February 3, 2025
L-2025-012
10 CFR 51
10 CFR 54

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

RE: St. Lucie Units 1 and 2
Docket Nos. 50-335 and 50-389
Renewed Facility Operating Licenses DPR-67 and NPF-16

Supplement to Subsequent License Renewal Application Environmental Report

Reference:

1. Florida Power & Light Company letter L-2021-142, Application for Subsequent Renewed Facility Operating Licenses (ADAMS Package Accession No. ML21215A314)

In Reference 1, Florida Power & Light Company (FPL) submitted its Environmental Report (Appendix E) in support of the Subsequent License Renewal Application for St. Lucie Units 1 and 2.

The enclosure to this letter provides information that supplements information provided in Reference 1. The enclosure updates the status of permits, licenses, and authorizations; provides results of review of potentially new and significant information since submittal of Reference 1; and provides an assessment of applicable new Category 2 issues from the Generic Environmental Impact Statement for License Renewal of Nuclear Plants.

There are no regulatory commitments contained in this letter.

Should you have any questions regarding this submission, please contact Ms. Maribel Valdez, Fleet Licensing Manager, at (561) 904-5164.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on February 3, 2025

Sincerely,

Kenneth A. Mack
Director, Licensing and Regulatory Compliance

Enclosure

Cc: USNRC Regional Administrator, Region II
USNRC License Renewal (Environmental) Project Manager, St. Lucie Nuclear Plant
USNRC Senior Resident Inspector, St. Lucie Nuclear Plant
Mr. Clark Eldredge, Florida Department of Health

ENCLOSURE

January 2025

St. Lucie Nuclear Plant Units 1 and 2
SLRA Appendix E
Environmental Report Additional Information

Revision 1

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Abbreviations, Acronyms, and Symbols

°C	degrees Celsius
°F	degrees Fahrenheit
APE	area of potential effect
BO	biological opinion
BTA	best technology available
CO_2	carbon dioxide
CWA	Clean Water Act
DPS	distinct population segment
DTA	diesel tank area
EFH	essential fish habitat
EPA	U.S. Environmental Protection Agency
ER	environmental report
ESA	Endangered Species Act
FDEP	Florida Department of Environmental Protection
FDH	Florida Department of Health
FFWCC	Florida Fish & Wildlife Conservation Commission
FPL	Florida Power and Light
GEIS	*Generic Environmental Impact Statement for License Renewal of Nuclear Plants.* NUREG-1437, Volume 1, Revision 2. August 2024.
GHG	greenhouse gas
GWL	global warming level
GWPP	groundwater protection program
ISFSI	independent spent fuel storage installation
LR	license renewal
MCL	maximum contaminant level
NESC	National Electric Safety Code
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NRC	U.S. Nuclear Regulatory Commission
pCi/L	picocuries per liter
PSL	St. Lucie Nuclear Plant, Units 1 and 2
RCP	representative concentrations pathways
RPM	reasonable and prudent measure
SLR	subsequent license renewal
SSP	Shared Socioeconomic Pathways
SWPPP	stormwater pollution prevention plan
USFWS	U.S. Fish and Wildlife Service
USCB	U.S. Census Bureau
USGCRP	U.S. Global Change Research Program

1.0 Introduction

This supplemental additional information to the August 2021 Applicant's Environmental Report (ER) – Subsequent Operating License Renewal, St. Lucie Nuclear Plant Units 1 and 2 (PSL) (FPL 2021) is provided by Florida Power and Light (FPL) to:

1. Provide an updated status of PSL permits, licenses, and authorizations.
2. Provide results of review of potentially new and significant information since the submittal of the 2021 PSL Subsequent License Renewal (SLR) ER and the United States Nuclear Regulatory Commission's (NRC) audit concerning the PSL SLR ER, conducted February 28–March 3, 2022, regarding Category 1 issues from NUREG-1437, Volume 1, Revision 2, *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS).
3. Provide review of potentially new and significant information since submittal of the PSL SLR ER and NRC's audit conducted February 28–March 3, 2022, regarding Category 2 issues from the GEIS.
4. Provide an assessment of applicable new Category 2 issues from the GEIS.

2.0 Proposed Action Changes

The following are changes to plant structures, systems, or operations with environmental interfaces that have been undertaken or planned for future implementation since the preparation of the PSL SLR ER:

1. Change to a 24-month fuel cycle from an 18-month fuel cycle.
2. Removal of the West Test Facility and the Quality Control Building, formerly located east of Units 1 and 2 (their concrete pad areas remain in place).
3. Addition of a second switchyard (Sandlot Substation) southeast of the existing switchyard in an area previously occupied by the site's ballfield.
4. Dune renourishment seaward of the seawall project was conducted in 2023 under Florida Department of Environmental Protection's (FDEP) amended emergency final order OGC No. 22-2602 (FDEP 2022).
5. In 2019, FPL applied for and obtained a revision to PSL's National Pollutant Discharge Elimination System (NPDES) permit to allow for the use of chlorine dioxide for biofouling (FPL 2021). A chlorine dioxide/Purate system was fully implemented in 2022, replacing sodium hypochlorite.

Additionally, two projects identified during the PSL SLR ER audit are currently not being pursued:

1. Re-engineer existing onsite dredge spoils pits.
2. Increase the site's stormwater discharge and associated stormwater pollution prevention plan (SWPPP) revisions.

3.0 Updated Environmental Authorizations

Table 3.0-1 provides the status of authorizations for PSL operations cited in the PSL SLR ER Table 9.1-1.

Table 3.0-1 Environmental Authorizations for Current PSL Operations (Sheet 1 of 4)

Agency	Authority	Requirement	Number	Expiration Date	Authorized Activity
NRC	Atomic Energy Act [10 CFR Part 50]	Licensing of nuclear power plant	DPR-67	Expires 3/1/2036	Operation of Unit 1
NRC	Atomic Energy Act [10 CFR Part 50]	Licensing of nuclear power plant	NPF-16	Expires 4/6/2043	Operation of Unit 2
NRC	10 CFR 72	General license for storage of spent fuel at power reactors	General permit	Not Applicable	Dry storage of power reactor spent fuel and other associated radioactive materials in an independent spent fuel storage installation (ISFSI)
Florida Department of Environmental Protection (FDEP) Siting Board	Florida Statutes § 403.501-518	Power plant site certification	Case No. PA 74-02A2	Final conditions of certification issued 9/17/2008	Siting, construction, and operation of PSL Units 1 and 2 and associated facilities
U.S. Environmental Protection Agency (EPA)/FDEP	Clean Water Act Section 401 [33 USC 1341]	Certification of state water quality standards	Case No. PA 74-02A2	Final conditions of certification issued 9/17/2008	Discharges during license renewal term
U.S. Army Corps of Engineers	Clean Water Act Section 404 [33 USC 1344]	Permit	SAJ-1993-01803	Issued 8/22/2016 10-year authorization	Permit to perform maintenance dredging in the intake canal at PSL

Table 3.0-1 Environmental Authorizations for Current PSL Operations (Sheet 2 of 4)

Agency	Authority	Requirement	Number	Expiration Date	Authorized Activity
EPA/FDEP	Resource Conservation and Recovery Act 42 USC 6901	Hazardous waste generator number	FLD000807479	Not applicable	Very small quantity hazardous waste generator
U.S. Department of Transportation	49 CFR 107 Subpart G	Registration	052324550036G	6/30/2025	Hazardous materials shipments.
Tennessee Department of Environment and Conservation	Tennessee Code Annotated 68-202-206	License to ship radioactive material	T-FL003-L25	12/31/25	Shipment of radioactive material to processing facility in Tennessee
FDEP	Florida Statutes Chapter 403	Industrial wastewater facility permit	FL0002208	11/3/2021 administratively continued until renewed permit is issued	State implementation of NPDES. Effluent discharge to waters of the state
FDEP	Florida Statutes Chapter 403	Air permit	1110071-016-AO	11/3/2025	Emissions from four emergency diesel generators; four diesel and propane emergency generators; miscellaneous diesel-driven equipment, and facility-wide fugitive emission from storage tanks, roadways, and paint/ sandblasting

Table 3.0-1 Environmental Authorizations for Current PSL Operations (Sheet 3 of 4)

Agency	Authority	Requirement	Number	Expiration Date	Authorized Activity
FDEP	Florida Statutes Chapter 376	Annual storage tank registration	Facility ID: 8630677	6/30/25 Annual renewal	Operation of aboveground storage tanks
FDEP	Florida Statutes Chapter 161 and Part IV of Chapter 373	Joint coastal permit	0314668-001-JC	9/10/2028	Permit to construct a submerged reef ball breakwater
U.S. Fish and Wildlife Service (USFWS)	Migratory Bird Treaty Act [16 USC 703-712]	Special purpose utility permit	MB697722-0	3/31/2024 Administratively continued until renewed permit is issued	Provides authorization for carcass salvage, nest relocation, and injured bird transport. This is an FPL system-wide permit that may be applied as necessary and appropriate at PSL Units 1 and 2
National Marine Fisheries Service (NMFS)	Biological Opinion (BO)	Effects of operation on federally listed threatened and endangered species	SERO-2019-03494	2043	Incidental take of specified turtle species and fish

Table 3.0-1 Environmental Authorizations for Current PSL Operations (Sheet 4 of 4)

Agency	Authority	Requirement	Number	Expiration Date	Authorized Activity
Florida Fish & Wildlife Conservation Commission (FFWCC)	Florida Administrative Code Chapter 68B-8.006	Special activity license	SAL-22-0018-SR	2/1/2025 Permit renewal submitted	Tag, release, and recapture of fish and invertebrates.
FFWCC	Florida Administrative Code Chapter 39	Marine turtle permit	MTP-23-125	Expired 1/31/2025 Administratively continued until renewed permit is issued	Conduct turtle activities including net capture, tagging, nesting surveys, hand capture, nest relocation, rescue, and release of hatchlings, stranding and salvage activities.
South Florida Water Management District	Florida Administrative Code 65-25	Stormwater discharge permit	56-00848-S	Perpetual	Stormwater discharge from overflow parking lot
South Florida Water Management District	Florida Administrative Code 65-25	Stormwater discharge permit	85-142	Perpetual	Stormwater discharge from the simulator building

4.0 Category 1 Evaluation

FPL conducted a new and significant information review for Category 1 issues following the process presented in PSL SLR ER Chapter 5, which included both the recategorized severe accidents issue and the new greenhouse gas impacts on climate change issue. FPL did not identify any new and significant information regarding the Category 1 issues during their preparation of this supplemental additional information to the PSL SLR ER. Therefore, the conclusions regarding impacts of the Category 1 issues in the GEIS are considered appropriate for the PSL SLR and are incorporated herein by reference. Impacts related to Category 1 issues do not need further analysis.

5.0 Category 2 Evaluation

FPL conducted a new and significant information review for Category 2 issues previously reviewed in the PSL SLR ER. Category 2 issues concerning impacts from cooling towers and cooling ponds continue to be not applicable because PSL does not have cooling towers or cooling ponds. Also, the Category 2 issue of groundwater withdrawals of more than 100 gallons per minute continues to be not applicable to PSL because no groundwater withdrawal is being conducted (FPL 2021). In addition, FPL conducted plant-specific environmental assessments for the new issues of impacts to National Marine Sanctuary resources and climate change impacts. The Category 2 issues are identified in Table 5.0-1. The results of the new and significant information review and new issue assessments are presented in the following sections.

