other tribes from Alabama and Georgia moved south to Florida (Leynes and Cullison 1998). Later joined by Creeks and fugitive slaves, this group became known as the Seminole. The Seminole moved to the southern Florida region after the Second Seminole War when surviving members of the tribe fled south to the Everglades to avoid relocation to Oklahoma and continued fighting with U.S. troops (Griffen 1988). The present-day Seminole are represented by two groups; the Seminole who are primarily Muskogee-speaking and the Mikasuki (Miccosukee) who are primarily Hichiti-speaking.

Survey maps at the State Library of Florida do not show any permanent settlement in the area surrounding the Turkey Point site. One map dating from 1835 shows the southeast coast of Florida as "Indian Hunting Grounds." Another set of survey maps states that the area around Turkey Point site was too swampy to survey.

Florida was granted statehood in 1845. White settlement of southern Florida began in the 1800s and was enhanced with draining of swampy areas beginning in 1906. A large influx of

people occurred in the 1920s era land boom. Following World War II, the population of southern Florida expanded substantially and agriculture, aviation, and tourism became major industries of the area.

#### **2.2.9.2 Historic and Archaeological Resources at Turkey Point Site**

Historic and archaeological site file searches were conducted at the Florida Department of State, Division of Historical Resources, the National Park Service Southeast Archaeological Center, and at Biscayne National Park. In addition, maps at the State Library of Florida were examined for information that would indicate the potential for historic and archaeological sites at or near Turkey Point site.

No historic or archaeological sites have been recorded on the Turkey Point site, although no cultural resource inventories have been completed for the plant site. An archaeological survey was conducted for the Everglades Mitigation Bank, which is adjacent to the Turkey Point site to the west and south. Areas most likely to contain historic or prehistoric cultural resources were identified through evaluations of several maps, photographs, and other information sources. No cultural resources were found in surveys of more than 100 target sites and 61 test excavations (Lewis and Davis 1996). In a letter dated September 11, 1996, the archaeologist for the Metro-Dade County Office of Community and Economic Development, Historic Preservation Division, concurred with the findings of the survey report (Carr 1996). There are no prehistoric or historic sites located along the Turkey Point site's boundary with Biscayne National Park.

The closest archaeological site to Turkey Point is the Snapper Creek Future Archaeological Zone, which is approximately 26 km (16 mi) north of the plant site. Other "probable archaeological sites" are located as close as approximately 32 km (20 mi) northwest of the plant site (Miami-Dade County 2000b).

#### **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 Turkey Point Units 3 and 4. Any such activities could result in cumulative environmental impacts and the possible need for the Federal agency to become a cooperating agency for preparation of the SEIS.

Significant Federal activities in relatively close proximity to the Turkey Point site are the Biscayne and Everglades National Parks operated by the National Park Service and the former Homestead Air Force Base (see Section 2.2.8.3). The Federal Government is also participating in the Comprehensive Everglades Restoration Plan.

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Biscayne National Park is immediately north and east of the plant site. Everglades National Park is approximately 24 km (15 mi) west of the plant site; the park preserves a large area of subtropical wetlands.

The former Homestead Air Force Base is also close to the plant site. The USAF and the Federal Aviation Administration prepared a supplemental EIS concerning the disposition of land at the former base, which is considered excess to the needs of the USAF and surplus to the needs of the Federal Government (USAF 2000). The proposed action in the EIS was to transfer the surplus property to Miami-Dade County for the development of a one-runway commercial airport. The Record of Decision, however, authorizes transfer of 290 ha (717 ac) at the former base to Miami-Dade County for mixed economic uses that could include commercial development as well as residential or recreational uses (66 FR 12930 [DOD 2001]). Development of a commercial airport will not be permitted. The USAF will retain the runway and airfield areas at the former base for its own use.

The wetlands in southern Florida are only approximately half their original size. During the dry season, there is insufficient freshwater for the natural system and for urban and agricultural consumers. The U.S. Army Corps of Engineers and other public and tribal agencies have collaborated to develop the Comprehensive Everglades Restoration Plan. The plan focuses on increasing storage of wet season waters so that more water is available during the dry season for public and tribal lands and for urban and agricultural users. The plan consists of 68 projects estimated to take 36 years and \$7.8 billion to complete. Title VI of the Water Resources Development Act of 2000 approved the plan as a framework for changes that are needed to (1) restore, preserve, and protect the southern Florida ecosystem; (2) provide for the protection of water quality in, and the reduction of the loss of freshwater from, the Everglades; and (3) provide for the water-related needs of the southern Florida region. The Act authorizes appropriations for the plan's initial construction projects and their operation and maintenance. The Federal Government will pay half the costs of implementing the plan and public and tribal agencies the other half.

After reviewing the Federal activities in the vicinity of the Turkey Point site, 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 the SEIS.

NRC is required under Section 102 of the NEPA 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. NRC consulted with the U.S. Army Corps of Engineers, the FWS, and the National Park Service. Consultation correspondence is included in Appendix E. The National Park Service submitted written comments during the scoping process; their comments are reflected in this SEIS.

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10 CFR 20. Code of Federal Regulations, Title 10, *Energy*, Part 20, “Standards for Protection Against Radiation.”

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

10 CFR 54. Code of Federal Regulations, Title 10, *Energy*, Part 54, “Requirements for Renewal of Operating Licenses for Nuclear Power Plants.”

10 CFR 61. Code of Federal Regulations, Title 10, *Energy*, Part 61, “Licensing Requirements for Land Disposal of Radioactive Waste.”

10 CFR 71. Code of Federal Regulations, Title 10, *Energy*, Part 71, “Packaging and Transportation of Radioactive Material.”

40 CFR 81. Code of Federal Regulations, Title 40, *Protection of 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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