Table 5.0-1 Category 2 Issues Applicable to PSL SLR (Sheet 1 of 2)

Resource Issue	ER Section	Delta GEIS Rev 1/2 Y/N	New & Significant Information Y/N/New Issue
Groundwater Resources			
Radionuclides released to groundwater	4.5.5	N	N
Terrestrial Resources			
Non-cooling system impacts on terrestrial resources	4.6.5	Y[(a)]	N
Aquatic Resources			
Impingement mortality and entrainment of aquatic organisms (plants with once-through cooling systems or cooling ponds)	4.6.1	Y	N
Effects of thermal effluents on aquatic organisms (plants with once-through cooling systems or cooling ponds)	4.6.2	Y[(a)]	N
Federally Protected Ecological Resources			
Endangered Species Act: federally listed species and critical habitats under U.S. Fish and Wildlife Service jurisdiction	4.6.6	Y	N
Endangered Species Act: federally listed species and critical habitats under National Marine Fisheries Service jurisdiction	4.6.6	Y	N
Magnuson-Stevens Act: essential fish habitat	4.6.6	Y	N
National Marine Sanctuaries Act: sanctuary resources	New	Y	New Issue
Historic and Cultural Resources			
Historic and cultural resources	4.7	N	N
Human Health			
Microbiological hazards to the public	4.9.1	Y	N
Electric shock hazards	4.9.2	N	N
Environmental Justice			
Impacts on minority populations, low-income populations, and Indian Tribes	4.10.1	Y	N

Table 5.0-1 Category 2 Issues Applicable to PSL SLR (Sheet 2 of 2)

Resource Issue	ER Section	Delta GEIS Rev 1/2 Y/N	New & Significant Information Y/N/New Issue
Greenhouse Gas Emissions and Climate Change			
Climate change impacts on environmental resources	New	Y	New Issue
Cumulative Impacts			
Cumulative effects	4.12	N	N

(a) Textual changes in the issue title or discussion that do not substantially change the context of the issue.

5.1 Ground Water Resources – Radionuclides Released to Groundwater

PSL SLR ER Section 4.5.5

5.1.1 Supplemental Information

5.1.1.1 Findings from 10 CFR Part 51, Subpart A, Appendix B, Table B-1

SMALL or MODERATE. Leaks of radioactive liquids from plant components and pipes have occurred at numerous plants. Groundwater protection programs have been established at all operating nuclear power plants to minimize the potential impact from any inadvertent releases. The magnitude of impacts would depend on site-specific characteristics.

5.1.1.2 Requirement [10 CFR 51.53(c)(3)(ii)(P)]

An applicant shall assess the impact of any documented inadvertent releases of radionuclides into groundwater. The applicant shall include in its assessment a description of any groundwater protection program used for the surveillance of piping and components containing radioactive liquids for which a pathway to groundwater may exist. The assessment must also include a description of any past inadvertent releases and the projected impact to the environment (e.g., aquifers, rivers, lakes, ponds, ocean) during the license renewal term.

5.1.1.3 Background [GEIS Section 4.5.1.2.7]

The issue is relevant to license renewal because all commercial nuclear power plants routinely release radioactive gaseous and liquid materials into the environment. These radioactive releases are designed to be planned, monitored, documented, and released into the environment at designated discharge points. However, numerous events at power reactor sites have involved unknown, uncontrolled, and unmonitored release of liquids containing radioactive material into the environment and affecting groundwater.

The majority of the inadvertent liquid release events involved tritium, which is a radioactive isotope of hydrogen. However, other radioactive isotopes, such as cesium and strontium, have also been inadvertently released into the groundwater. The types of events have included, but have not been limited to, leakage from spent fuel pools, storage tanks, buried piping, failed pressure relief valves on an effluent discharge line, and other nuclear power plant equipment.

In 2006, the NRC's Executive Director for Operations chartered a task force to conduct a lessons-learned review of these incidents. On September 1, 2006, the task force issued its report: *Liquid Radioactive Release Lessons Learned Task Force Report.*

The most significant conclusion dealt with the potential health impacts on the public from the inadvertent releases. Although there were numerous events where radioactive liquid was released to the groundwater in an unplanned, uncontrolled, and unmonitored fashion, based on the data available, the task force did not identify any instances where public health and safety were adversely impacted. The NRC task force did not find the referenced tritium releases to be a health risk to the public or onsite workers. The task force identified that under current NRC regulations the potential exists for unplanned, uncontrolled, and unmonitored releases of radioactive liquids to migrate offsite into the public domain. The NRC has continued its oversight

and evaluation of inadvertent releases of liquids containing radioactive material from nuclear power plants, particularly those that result in groundwater contamination.

On the basis of the information about inadvertent releases at operating nuclear power plants, the NRC concluded that the impact on groundwater quality from the release of radionuclides could be SMALL or MODERATE during the initial license renewal (LR) and SLR terms, depending on the magnitude of the leak, radionuclides involved, hydrogeologic factors, the distance to receptors, and the response time of plant personnel to identify and stop the leak in a timely fashion. The NRC staff will consider whether the release has caused or could cause substantial impairment or noticeable alteration of groundwater quality in an aquifer with respect to designated use classification or applicable drinking water or other applicable standards.

5.1.1.4 Analysis

Groundwater is monitored at PSL for radionuclides as part of its groundwater protection program (GWPP). The PSL GWPP was implemented to comply with NEI 07-07, the nuclear industry's groundwater protection initiative. The groundwater monitoring program at PSL includes 52 wells located throughout the site. In the PSL SLR ER, groundwater monitoring well construction details are presented in Table 3.6-2, and well locations are presented in Figure 3.6-6 (FPL 2021).

Groundwater flow patterns at PSL are largely controlled by the intake and discharge canals. Groundwater gradient at PSL generally flows from the discharge canal in the northeastern part of the site toward the intake canal in the west and southeast area of the site. Almost all groundwater beneath the site discharges to the intake canal, where it is captured and used as cooling water prior to discharge to the Atlantic Ocean. In the PSL SLR ER, a potentiometric surface map is presented in Figure 3.6-7. (FPL 2021)

The groundwater monitoring wells are sampled at least annually for tritium and principal gamma emitters. Ten of these wells are located around the site boundary, and the Florida Department of Health (FDH), Bureau of Radiation Control, samples these 10 wells on a quarterly basis for tritium and gamma emitters. (FPL 2023a)

Tritium is the only radionuclide, other than naturally occurring radionuclides, detected at PSL. In general, tritium has been detected in groundwater within the surficial aquifer in the power block portion of the site due to historical releases that occurred near the Units 1 and 2 reactor containment buildings. Tritium migrates with groundwater flow and discharges to the intake canal, where it is captured and used in the cooling water system. Once used for cooling water by the plant, the water is then conveyed to the discharge canal and ultimately to the Atlantic Ocean. Elevated tritium concentrations have been reported in monitoring wells located in the diesel tank area (DTA) east of the Units 1 and 2 reactor containment buildings. Tritium has also been detected downgradient of the DTA in the turbine lube oil area. (FPL 2021)

In 2020, the highest tritium concentrations were detected in wells located within the DTA. The maximum tritium concentration was detected in well MW-6, located within the DTA at 18,900 picocuries per liter (pCi/L), which is below the EPA drinking water maximum contaminant level (MCL) of 20,000 pCi/L and below the reporting limit of 30,000 pCi/L. (FPL 2021) In 2021 and 2022, maximum tritium concentrations were below those previously reported in the PSL SLR

ER. These concentrations are below the EPA MCL and the reporting limit. (FPL 2023a; FPL 2023b)

In the 10 boundary wells, tritium was the only radionuclide detected. In 2016–2020, tritium was detected in two of these border wells located near the discharge canal (H70 and H71) at concentrations far below the MCL and the reporting limit. (FPL 2021) In 2021 and 2022, tritium was detected in at least one boundary well per quarterly sampling event. The maximum tritium concentration was 541 pCi/L, which is far below the MCL and the reporting limit. (FPL 2022a; FPL 2023c)

There are no discharges to groundwater from PSL. Groundwater at PSL is not potable because of its salinity. There are no groundwater withdrawals at PSL. A municipal water supply provides service water and drinking water to PSL and drinking water to the inhabitants of Hutchinson Island. There are no water supply wells within 2 miles of the PSL site boundary. A list of offsite wells and a map of offsite wells located between 2 and 5 miles from PSL is presented in Table 3.6-6 and Figure 3.6-8, respectively, of the PSL SLR ER. These wells are used primarily for domestic purposes. (FPL 2021)

There are no offsite drinking water users that are impacted by groundwater at PSL because drinking water is provided to PSL and to Hutchinson Island by a municipal water source and because tritium concentrations detected in PSL boundary wells are far below the MCL. In addition, water from plant uses continues to be processed and monitored in compliance with licensing and permitting.

5.1.2 Conclusion

FPL did not identify any new and significant information for radionuclides in groundwater, and therefore concludes that the PSL SLR ER assessment of SMALL remains valid for the SLR.

5.2 Non-Cooling System Impacts on Terrestrial Resources

PSL SLR ER Section 4.6.5

5.2.1 Supplemental Information

5.2.1.1 Findings from 10 CFR Part 51, Subpart A, Appendix B, Table B-1

SMALL, MODERATE, or LARGE. The magnitude of effects of continued nuclear power plant operation and refurbishment, unrelated to operation of the cooling system, would depend on numerous site-specific factors, including ecological setting, planned activities during the license renewal term, and characteristics of the plants and animals present in the area. Application of best management practices and other conservation initiatives would reduce the potential for impacts.

5.2.1.2 Requirement [10 CFR 51.53(c)(3)(ii)(E)]

All license renewal applicants shall assess the impact of refurbishment, continued operations, and other license renewal-related construction activities on important plant and animal habitats. Additionally, the applicant shall assess the impact of the proposed action on federally protected ecological resources in accordance with Federal laws protecting such resources, including (but not limited to) the Endangered Species Act, the Magnuson-Stevens Fishery Conservation and Management Act, and the National Marine Sanctuaries Act.

5.2.1.3 Background [GEIS Section 4.6.1.1.1]

The GEIS has refined the title of this issue from "Effects on Terrestrial Resources (Non-cooling System Impacts)" to "Non-cooling System Impacts on Terrestrial Resources" for clarity and consistency with other ecological resource LR GEIS issue titles. This issue concerns the effects of nuclear power plant operations on terrestrial resources during an initial LR or SLR term that are unrelated to operation of the cooling system. This renamed issue is an expansion of the issue "Microbiological hazards to the public (plants with cooling ponds or canals or cooling towers that discharge to a river)" in the 2013 LR GEIS, because this issue is a concern wherever receiving waters are accessible to the public. Specifically, members of the public could be exposed to microorganisms in thermal effluents at nuclear power plants that use cooling ponds, lakes, canals, or that discharge to publicly accessible surface waters.

Because the plants and animals present on nuclear power plant sites are generally tolerant of disturbance and acclimated to human activity, continued operations during the license renewal term would not affect the composition of terrestrial communities or any current trends of change. Activities that would require state or federal permits (e.g., Clean Water Act [CWA] Section 404 permit), and federal review (e.g., USFWS [U.S. Fish and Wildlife Service] and National Oceanic and Atmospheric Administration [NOAA]) would mitigate potential impacts. Typically, plants operate under environmental procedures, and proper implementation of these procedures and best management practices would minimize or mitigate potential effects on terrestrial resources during the license renewal term. Non-cooling system impacts would be SMALL at most nuclear power plants but may be MODERATE or LARGE at some plants.

5.2.1.4 Analysis

The GEIS did not significantly change the scope of this issue to warrant site-specific analysis. However, the issue was still evaluated for new and significant information since the PSL SLR ER.

Refurbishment Activities

As presented in Section 2.3 of the PSL SLR ER, no SLR-related refurbishment activities have been identified. Therefore, there would be no SLR-related refurbishment impacts to important plant and animal habitats, and no further analysis is required. (FPL 2021)

Operational Activities

Terrestrial resources are described in Section 3.7.2 of the PSL SLR ER. No SLR-related construction activities or changes in operational practices have been identified that would involve disturbing habitats. (FPL 2021)

Operational and maintenance activities that PSL might undertake during the renewal term, such as maintenance and repair of plant infrastructure (e.g., roadways, piping installations, fencing, and other security infrastructure), would likely be confined to previously disturbed areas of the site. Furthermore, as presented in Section 9.6 of the PSL SLR ER, FPL has administrative controls in place at PSL to provide reasonable assurance that operational changes or construction activities are reviewed and the impacts minimized through implementation of best management practices, permit modifications, surveys, monitoring of species and habitats, or acquisition of new permits as needed. In addition, regulatory programs that the site is currently subject to, such as stormwater management, spill prevention, dredging, and herbicide use, further serve to minimize impacts to terrestrial resources. (FPL 2021) FPL confirmed that there is no new and significant information related to landscape and grounds maintenance, stormwater management, elevated noise levels and vibrations, and ground-disturbing activities.

5.2.2 Conclusion

FPL did not identify any new and significant information regarding non-cooling system impacts on terrestrial resources. FPL concludes the PSL SLR ER assessment of SMALL remains valid for the SLR.

5.3 Aquatic Resources – Impingement Mortality and Entrainment of Aquatic Organisms (Plants with Once-Through Cooling Systems or Cooling Ponds)

PSL SLR ER Section 4.6.1

5.3.1 Supplemental Information

5.3.1.1 Findings from 10 CFR Part 51, Subpart A, Appendix B, Table B-1

SMALL, MODERATE, or LARGE. The impacts of impingement mortality and entrainment would generally be small at nuclear power plants with once-through cooling systems or cooling ponds that have implemented best technology requirements for existing facilities under Clean Water Act (CWA) Section 316(b). For all other plants, impacts could be small, moderate, or large depending on characteristics of the cooling water intake system, results of impingement and entrainment studies performed at the plant, trends in local fish and shellfish populations, and implementation of mitigation measures.

5.3.1.2 Requirement [10 CFR 51.53(c)(3)(ii)(B)]

If the applicant's plant utilizes once-through cooling or cooling pond water intake and discharge systems, the applicant shall provide a copy of current Clean Water Act 316(b) Best Technology Available determinations and, if applicable, a 316(a) variance in accordance with 40 CFR part 125, or equivalent State permits and supporting documentation. If the applicant cannot provide these documents, it shall assess the impact of the proposed action on fish and shellfish resources resulting from impingement mortality and entrainment and thermal discharges.

5.3.1.3 Background [GEIS Section 4.6.1.2.1]

The NRC refines the title of this issue to include impingement mortality, rather than simply impingement. This issue pertains to impingement and entrainment of finfish and shellfish at nuclear power plants with once-through cooling systems or cooling ponds during an initial LR or SLR term. This includes plants with helper cooling towers that are seasonally operated to reduce thermal load to the receiving water body, reduce entrainment during peak spawning periods, or reduce consumptive water use during periods of low river flow. The potential effects of impingement and entrainment during an initial LR or SLR term depend on numerous site-specific factors, including the ecological setting of the plant; the characteristics of the cooling system; and the characteristics of the fish, shellfish, and other aquatic organisms present in the area (e.g., life history, distribution, population trends, management objectives, etc.).

The NRC considered EPA's 2014 CWA Section 316(b) regulations and the EPA's assessment that impingement reduction technology is available, feasible, and has been demonstrated to be effective. CWA Section 316(b) regulations establish best technology available (BTA) standards for impingement mortality. If the NPDES permitting authority has made BTA determinations for a nuclear power plant, and that plant has implemented any associated requirements (or those requirements would be implemented before the LR period), then the NRC assumes that adverse impacts on the aquatic environment would be minimized. In cases where the NPDES permitting authority has not made BTA determinations, the NRC analyzes the potential impacts of impingement mortality, entrainment, or both using a weight-of-evidence approach. The NRC concluded that the impacts of impingement mortality and entrainment of aquatic organisms

during the license renewal term (initial LR or SLR) at nuclear power plants with once-through cooling systems or cooling ponds could be SMALL, MODERATE, or LARGE.

5.3.1.4 Analysis

The GEIS expanded the scope of this issue from the 2013 GEIS. The Category 2 issue, "Impingement and Entrainment of Aquatic Organisms (Plants with Once-through Cooling Systems or Cooling Ponds)," and the impingement component of the Category 1 issue, "Losses from Predation, Parasitism, and Disease among Organisms Exposed to Sublethal Stresses," was consolidated into a single Category 2 issue: "Impingement Mortality and Entrainment of Aquatic Organisms (Plants with Once-through Cooling Systems or Cooling Ponds)".

As presented in Section 3.7.7 of the PSL SLR ER, periodic monitoring of entrainment and impingement of fish and aquatic species has been conducted to verify that PSL is utilizing BTA to reduce impacts to fish and other wildlife surrounding the plant (FPL 2021). There have not been any other impingement or entrainment studies performed at PSL since preparation of the PSL SLR ER.

An NPDES permit renewal application was submitted on April 16, 2021, and the current NPDES Permit No. FL0002208 is administratively continued until the renewed permit is issued. The facility's April 2021 CWA 316(b) compliance report was included as part of the renewal application. The report outlines the proposed basis of impingement mortality and entrainment BTA. Based on the information provided in this report, FPL proposed that its existing system of offshore velocity caps be determined to be impingement mortality BTA under 40 CFR 125.94(c)(4).

In a letter dated December 4, 2024, FDEP issued a notice to FPL of its preparation of a draft permit for the continued operation of PSL. Under the draft permit, FDEP concurs that the existing offshore velocity caps comply with impingement mortality BTA standards per 40 CFR 125.94(c)(4). Further, FDEP concurs that the entrainment technologies considered are not justified for retrofitting the facility based on costs and benefits in accordance with 40 CFR 125.98(f)(4) and that no additional control requirements are necessary. (FDEP 2024a)

A 2022 BO was prepared by the NMFS that determined reasonable and prudent measures (RPMs), as well as respective terms and conditions, to minimize the amount or extent of incidental take of sea turtles, giant manta rays, and smalltooth sawfish. Section 5.6.1.4 of this report describes these RPMs in detail.

PSL conducts intake canal monitoring and maintains barrier nets to reduce mortality rates and residency times of entrained sea turtles as mandated by the most recent BO issued by NMFS. Daily inspections are performed from a small boat to remove floating debris and to repair holes at or near the water's surface. Periodic inspections of the barrier nets, as well as debris removal when warranted, are conducted. In addition to the scheduled inspections and cleaning of the nets, divers are deployed when the integrity of the nets is threatened by algae events. These algae events can cause undue stress to the net structures and may cause the nets to fail, which can increase the risk of sea turtle mortalities and overall residency times. (FPL 2024a)

5.3.2 Conclusion

FPL concludes that the PSL SLR ER assessment of SMALL for impacts from impingement and entrainment of aquatic organisms during the proposed SLR term remains valid. The BTA and other mitigation measures implemented under the 316(b) rule and the 2022 BO would further reduce the SMALL impacts.

5.4 Aquatic Resources – Effects of Thermal Effluents on Aquatic Organisms (Plants with Once-Through Cooling Systems or Cooling Ponds)

PSL SLR ER Section 4.6.2

5.4.1 Supplemental Information

5.4.1.1 Findings from 10 CFR Part 51, Subpart A, Appendix B, Table B-1

SMALL, MODERATE, or LARGE. Acute, sublethal, and community-level effects of thermal effluents on aquatic organisms would generally be small at nuclear power plants with once-through cooling systems or cooling ponds that adhere to State water quality criteria or that have and maintain a valid CWA Section 316(a) variance. For all other plants, impacts could be small, moderate, or large depending on site-specific factors, including ecological setting of the plant; characteristics of the cooling system and effluent discharges; and characteristics of the fish, shellfish, and other aquatic organisms present in the area.

5.4.1.2 Requirement [10 CFR 51.53(c)(3)(ii)(B)]

If the applicant's plant utilizes once-through cooling or cooling pond water intake and discharge systems, the applicant shall provide a copy of current Clean Water Act 316(b) Best Technology Available determinations and, if applicable, a 316(a) variance in accordance with 40 CFR part 125, or equivalent State permits and supporting documentation. If the applicant cannot provide these documents, it shall assess the impact of the proposed action on fish and shellfish resources resulting from impingement mortality and entrainment and thermal discharges.

5.4.1.3 Background [GEIS Section 4.6.1.2.4]

The GEIS refines the title of this issue from, "Thermal Impacts on Aquatic Organisms (Plants with Once-through Cooling Systems or Cooling Ponds)," to "Effects of Thermal Effluents on Aquatic Organisms (Plants with Once-through Cooling Systems or Cooling Ponds)," for clarity and consistency with other ecological resource LR GEIS issue titles. This issue pertains to acute, sublethal, and community-level effects of thermal effluents on finfish and shellfish from operation of nuclear power plants with once-through cooling systems and cooling ponds during an initial LR or SLR term. This includes plants with helper cooling towers that are seasonally operated to reduce thermal load to the receiving water body, entrainment in the during peak spawning periods, or consumptive water use during periods of low river flow.

The potential effects of thermal effluent discharges during an initial LR or SLR term depends on numerous site-specific factors, including the ecological setting of the nuclear power plant; the characteristics of the cooling system and effluent discharges; and the characteristics of the fish, shellfish, and other aquatic organisms present in the area (e.g., life history, distribution, population trends, management objectives, etc.). The NRC relies on the expertise and authority of the NPDES permitting authority with respect to thermal impacts on aquatic organisms. If the NPDES permitting authority has determined under CWA Section 316(a) that thermal effluent limits are sufficiently stringent to assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on the receiving body of water, and the nuclear power plant has implemented any associated requirements, then the NRC assumes that adverse impacts on the aquatic environment will be minimized. In cases where the NPDES

permitting authority has not granted a CWA Section 316(a) variance, the NRC analyzes the potential impacts of thermal discharges using a weight-of-evidence approach. The NRC concluded that the effects of thermal effluents on aquatic organisms during the license renewal term (initial LR or SLR) at nuclear power plants with once-through cooling or cooling ponds could be SMALL, MODERATE, or LARGE.

5.4.1.4 Analysis

The revised GEIS did not significantly change the scope of this issue to warrant site-specific analysis. However, the issue was still evaluated for new and significant information since the PSL SLR ER.

PSL submitted an NPDES Permit Renewal Application on April 16, 2021, and the current NPDES Permit No. FL0002208 is administratively continued until the renewed permit is issued. In a letter dated December 4, 2024, FDEP issued a notice to FPL of its preparation of a draft permit for the continued operation of PSL. (FDEP 2024a)

The thermal plume caused by the PSL discharges is limited by the FDEP in the facility's NPDES permit and has not changed since the PSL SLR ER or the 2016 BO. In the 2022 BO, NMFS identified that sea turtles, giant manta rays, and smalltooth sawfish may feed or swim near the mixing zone, but they may avoid the small mixing zone. The NMFS concluded that such avoidance behavior is not expected to adversely affect listed species and found that effects of the discharge systems on sea turtles, giant manta rays, and sawfish would be insignificant.

5.4.2 Conclusion

Consistent with the 2016 BO, the 2022 BO issued by the NMFS concluded that the effects of discharge systems on listed species would be insignificant. Thus, FPL concludes that the PSL SLR ER assessment of SMALL for this issue remains valid.

5.5 Federally Protected Ecological Resources – Endangered Species Act: Federally Listed Species and Critical Habitats Under U.S. Fish and Wildlife Service Jurisdiction

PSL SLR ER Section: 4.6.6

5.5.1 Supplemental Information

5.5.1.1 Findings from 10 CFR Part 51, Subpart A, Appendix B, Table B-1

The potential effects of continued nuclear power plant operation and refurbishment on federally listed species and critical habitats would depend on numerous site-specific factors, including the ecological setting; listed species and critical habitats present in the action area; and plant-specific factors related to operations, including water withdrawal, effluent discharges, and other ground-disturbing activities. Consultation with the U.S. Fish and Wildlife Service under Endangered Species Act Section 7(a)(2) would be required if license renewal may affect listed species or critical habitats under this agency's jurisdiction.

5.5.1.2 Requirement [10 CFR 51.53(c)(3)(ii)(E)]

All license renewal applicants shall assess the impact of refurbishment, continued operations, and other license-renewal-related construction activities on important plant and animal habitats. Additionally, the applicant shall assess the impact of the proposed action on federally protected ecological resources in accordance with Federal laws protecting such resources, including, but not limited to, the Endangered Species Act, the Magnuson-Stevens Fishery Conservation and Management Act, and the National Marine Sanctuaries Act.

5.5.1.3 Background [GEIS Section 4.6.1.3.1]

This issue has been separated from the 2013 LR GEIS issue, "Threatened, Endangered, and Protected Species and Essential Fish Habitat", into a distinct issue that addresses impacts specific to federally listed species and critical habitats under USFWS jurisdiction. This issue concerns the potential effects of continued nuclear power plant operation and any refurbishment during an initial LR or SLR term on federally listed species and critical habitats protected under the Endangered Species Act (ESA) and under the jurisdiction of the USFWS.

The NRC considered the potential effects of particular concern for listed terrestrial species, including habitat loss, degradation, disturbance, or fragmentation resulting from construction, refurbishment, or other site activities (including site maintenance and infrastructure repairs); noise and vibration and general human disturbance; and mortality or injury from collisions with plant structures and vehicles. The NRC considered the potential effects of particular concern for listed aquatic species, including impingement (as well as entrapment) and entrainment, thermal effects, exposure to radionuclides and other contaminants, reduction in available food resources due to impingement mortality and entrainment or thermal effects on prey species, and effects associated with maintenance dredging. Section 7 of the ESA requires that federal agencies consult with the USFWS for actions that "may affect" federally listed species and critical habitats. A plant-specific impact assessment as part of each initial LR or SLR environmental review to determine the potential effects on these resources and informal or formal consultation with the USFWS may be required.

5.5.1.4 Analysis

The revised GEIS did not significantly change the scope of this issue to warrant site-specific analysis. However, the issue was still evaluated for new and significant information since the PSL SLR ER.

Refurbishment Activities

As presented in PSL SLR ER Section 2.3, no SLR-related refurbishment activities have been identified. Therefore, there would be no license renewal-related refurbishment impacts to threatened, endangered, and protected species, or essential fish habitat (EFH), and no further analysis is required. (FPL 2021)

Operational Activities

In November 2020, the eastern black rail (*Laterallus jamaicensis ssp. jamaicensis*) was listed as a threatened species. In December 2024, the USFWS proposed to list the monarch butterfly (*Danaus plexippus*) as a proposed threatened species at the federal level in accordance with the ESA. The current known range for both species overlaps with the PSL action area. Although critical habitat has been proposed for monarch butterfly, it does not overlap with the 6-mile vicinity of PSL. (USFWS 2023a; USFWS 2023b, USFWS 2024)

Eastern black rails require dense vegetation cover that allows movement underneath the canopy. The species can be found in a variety of salt, brackish, and freshwater marsh habitats that can be tidally or non-tidally influenced. Along the Atlantic Coast in the southern United States, eastern black rail habitat includes impounded and unimpounded salt and brackish marshes. (USFWS 2023a) There are no known observations of eastern black rails at the PSL site.

Monarch butterflies require healthy and abundant milkweed plants for laying eggs on and as a food source for larvae or caterpillars. By consuming milkweed plants, monarchs obtain toxins, called cardenolides, that provide a defense against predators. Additionally, nectar from flowers is needed for adults throughout the breeding season, migration, and overwintering. For overwintering monarchs, habitat with a specific microclimate is needed for protection from the elements, as well as moderate temperatures to avoid freezing. (USFWS 2023b) Monarch butterflies have been documented as occurring within the 6-mile vicinity of PSL and may frequent the site (FPL 2021).

No SLR-related refurbishment activities have been identified. The continued operation of PSL under the proposed SLR is not likely to adversely affect the remaining ESA-listed species under USFWS jurisdiction. An analysis of marine species is provided in Section 5.6.1.4.

5.5.2 Conclusion

Although there have been some changes since the PSL SLR ER, those changes do not constitute significant information for the reasons previously set forth.

Since the PSL SLR ER, two new species under USFWS jurisdiction have been listed or proposed for listing under the ESA: the eastern black rail (ESA threatened species) and monarch butterfly (ESA proposed threatened species). Compliance with all regulatory

requirements associated with protected species will continue to be an administrative control practiced by FPL for the licensed life of the PSL facility. Adherence to these controls, as well as compliance with applicable laws and regulations, is anticipated to prevent negative impacts to the ESA-listed species and birds protected under the Migratory Bird Treaty Act. Conclusions regarding marine species are provided in Section 5.6.2.

5.6 Federally Protected Ecological Resources – Endangered Species Act: Federally Listed Species and Critical Habitats Under National Marine Fisheries Service Jurisdiction

PSL SLR ER Section: 4.6.6

5.6.1 Supplemental Information

5.6.1.1 Findings from 10 CFR Part 51, Subpart A, Appendix B, Table B-1

The potential effects of continued nuclear power plant operation and refurbishment on federally listed species and critical habitats would depend on numerous site-specific factors, including the ecological setting; listed species and critical habitats present in the action area; and plant-specific factors related to operations, including water withdrawal, effluent discharges, and other ground-disturbing activities. Consultation with the National Marine Fisheries Service under Endangered Species Act Section 7(a)(2) would be required if license renewal may affect listed species or critical habitats under this agency's jurisdiction.

5.6.1.2 Requirement [10 CFR 51.53(c)(3)(ii)(E)]

All license renewal applicants shall assess the impact of refurbishment, continued operations, and other license-renewal-related construction activities on important plant and animal habitats. Additionally, the applicant shall assess the impact of the proposed action on federally protected ecological resources in accordance with Federal laws protecting such resources, including, but not limited to, the Endangered Species Act, the Magnuson-Stevens Fishery Conservation and Management Act, and the National Marine Sanctuaries Act.

5.6.1.3 Background [GEIS Section 4.6.1.3.2]

This issue has been separated from the 2013 GEIS issue, "Threatened, Endangered, and Protected Species and Essential Fish Habitat", into a distinct issue that addresses impacts specific to federally listed species and critical habitats under NMFS jurisdiction. This issue concerns the potential effects of continued nuclear power plant operation and any refurbishment during an initial LR or SLR term on federally listed species and critical habitats protected under the ESA and under the jurisdiction of NMFS. The NRC considered the potential effects of continued nuclear power plant operation during an initial LR or SLR term depend on numerous site-specific factors, including the ecological setting of the plant; the listed species and critical habitats present in the action area; and plant-specific factors related to operations, including water withdrawal, effluent discharges, and refurbishment and other ground-disturbing activities. Section 7 of the ESA requires that federal agencies consult with the NMFS for actions that "may affect" federally listed species and critical habitats. A plant-specific impact assessment as part of each initial LR or SLR environmental review to determine the potential effects on these resources, and consultation with the NMFS, as appropriate.

5.6.1.4 Analysis

The GEIS did not significantly change the scope of this issue to warrant site-specific analysis. However, the issue was still evaluated for new and significant information since the PSL SLR ER.

In August 2022, an ESA Section 7 Consultation BO was prepared by the NMFS that considered the effects of continued operation of PSL on ESA-listed species and designated critical habitat. The 2022 BO sets new incidental take limits through 2043 for PSL. Causal injuries and mortality take limits are also described in the BO and included in the overall take number. No lethal take or causal injury is authorized for smalltooth sawfish, giant manta rays, hawksbills, or leatherbacks. The following capture take limits are for every 3 years, starting in 2022:

- 6 hawkbill sea turtles
- 24 Kemp's ridley sea turtles
- 3 leatherback sea turtles
- Up to 741 North Atlantic Distinct Population Segment (DPS) green sea turtles
- Up to 39 South Atlantic DPS green sea turtles
- 729 loggerhead sea turtles
- 3 smalltooth sawfish
- 3 giant manta rays

On February 11th, 2024, PSL exceeded its take limit by capturing more than 780 green sea turtles within a 3-year period (combined North and South Atlantic DPS). In 2023, PSL had 557 green sea turtle captures, qualifying as the second highest that the site has ever captured in a year (the highest number of green sea turtle captures was in 1995 with a total of 673). In addition to PSL's captures, the FWC also had a record year for green sea turtle nests throughout the state of Florida with a total of 77,040 nests (FWC 2024a).

On November 9, 2024, PSL exceeded its take limit by capturing more than 729 loggerhead sea turtles within a 3-year period – 145 loggerheads in 2022, 355 loggerheads in 2023, and 242 loggerheads in 2024. Like the green sea turtle, FWC documented a record year for loggerhead sea turtle nests throughout Florida with 134,913 nests. In St. Lucie County, 10,533 loggerhead sea turtle nests were recorded in 2023 compared to an average of 7,401 nests in the four previous years. (FWC 2024b)

There have been no operational changes at PSL that would affect marine species, and the green sea turtle and loggerhead sea turtle exceedances are, in part, likely due to the documented increase in nesting in St. Lucie County (FWC 2024b). The exceedances are not expected to have any measurable impact on the reproduction, numbers, or distribution of the species. Any incidentally captured animal is released locally in the ocean and no change in the distribution of green sea turtles or loggerhead sea turtles is anticipated. FPL notified the NRC and NMFS of the green sea turtle and loggerhead sea turtle exceedance events, and both species will be included in the reinitiation of ESA Section 7 Consultation with NMFS.

NMFS does not expect olive ridley sea turtles to be present at PSL because Florida is outside of the general range of the species. While one confirmed take of an olive ridley sea turtle in pelagic longline fisheries occurred in 2003, it was considered an aberration. In addition, one healthy olive ridley sea turtle was captured in 2019. The individual was fitted with a Passive Integrated Transponder (i.e., PIT tag) and released back to the wild. Despite these instances of olive ridley sea turtle captures at PSL, NMFS does not expect the species to be present in the action area.

Thus, NMFS concluded that it is extremely unlikely that any additional olive ridley sea turtles would be incidentally captured at the plant.

During the consultation process prior to the 2022 BO issuance, there was discussion on the federally threatened scalloped hammerhead shark. Only certain DPSs of the scalloped hammerhead sharks are federally listed – the Central DPS and South Atlantic DPS. Individuals from the Northwest Atlantic DPS and Gulf of Mexico DPS – both of which are not federally listed – would be the only DPS to interact with PSL. Further, there is no evidence of Northwest Atlantic DPS or Gulf of Mexico DPS individuals interacting with the federally listed DPSs. Therefore, the scalloped hammerhead shark was removed from the consultation. Although there are still references to the scalloped hammerhead shark within the 2022 BO, these are left over from the initial discussions and no longer apply.

According to the 2022 BO, NMFS concluded that the proposed action may affect, but is not likely to adversely affect, designated critical habitat for the Northwest Atlantic DPS of the loggerhead sea turtle. In addition, NMFS concluded that the proposed action is likely to adversely affect but will not jeopardize the continued existence of the green sea turtle (North Atlantic and South Atlantic DPSs), Kemp's ridley sea turtle, loggerhead sea turtle (Northwest Atlantic DPS), hawksbill sea turtle, leatherback sea turtle, giant manta ray, and smalltooth sawfish (U.S. DPS).

According to the 2022 BO, four conservation actions are recommended by the NMFS. Conservation Recommendations 1 through 3 have been reiterated from the 2016 BO, with Conservation Recommendation 4 added to the 2022 BO.

1. The NRC should promote FPL's continued efforts to determine post-capture release information on sea turtles, giant manta rays, and smalltooth sawfish released into the wild.
2. The NRC should promote the improvement of procedures for determining the actual total residency time for captured sea turtles, giant manta rays, and smalltooth sawfish in the intake canal.
3. The NRC should promote improvements to the condenser tube cleaning system that reduce the amount of sponge balls released into the Atlantic Ocean. For example, FPL should inspect the system to determine why sponge balls are released into the ocean and implement a solution to prevent the sponge balls from escaping.
4. The NRC should promote FPL to publish the results of Phase 1 and Phase 2 testing of sea turtle deterrents in the peer-reviewed literature.

In addition to the above conservation recommendations, NMFS has determined the following RPMs are necessary and appropriate to minimize the amount and the extent of the incidental take of sea turtles, giant manta rays, and smalltooth sawfish during the continued operation of the PSL:

1. Minimize Entrainment into the PSL Intake Canal.

   Entrainment and entrapment of sea turtles, giant manta rays, and smalltooth sawfish temporarily remove these animals from their natural habitats. Some of the sea turtles are also injured and/or killed from the ongoing operation of the PSL, and in the case of a

causal mortality, these animals are permanently removed from the population. To minimize the amount of take, the NRC must ensure FPL designs, tests, constructs, and implements a deterrent(s) at the three intake structures that will reduce the number of sea turtles entering the PSL intake canal. The deterrent(s) selected by FPL must not adversely affect any ESA-listed species under NMFS's purview.

2. Minimize Injurious and Lethal Take from Entrainment into, Entrapment in, Capture in, and Release from the PSL Intake Canal or from Impingement at Intake Wells.
   a. The NRC must ensure FPL monitors the number of sea turtles, giant manta rays, and smalltooth sawfish entering the intake canal and documents the injuries that are attributed to biofouling and marine debris during the animal's travel through the intake pipes or attributed to net entanglements in the intake canal.
   b. The NRC must ensure FPL inspects and maintains the integrity of the 5-inch and 8-inch mesh barrier nets in the intake canal.
   c. The NRC must ensure FPL continues the existing monitoring and capture program for sea turtles and smalltooth sawfish entrapped in the intake canal. Giant manta rays must be included in FPL's ongoing monitoring and capture program.
   d. The NRC must ensure FPL coordinates determination of the cause of injury or death of sea turtles with the FFWCC and/or the Sea Turtle Standing and Salvage Network.
   e. The NRC must ensure FPL has experienced marine biologists working in the monitoring and capture program.

5.6.2 Conclusion

Compliance with the terms and conditions and reasonable and prudent measures identified in the 2022 BO provides reasonable assurance that the continued operation of PSL under the proposed SLR is not anticipated to jeopardize the continued existence of the marine species and is not likely to adversely modify the designated critical habitat for the loggerhead sea turtle. While PSL exceeded its take limit for green sea turtles and loggerhead sea turtles, that exceedances will not jeopardize the continued existence of either species for the reasons set forth above.

5.7 Federally Protected Ecological Resources – Magnuson-Stevens Act: Essential Fish Habitat

PSL SLR ER Section: 4.6.6

5.7.1 Supplemental Information

5.7.1.1 Findings from 10 CFR Part 51, Subpart A, Appendix B, Table B-1

The potential effects of continued nuclear power plant operation and refurbishment on essential fish habitat would depend on numerous site-specific factors, including the ecological setting; essential fish habitat present in the area, including habitats of particular concern; and plant-specific factors related to operations, including water withdrawal, effluent discharges, and other activities that may affect aquatic habitats. Consultation with the National Marine Fisheries Service under Magnuson-Stevens Act Section 305(b) would be required if license renewal could result in adverse effects to essential fish habitat.

5.7.1.2 Requirement [10 CFR 51.53I(c)(3)(ii)(E)]

All license renewal applicants shall assess the impact of refurbishment, continued operations, and other license-renewal-related construction activities on important plant and animal habitats. Additionally, the applicant shall assess the impact of the proposed action on federally protected ecological resources in accordance with Federal laws protecting such resources, including, but not limited to, the Endangered Species Act, the Magnuson-Stevens Fishery Conservation and Management Act, and the National Marine Sanctuaries Act.

5.7.1.3 Background [GEIS Section 4.6.1.3.3]

This issue has been separated from the 2013 LR GEIS issue, "Threatened, Endangered, and Protected Species and Essential Fish Habitat," into a distinct issue that addresses impacts specific to EFH. This issue concerns the potential effects of continued nuclear power plant operation and any refurbishment during an initial LR or SLR term on EFH protected under the Magnuson-Stevens Fishery Conservation and Management Act (MSA).

EFH is assessed in terms of impacts on the habitat of each EFH species, life stage, and their prey and each habitat area of particular concern. Importantly, EFH effect determinations characterize the effects on the habitat of the EFH species and their life stages. They do not characterize the effects on the species, or the life stages themselves. Similarly, effect determinations for EFH prey characterize the effects on the prey as a food resource rather than the effects on the prey species themselves. The NRC considered the potential effects of particular concern for EFH, including physical removal of habitat through cooling water withdrawals, physical alteration of habitat through heated effluent discharges, chemical alteration of habitat through radionuclides and other contaminants in heated effluent discharges, physical removal of habitat through maintenance dredging, and reduction in the prey base of the habitat. The NRC may be required to consult with NMFS under MSA Section 305(b). The NMFS has developed EFH conservation recommendations in connection with four initial LR and SLR environmental reviews conducted since the publication of the 2013 LR GEIS. A plant-specific impact assessment as part of each initial LR or SLR environmental review to determine the potential effects on these resources, and consultation with NMFS, as appropriate.

5.7.1.4 Analysis

The GEIS did not significantly change the scope of this issue to warrant site-specific analysis. However, the issue was still evaluated for new and significant information since the PSL SLR ER.

EFH for 22 species exists within the 6-mile radius, including 16 highly migratory species. The species and their associated EFHs are described in Section 3.7.8.6 of the PSL SLR ER (FPL 2021). The species and EFHs around the site have not changed since the PSL SLR ER.

As discussed in Sections 3.7.3 and 3.7.7 of the PSL SLR ER, studies have been conducted to evaluate the effects of the operation of PSL on aquatic habitat. Furthermore, PSL maintains an environmental control program to provide reasonable assurance that all site activities comply with applicable environmental regulations (i.e., water withdrawal increase, NPDES discharge point, thermal effluents, wastewater discharge increase, air emissions increase). (FPL 2021) Thus, the operation of PSL under the proposed SLR is expected to have minimal adverse effects on EFH, EFH species, and habitat areas of particular concern.

5.7.2 Conclusion

There has been no new and significant information regarding impacts to MSA EFH since the 2021 PSL SLR ER. Thus, the conclusion made in the PSL SLR ER that the continued operation of PSL during the period of extended operation is anticipated to have no adverse impact on EFH remains valid.

5.8 Federally Protected Ecological Resources – National Marine Sanctuaries Act: Sanctuary Resources

PSL SLR ER Section: New

5.8.1 Supplemental Information

5.8.1.1 Findings from 10 CFR Part 51, Subpart A, Appendix B, Table B-1

The potential effects of continued nuclear power plant operation and refurbishment on sanctuary resources would depend on numerous site-specific factors, including the ecological setting; national marine sanctuaries present in the area, and plant-specific factors related to operations, including water withdrawal, effluent discharges, and other activities that may affect aquatic habitats. Consultation with the Office of National Marine Sanctuaries under National Marine Sanctuaries Act Section 304(d) would be required if license renewal could destroy, cause the loss of, or injure sanctuary resources.

5.8.1.2 Requirement [10 CFR 51.53(c)(3)(ii)(E)]

All license renewal applicants shall assess the impact of refurbishment, continued operations, and other license-renewal-related construction activities on important plant and animal habitats. Additionally, the applicant shall assess the impact of the proposed action on federally protected ecological resources in accordance with Federal laws protecting such resources, including, but not limited to, the Endangered Species Act, the Magnuson-Stevens Fishery Conservation and Management Act, and the National Marine Sanctuaries Act.

5.8.1.3 Background [GEIS Section 4.6.1.3.4]

This issue concerns the potential effects of continued nuclear power plant operation and any refurbishment during an initial LR or SLR term on sanctuary resources protected under the National Marine Sanctuaries Act. Impacts on marine sanctuaries are broad ranging because such resources include any living or nonliving resource of a national marine sanctuary.

With respect to ecological sanctuary resources, the NRC considered the potential effects of particular concern, including impingement (as well as entrapment) and entrainment, thermal effects, exposure to radionuclides and other contaminants, reduction in available food resources due to impingement mortality and entrainment or thermal effects on prey species, and effects associated with maintenance dredging. Depending on the NRC's effect determinations, the NRC may be required to consult with Office of National Marine Sanctuaries under National Marine Sanctuaries Act Section 304(d). National marine sanctuary status is not static. The geographic extent of existing sanctuaries may change or expand in the future, and NOAA is likely to designate new sanctuaries as additional areas of conservation need are identified and assessed. Therefore, a generic determination of potential impacts on sanctuary resources during a nuclear power plant's license renewal term is not possible. A plant-specific impact assessment as part of each initial LR or SLR environmental review to determine the potential effects on these resources and consult with the NMFS may be required.

5.8.1.4 Analysis

No national marine sanctuaries are located within the 6-mile radius of the PSL site. The nearest national marine sanctuaries are the Florida Keys National Marine Sanctuary, located over 120 miles to the south, and the Gray's Reef National Marine Sanctuary, located over 270 miles north off the coast of Georgia. (NOAA 2024)

5.8.2 Conclusion

No national marine sanctuaries are located within the affected area of PSL. As such, this issue is not applicable to the continued operation of the PSL site for the proposed operating term. PSL finds that there would be no effect to sanctuary resources during the proposed SLR term.

5.9 Historic and Cultural Resources

PSL SLR ER Section 4.7

5.9.1 Supplemental Information

5.9.1.1 Findings from 10 CFR Part 51, Subpart A, Appendix B, Table B-1

Impacts from continued operations and refurbishment on historic and cultural resources located onsite and in the transmission line ROW are analyzed on a plant-specific basis. The NRC will perform a National Historic Preservation Act (NHPA) Section 106 review, in accordance with 36 CFR Part 800 which consultation with the State and Tribal Historic Preservation Officers, Indian Tribes, and other interested parties.

5.9.1.2 Requirement [10 CFR 51.53(c)(3)(ii)(K)]

All applicants shall identify any potentially affected historic and cultural resources and historic properties and assess whether future plant operations and any planned refurbishment activities would affect these resources in accordance with Section 106 of the National Historic Preservation Act and in the context of the National Environmental Policy Act.

5.9.1.3 Background [GEIS Section 4.7]

For the issue of historic and cultural resources, the NRC evaluated the impact of continued operations and refurbishment activities during the license renewal term on historic and cultural resources located onsite and in transmission line ROWs. This issue was addressed in the 2013 LR GEIS (NRC 2013), and it is a Category 2 issue. The issue has been updated to include discussion of impacts on cultural resources that are not eligible for or listed in the National Register of Historic Places that would also need to be considered during license renewal reviews. The NRC will identify historic and cultural resources within a defined area of potential effect (APE). The LR APE is the area that may be impacted by land-disturbing or other operational activities associated with continued plant operations and maintenance during the renewal term and/or refurbishment. The APE typically encompasses the nuclear power plant site, its immediate environs, including viewshed, and the transmission lines within this scope of review. The APE may extend beyond the nuclear plant site and transmission lines when these activities may affect historic and cultural resources.

Continued operations during the renewal term and refurbishment activities at a nuclear power plant can affect historic and cultural resources through (1) ground-disturbing activities associated with plant operations and ongoing maintenance (e.g., construction of new parking lots or buildings), landscaping, agricultural or other use of plant property; (2) activities associated with transmission line maintenance (e.g., maintenance of access roads or removal of danger trees); and (3) changes to the appearance of nuclear power plants and transmission lines. License renewal environmental reviews have shown that the appearance of nuclear power plants and transmission lines has not changed significantly over time; therefore, additional viewshed impacts to historic and cultural resources are not anticipated.

The NHPA requires the NRC to conduct a plant-specific assessment to determine whether historic properties are present in the APE, and if so, whether the license renewal (initial LR or SLR) would result in any adverse effect upon such properties. There are three potential determinations (see 36 CFR 800.4) for plant-specific license renewal, which include: no historic properties present, the undertaking will have no effect to historic properties; historic properties present, the undertaking will have no adverse effect upon them; historic properties present, the undertaking will have an adverse effect upon one or more historic properties (see 36 CFR 800.5).

A historic property under the NHPA that does not meet the criteria, the NRC will assess whether any potential significant impacts on this resource through the NEPA process.

The NRC reviewed information from supplemental environmental impact statements completed since development of the 2013 LR GEIS and concluded that potential impacts from continued operations and refurbishment activities on historic and cultural resources during the initial LR and SLR terms are unique to each nuclear power plant site.

5.9.1.4 Analysis

There have not been any revisions to the FPL procedures or the cultural resource management plan since the PSL SLR ER. Additionally, there have been no reported construction activities involving initial ground-disturbing activities or inadvertent discoveries of any pre-contact or historic period artifacts or features since the PSL SLR ER.

There has been no correspondence with the Florida state historic preservation office, the Seminole Tribe tribal historic preservation office, other Indian Tribes or interested parties regarding historic properties or sites of religious or cultural significance to any Tribes with regard to PSL since the PSL SLR ER.

A review of the Florida Master Site File GIS data, current as of September 2023 and conducted in January 2024, found that there have been no new cultural resource studies, or archaeological or historic sites recorded within the 1,132-acre PSL site since the PSL SLR ER was submitted.

As presented in Section 2.3 of the PSL SLR ER, no SLR-related refurbishment activities have been identified; therefore, there would be no SLR-related refurbishment impacts to historic cultural resources. In addition, no SLR-related construction activities or changes in operational practices have been identified that would involve ground disturbance.

5.9.2 Conclusion

Based on the discussion above, FPL concludes that there will be no adverse effects to historic or cultural resources during the term of SLR. PSL has a cultural resource management plan in place to protect historic and cultural resources, any impacts would be SMALL, and the conclusions in the PSL SLR ER remain valid.

5.10 Human Health – Microbiological Hazards to the Public

PSL SLR ER Section 4.9.1

5.10.1 Supplemental Information

5.10.1.1 Findings from 10 CFR Part 51, Subpart A, Appendix B, Table B-1

SMALL, MODERATE, or LARGE. These microorganisms are not expected to be a problem at most operating plants except possibly at plants using cooling ponds, lakes, or canals, or that discharge to waters of the United States accessible to the public. Impacts would depend on site-specific characteristics.

5.10.1.2 Requirement [10 CFR 51.53(c)(3)(ii)(G)]

If the applicant's plant uses a cooling pond, lake, or canal or discharges into waters of the United States accessible to the public, an assessment of the impact of the proposed action on public health from thermophilic organisms in the affected water must be provided.

5.10.1.3 Background [GEIS Section 4.9.1.1.3]

This renamed issue is an expansion of the issue, "Microbiological Hazards to the Public (Plants with Cooling Ponds or Canals or Cooling Towers that Discharge to a River)," in the 2013 LR GEIS, because this issue is a concern wherever receiving waters are accessible to the public. Specifically, members of the public could be exposed to microorganisms in thermal effluents at nuclear power plants that use cooling ponds, lakes, canals, or that discharge to publicly accessible surface waters. Microbiological hazards concern disease-causing microorganisms, also known as etiological agents. Etiological agents associated with nuclear power stations include more than just thermophilic microorganisms and may be present in elevated numbers in unheated and heated water systems, as well as in cooling systems, receiving and source waterbodies, and site sewage treatment facilities. Microbiological organisms of concern for public and occupational health include enteric pathogens (bacteria that typically exist in the intestines of animals and humans e.g., *Pseudomonas aeruginosa*), thermophilic fungi, bacteria (e.g., *Legionella* spp. and *Vibrio* spp.), free-living amoebae (e.g., *Naegleria fowleri* and *Acanthamoeba* spp.), and organisms that produce toxins that affect human health (e.g., dinoflagellates *[Karenia brevis*] and blue-green algae). Some of these disease-causing organisms have been associated with the operation of nuclear power plant cooling systems. Members of the public could be exposed to microorganisms in thermal effluents at nuclear plants that use cooling ponds, lakes, or canals that discharge to waters of the United States accessible to the public.

Changes in microbial populations and in the public use of water bodies might occur after the operating license is issued and the application for license renewal is filed. Other factors could also change, including the average temperature of the water, which could result from climate change that affected water levels and air temperature. Finally, the long-term presence of a power plant might change the natural dynamics of harmful microorganisms within a body of water.

5.10.1.4 Analysis

The revised GEIS expanded the scope of this issue from plants with discharges to a river to plants that discharge to any water of the United States that is accessible to the public. Also, NRC expanded the microorganisms of concern to include toxins that affect human health (e.g., dinoflagellates [*Karenia brevis*] and blue-green algae), which are microorganisms that involve harmful algal blooms (NRC 2024a).

PSL's cooling water system remains as described in PSL SLR ER Section 2.2.3.1. Permit limits for PSL's discharge remain in effect as presented in the PSL SLR ER. Effluent temperatures are regulated under PSL's industrial wastewater facility permit (No. FL0002208), which specifies that the daily maximum effluent temperature limit is 115 degrees Fahrenheit (°F) during normal operation and the difference between the intake and discharge temperatures is a maximum of 30°F (FDEP 2020). There have been no thermal limit exceedances since submittal of the PSL SLR ER.

A search of the FDH's food and waterborne disease outbreak data, which is updated through 2021, was conducted and no outbreaks were reported for St. Lucie County for 2020–2021 (FDH 2023a). The FDH stated that of Florida's 38 cases of primary amebic meningoencephalitis (1962–2020), none have been documented as due to exposures in St. Lucie County (FDH 2023b).

The FDEP's algal bloom sampling status database was reviewed, and the presence of algal blooms has not been reported the vicinity of PSL discharge (FDEP 2024b). Also, FPL is not aware of any algal or bacteria blooms in the Atlantic Ocean in the vicinity of the PSL discharge occurring since 2021.

5.10.2 Conclusion

FPL did not identify any new and significant information for microbiological hazards, and therefore concludes that the PSL SLR ER assessment of SMALL remains valid for the PSL SLR.

5.11 Human Health – Electric Shock Hazards

PSL SLR ER Section 4.9.2

5.11.1 Supplemental Information

5.11.1.1 Findings from 10 CFR Part 51, Subpart A, Appendix B, Table B-1

SMALL, MODERATE, or LARGE. Electrical shock potential is of small significance for transmission lines that are operated in adherence with the National Electrical Safety Code (NESC). Without a review of conformance with NESC criteria of each nuclear power plant's in-scope transmission lines, it is not possible to determine the significance of the electrical shock potential.

5.11.1.2 Requirement [10 CFR 51.53(c)(3)(ii)(H)]

If the applicant's transmission lines that were constructed for the specific purpose of connecting the plant to the transmission system do not meet the recommendations of the National Electrical Safety Code for preventing electric shock from induced currents, an assessment of the impact of the proposed action on the potential shock hazard from the transmission lines must be provided.

5.11.1.3 Background [GEIS Section 4.9.1.1.5]

The shock hazard issue is evaluated by referring to the NESC. Primary shock currents are produced mainly through direct contact with conductors and have effects ranging from a mild tingling sensation to death by electrocution. Tower designs preclude direct public access to the conductors. Secondary shock currents are produced when humans make contact with capacitively-charged bodies, such as a vehicle parked near a transmission line, or magnetically linked metallic structures, such as fences near transmission lines. A person who contacts such an object could receive a shock and experience a painful sensation at the point of contact. The intensity of the shock depends on the electromagnetic field strength, the size of the object, and how well the object and the person are insulated from ground. Design criteria for nuclear power plants that limit hazards from steady-state currents are based on the NESC, which requires that utility companies design transmission lines so that the short-circuit current to ground produced from the largest anticipated vehicle or object is limited to less than 5 milliamperes.

With respect to shock safety issues and license renewal, three points must be made. First, in the licensing process for the earlier licensed nuclear plants, the issue of electrical shock safety was not addressed. Second, some plants that received operating licenses with a stated transmission line voltage may have chosen to upgrade the line voltage for reasons of efficiency, possibly without reanalysis of induction effects. Third, since the initial National Environmental Policy Act review for those utilities that evaluated potential shock situations under the provision of the NESC, land use may have changed, resulting in the need for a reevaluation of this issue. The electrical shock issue, which is generic to all types of electrical generating stations, including nuclear plants, is of SMALL significance for transmission lines that are operated in adherence with the NESC. Without a review of the conformance of each nuclear plant's transmission lines, within this scope of review with NESC criteria, it is not possible to determine the significance of the electrical shock potential generically.

5.11.1.4 Analysis

In-scope transmissions lines at PSL include one overhead 230-kV line connecting Units 1 and 2 to the regional electric power grid, and one overhead 230-kV line. These provide power from the grid to feed the plant during outages, as discussed in PSL SLR ER Section 2.2.5.1. All in-scope transmission lines are located completely within the PSL site boundary, as shown in Figure 2.2-4 of the PSL SLR ER. No modifications to the in-scope transmission lines have been made since the submittal of the PSL SLR ER. All in-scope transmission lines at PSL meet or exceed the applicable NESC standards. To maintain this status, FPL monitors and reviews all changes to existing NESC design standards to determine if these changes would be applicable to PSL.

FPL maintains electrical safety procedures, including procedure for working on or near exposed energized parts, procedure for proper personal protective equipment and tool selection, and grounding for the protection of employees.

5.11.2 Conclusion

FPL did not identify any new and significant information for electrical shock hazards, and therefore concludes the PSL SLR ER assessment of SMALL remains valid for the PSL SLR.

5.12 Environmental Justice – Impacts on Minority Populations, Low-Income Populations, and Indian Tribes

PSL SLR ER Section 4.10.1

5.12.1 Supplemental Information

5.12.1.1 Findings from 10 CFR Part 51, Subpart A, Appendix B, Table B-1

Impacts on minority, low-income populations, Indian Tribes, and subsistence consumption resulting from continued operations and refurbishment associated with license renewal will be addressed in nuclear plant-specific reviews.

5.12.1.2 Requirement [10 CFR 51.53(c)(3)(ii)(N)]

Applicants shall provide information on the general demographic composition of minority and low-income populations and communities (by race and ethnicity) and Indian tribes in the vicinity of the nuclear power plant that could be disproportionately affected by license renewal, including continued reactor operations and refurbishment activities.

5.12.1.3 Background [GEIS Section 4.10]

Disproportionately high and adverse environmental effects occur when an impact on the natural or physical environment significantly and adversely affects a minority population, low-income population, or Indian Tribe, and exceeds those on the general population or other comparison group. Such effects may include ecological, cultural, socioeconomic, or social impacts. These environmental effects are discussed in this chapter for each of these and other resource areas.

The environmental justice impact analysis: (1) identifies minority populations, low-income populations, and Indian Tribes that could be affected by continued reactor operations during the license renewal term and refurbishment activities at a nuclear power plant, (2) determines whether there would be any human health or environmental effects on these populations, and (3) determines whether these effects may be disproportionately high and adverse. Minority and low-income populations, Indian Tribes, and environmental justice issues are different at each nuclear power plant site.

Continued reactor operations during the license renewal term and refurbishment activities at a nuclear power plant could affect land, air, water, and ecological resources, which could result in human health or environmental effects. Consequently, minority and low-income populations and Indian Tribes could be disproportionately affected. The environmental justice impact analysis must therefore determine whether continued reactor operations during the license renewal term and refurbishment activities at a nuclear power plant would result in disproportionately high and adverse human health or environmental effects on a minority population, low-income population, or Indian Tribe. In assessing the human health effects of license renewal, examine radiological risk from consumption of fish, wildlife, and local produce; exposure to radioactive material in water, soils, and vegetation; and the inhalation of airborne radioactive material during nuclear power plant operation.

5.12.1.4 Analysis

The PSL SLR ER utilized the 2010 decennial census, 2019 American Community Survey estimates and TIGER/line data from the U.S. Census Bureau (USCB) to characterize the demographics for communities and counties within the 6-mile vicinity and 50-mile region. The most recent decennial census data (2020) and the 2022 population estimates were used to identify changes since the PSL SLR ER. Upon review, there were no more recent updates of the Florida state population projection information since the PSL SLR ER; therefore, no updated population projections are included (FDEC 2021). Similarly, there have been no updates since the 2017 U.S. Census of Agriculture; therefore, updated information for migrant workers is not available.

The 2000, 2010, and 2019 population for cities, villages, towns, and some census designated places with centers located within a 50-mile radius of PSL were provided in PSL SLR ER Table 3.11-1. Table 5.13-1, below, provides 2020 census counts and 2022 population estimates for these communities.

There are portions of two cities located within the 6-mile vicinity of PSL: Port St. Lucie and Fort Pierce. As noted in the PSL SLR ER, Port St. Lucie had experienced a population increase between 2010 and 2019. According to the 2020 Census, this trend continued as the city's population increased approximately 11.1 percent from 2019 to 204,851 persons in 2020. The 2022 population estimate for the Port St. Lucie is 210,520 persons. Similarly, the PSL SLR ER noted that the population of the Fort Pierce also had an increasing population trend from 2010 and 2019, which continued through 2020, resulting in a 2020 population of 47,297 persons. The 2022 population estimate for the city shows a small decrease to 47,153 persons. (FPL 2021; USCB 2020a; USCB 2022a)

As noted in the PSL SLR ER, the site is located in St. Lucie County, Florida. The largest city in St. Lucie County is Port St. Lucie. The USCB data also indicate that there is no change from the PSL SLR ER in the number of cities within a 50-mile radius with populations greater than 25,000 and 100,000. (FPL 2021; USCB 2020a; USCB 2022a)

There are a total of nine counties wholly or partially within a 50-mile radius of the site. Consistent with the PSL SLR ER, Table 5.13-2, below, shows that the two counties with the highest population within the PSL region are Palm Beach County (2019 population of 1,496,770) and Brevard County (2019 population of 601,942), Florida. Between 2019 and 2022, Palm Beach County experienced a decrease in population of approximately 0.13 percent, whereas Brevard County reported an increase in population of approximately 1.4 percent. (FPL 2021; USCB 2020b; USCB 2022b)

To evaluate changes in minority populations since the PSL SLR ER, Table 5.13-3 provides a summary of the Florida minority populations by census categories. As described in the PSL SLR ER, the largest minority groups in the state were Hispanic or Latino and Black or African American categories, which, according to the 2022 USCB data, continue to be the largest categories, at 26.52 percent and 15.5 percent, respectively. As noted in Table 5.13-3, the demographic makeup of the state has not changed significantly since 2019, with the largest changes identified in the Aggregate of all Minority Races category, whose percent of the total state population increased 11.3 percent. The next highest increase, at 9.9 percent and 1.9 percent, respectively, is in the Two or More Races and Aggregate and Hispanic categories.

Between 2019 and 2022 timeframe, the remaining minority census categories reported minor changes of less than 2 percent. (FPL 2021; USCB 2020c; USCB 2022c)

NRC guidance defines "low-income" by using USCB statistical poverty thresholds (NRC 2020). Poverty status for households and individuals within Florida was derived from the American Community Survey 5-Year estimates and decennial data for the years 2019, 2020 and 2022. Table 5.13-4 provides a summary of low-income individuals and families (e.g., households) for the state of Florida. As shown in the table, the percent of population for both the low-income individual and family categories decreased slightly between 2019 and 2022, at -1.1 percent and -0.6 percent, respectively. (FPL 2021; USCB 2020d; USCB 2022c)

Desktop-level reviews for articles or reports of subsistence populations in the site vicinity were conducted; however, no publicly available studies were identified. PSL staff were interviewed who live and work in the PSL region to identify updates; however, no subsistence activities were identified.

5.12.2 Conclusion

As demonstrated above, the demographic makeup of Florida has not changed significantly since 2019. Additionally, there are no SLR-related refurbishment activities identified, nor are there changes to the operational activities described in the PSL SLR ER. Therefore, no new and significant information was identified that would result in a change to the anticipated impact of no disproportionately high and adverse impacts or effects on members of the public, including minority, low-income, Indian tribes, or subsistence populations, as a result of SLR.

Table 5.12-1 Cities or Towns Located Totally or Partially within a 50-Mile Radius of PSL (Sheet 1 of 2)

City/Town/Village/ Census Designated Places	County	2020 Census Population	2022 Census Population Estimates
Belle Glade	Palm Beach	16,698	16,896
Cloud Lake	Palm Beach	134	219
Fellsmere	Indian River	4,834	4,885
Fort Pierce	Saint Lucie	47,297	47,153
Glen Ridge	Palm Beach	217	219
Grant-Valkaria	Brevard	4,509	4,520
Greenacres	Palm Beach	43,990	43,651
Haverhill	Palm Beach	2,187	2,859
Hobe Sound	Martin	13,163	14,188
Indian River Shores	Indian River	4,241	4,266
Indiantown	Martin	6,560	6,624
Jensen Beach	Martin	12,652	12,581
Juno Beach	Palm Beach	3,858	3,818
Jupiter	Palm Beach	61,047	60,926
Jupiter Inlet Colony	Palm Beach	405	461
Jupiter Island	Martin	804	866
Lake Clarke Shores	Palm Beach	3,564	3,553
Lake Park	Palm Beach	9,047	8,996
Lake Worth	Palm Beach	42,219	42,188
Loxahatchee Groves	Palm Beach	3,355	3,384
Malabar	Brevard	2,949	2,982
Mangonia Park	Palm Beach	2,142	1,950
North Palm Beach	Palm Beach	13,162	13,092
Ocean Breeze	Martin	301	285
Okeechobee	Okeechobee	5,254	5,319
Orchid	Indian River	516	537
Pahokee	Palm Beach	5,524	5,548
Palm Bay	Brevard	119,760	121,513

Table 5.12-1 Cities or Towns Located Totally or Partially within a 50-Mile Radius of PSL (Sheet 2 of 2)

City/Town/Village/ Census Designated Places	County	2020 Census Population	2022 Census Population Estimates
Palm Beach	Palm Beach	9,245	9,205
Palm Beach Gardens	Palm Beach	59,182	59,088
Palm Beach Shores	Palm Beach	1,330	1,217
Palm City	Martin	25,883	25,957
Palm Springs	Palm Beach	26,890	26,962
Port St. Lucie	Saint Lucie	204,851	210,520
Riviera Beach	Palm Beach	37,604	37,668
Royal Palm Beach	Palm Beach	38,932	38,874
Sebastian	Indian River	25,054	25,266
Sewall's Point	Martin	1,991	1,922
St. Lucie Village	Saint Lucie	613	838
Stuart	Martin	17,425	17,639
Tequesta	Palm Beach	6,158	6,116
The Acreage	Palm Beach	41,654	40,160
Vero Beach	Indian River	16,354	16,531
Wellington	Palm Beach	61,637	61,373
West Palm Beach	Palm Beach	117,415	117,588
Westlake	Palm Beach	906	1,855

(USCB 2020a; USCB 2022a)

Table 5.12-2 County Populations Totally or Partially within a 50-Mile Radius of PSL

State, County, and Independent City	2020 Population Estimate	2022 Population Estimate
Florida (9 Counties)	**3,287,909**	**3,308,728**
Brevard	606,612	610,723
Glades	12,126	12,179
Highlands	101,235	102,339
Indian River	159,788	160,986
Martin	158,431	159,399
Okeechobee	39,644	39,870
Osceola	388,656	393,745
Palm Beach	1,492,191	1,494,805
St. Lucie	329,226	334,682

(USCB 2020b; USCB 2022b)

Table 5.12-3 Minority Population

Census Categories	2019 Population		2020 Population		2022 Population		2019-2022 Change in Percent of Population
	20,598,139		21,538,216		22,245,521		
	Number	Percent	Number	Percent	Number	Percent	
Black or African American	3,359,031	16.1	3,246,381	15.1	3,355,708	15.5	-0.6
American Indian or Alaska Native	59,320	0.3	94,795	0.4	59,197	0.3	0.0
Asian	571,276	2.7	643,682	3.0	609,990	2.8	0.1
Native Hawaiian/Other Pacific Islander	12,653	0.1	14,014	0.1	13,200	0.1	0.0
Some Other Race	625,079	3.0	1,564,282	7.3	1,045,557	4.8	1.8
Two or More Races	572,021	2.7	3,552,072	16.5	2,743,467	12.7	9.9
Aggregate of All Races	5,199,380	24.9	9,115,226	42.3	7,827,119	36.2	11.3
Hispanic or Latino	5,346,684	25.6	5,697,240	26.5	5,738,283	26.5	0.9
Aggregate and Hispanic	9,635,289	46.1	10,437,684	48.5	10,392,014	48.0	1.9

(FPL 2021; USCB 2020c; USCB 2022c)

Table 5.12-4 Low-Income Population

	2019 Population		2020 Population		2022 Population		2019–2022 Change in Percent of Population
Low-Income Individuals	20,481,252		20,793,628		21,171,700		
Low-Income Household	7,736,311		7,931,313		8,353,441		
Census Category	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**	
Low Income - Number of - Persons Below Poverty Level (Individuals)	2,870,487	14.0	2,772,939	13.3	2,725,633	12.9	-1.1
Low Income - Number of Families Below Poverty Level (Households)	1,029,407	13.3	1,020,420	12.9	1,057,327	12.7	-0.6

(FPL 2021; USCB 2020d; USCB 2022c)

5.13 Climate Change – Climate Change Impacts on Environmental Resources

PSL SLR ER Section: New

5.13.1 Supplemental Information

5.13.1.1 Findings from 10 CFR Part 51, Subpart A, Appendix B, Table B-1

Climate change can have additive effects on environmental resource conditions that may also be directly impacted by continued operations and refurbishment during the license renewal term. The effects of climate change can vary regionally, and climate change information at the regional and local scale is necessary to assess trends and the impacts on the human environment for a specific location. The impacts of climate change on environmental resources during the license renewal term are location-specific and cannot be evaluated generically.

5.13.1.2 Requirement [10 CFR 51.53(c)(3)(ii)(Q)]

Applicants shall include an assessment of the effects of any observed and projected changes in climate on environmental resource areas that are affected by license renewal, as well as any mitigation measures implemented at the applicant's plant to address climate change impacts.

5.13.1.3 Background [GEIS Section 4.12]

Climate change is an environmental trend (i.e., change in climate indicators such as precipitation over time) that is irrespective of license renewal. Climate change could result in changes to the affected environmental resource baseline conditions. Future global greenhouse gas (GHG) emission concentrations (emission scenarios) and climate models are commonly used to project possible climate change. The Intergovernmental Panel on Climate Change and U.S. Global Change Research Program (USGCRP) indicate that over the longer term, the magnitude of temperature increases, and climate change-related effects will depend on future global GHG emissions.

Climate parameters used as indications of climate change include temperature, precipitation, floods, storm frequency, and sea level rise. Trending of these climate parameters varies regionally, and climate change information at the regional and local scale is necessary for assessing climate change impacts for license renewal. Climate change may impact the baseline environmental conditions (e.g., surface water temperature and levels) that are impacted by the proposed action (license renewal). For there to be a climate change impact on an environmental resource, the proposed action (license renewal) must have an incremental new, additive, or increased physical effect or impact on the resource or environmental condition beyond what is already occurring. The goal of the impacts of climate change on environmental resources analysis is to identify potentially significant impacts.

5.13.2 Analysis – Climate Change

Climatic changes are occurring on a timescale of decades, rather than over millions of years as with prehistoric climates. Observed changes include increased surface water temperatures, decreased glacial ice, increased sea levels, and increased numbers of extreme weather events. Observed changes in climate and associated impacts have not been uniform across the United

States. Globally, between 1901-2016, the average temperature increased by 1.8°F and precipitation increased by an average of 0.1 inch per decade. (NRC 2024a)

5.13.2.1 National Trends in Climate Change

The USGCRP issued the Fourth National Climate Assessment, which contains climate model simulations of future conditions which project an increase in temperature and extreme precipitation. Climate models project climate change effects through the mid-21st and late 21st century using representative concentrations pathways (RCPs). The RCP8.5 scenario, which is a "higher" scenario associated with more warming, most closely tracks with current U.S. consumption of fossil fuels (USGCRP 2018). Climate model simulations of future conditions project an increase in temperature and extreme precipitation for both the RCP4.5, which is a "lower" scenario with less warming, and the RCP8.5 scenarios.

The fifth National Climate Assessment illustrates that present temperatures are 1 to 1.5°F warmer than temperatures from 1900 to 1950. The projected changes in temperature are not presented temporally but rather as global warming scenarios. A global warming scenario presents spatial information based on a global warming level (GWL), which is the global average temperature change in degrees Celsius (°C) relative to preindustrial temperatures. Global temperature projections are presented as the year in which the 20-year global average temperature exceeds that of the preindustrial period by 2°C (3.6°F) or more. The Fifth National Climate Assessment uses Shared Socioeconomic Pathways (SSPs) instead of RCPs. The SSP scenarios are presented as SSP1-1.9 through SSP5-8.5 where the 1–1.9 and 5–8.5 pertain to a range of modeling inputs based on population growth and emission rates. Lower SSP values represent lower population growth and lower emission rates. (EPA 2017) Using the highest scenario (SSP5-8.5), the projected year in which the 20-year global average temperature exceeds 2°C (3.6°F) is 2042 (USGCRP 2023).

All projection information in the fifth National Climate Assessment uses the preindustrial period of 1850–1899 and the period of the first half of the last century (1900–1950) as a baseline for comparison, while the fourth National Climate Change Assessment compares to the present day. (USGCRP 2018; USGCRP 2023)

5.13.2.2 Regional (Southeast) Trends in Climate Change

By 2050, temperatures in the Southeast are expected to increase by 1 to 2°F from the present-day values using the RCP4.5 scenario and by 2 to 3°F using the RCP8.5 scenario (USGCRP 2018). In Florida, the temperature is projected, under the assumptions of the GWL 2°C scenario, to increase 3 to 4°F (USGCRP 2023). Since 1895, Florida's average temperature has increased by approximately 1.6°F. The number of hot days with nighttime minimums over 75°F have increased since the 1970s and extreme heat days (over 95°F) are projected to increase. (USGCRP 2018; FSU 2023) By 2050, Florida is expected to see an increase of more than 50 days with temperatures over 95°F (NOAA 2022).

Extreme rainfall events in the Southeast have increased in frequency, and the numbers are expected to continue to climb. The Southeast has experienced increases in the number of days with more than 3 inches of precipitation. These increases are expected to continue with a 16 percent increase in observed 5-year maximum daily precipitation under both the RCP4.5 and RCP8.5 scenarios. Under the higher scenario (RCP8.5), projections suggest that double the

number of extreme rainfall events will occur. (USGCRP 2018) Precipitation annual averages in Florida have remained the same over the past century; however, extreme precipitation events are expected to become more frequent and more intense (FSU 2023). Precipitation is projected to decrease up to 5 percent under the GWL 2°C scenario (USGCRP 2023).

Sea level in the continental United States is expected to rise 2 to 3 feet under the GWL 2°C scenario (USGCRP 2023). Global sea level is projected to rise 1 to 4 feet by 2100 (NOAA 2022). Sea level has been rising about 0.12 inches per year in the southeast United States region. Florida coastlines have had as much as 8 inches of sea level rise since 1950. Sea level rise is beginning to accelerate. Sea level rise projections over the next 30 years along the U.S. coastline is expected to average 10 to 12 inches for all scenarios. (FSU 2023)

5.13.2.3 Potential Climate Change Impacts

Climate change may impact the environment in a way that affects resources important to continued reactor operations during the SLR term. A climate change impact pathway exists if there is an incremental effect that is new, additive, or has an increased effect on a resource area beyond the baseline conditions. Changes in climate parameters and trends such as temperature, precipitation, and storm frequency have an incremental effect on an environmental resource area. (NRC 2024a)

Resource areas important to continued operations that can be affected by climate changes include air quality and water resources. Continued operation of the plant is not expected to have a reasonably foreseeable cumulative impact on other resource areas such as land use, visual resources, noise, geology, ecological resources, historic and cultural resources, human health, socioeconomics, environmental justice, and waste management.

Sea Level Rise and Other Shoreline Effects

Sea level along Florida's coast has risen as much as 8 inches since 1950. Sea level rise projections range from 0.98 feet to 1.35 feet (11.76 inches to 16.20 inches) by 2050. (FSU 2023) The plant is elevated 20 feet above sea level to protect against flooding and extreme storm surges and has successfully withstood the impacts from back-to-back hurricanes (FPL 2024b).

Air Quality

Climate change can impact air quality because of changes in meteorological conditions, as air pollutant concentrations are sensitive to wind, temperature, humidity, and precipitation.

Ozone levels have been found to be particularly sensitive to climate change influences. Sunshine, high temperatures, and air stagnation are favorable meteorological conditions leading to higher levels of ozone. (NRC 2015) As stated above, the number of days above 95°F is expected to increase, which could cause an increase in ozone levels. However, ozone levels may not necessarily increase because ozone formation is also dependent on the number of precursors available.

St. Lucie County is in attainment with the national ambient air quality standards for all criteria air pollutants (EPA 2023).

As the fuel source for PSL does not produce carbon dioxide (CO_2) or other GHG emissions, including ozone precursors, the continued operation of PSL would avoid millions of tons of greenhouse gases compared to a fossil fuel-fired alternative, such as the natural gas combined cycle plant alternative presented in the PSL SLR ER. In the PSL SLR ER Section 3.3.3.2, no future upgrade or replacement activities (e.g., replacement or addition of diesel generators, diesel pumps, etc.) that would increase or decrease air emissions over the proposed SLR operating term were identified as necessary for plant operations (FPL 2021). PSL operates under Air Permit No. 1110071-016-AO. Permit conditions and air emissions regulatory requirements would regulate any future PSL activities.

PSL does not utilize cooling towers or other cooling systems that rely on heat dissipation to the ambient air surrounding the PSL plant. As such, increased air temperature and humidity due to PSL is not a concern, and PSL is not expected to exacerbate conditions that would increase air pollutant concentrations at or around the plant. Even though climate change trends show an increasing number of days above 95°F, no changes to the cooling system or other systems that would radiate heat are anticipated during the SLR term. As such, continued operation of PSL would not cause a noticeable increase in ambient air temperature or humidity.

Water Resources

Climate change can affect the availability of water resources due to changes in precipitation patterns, changes in surface water temperature, and additional competition for available resources (NRC 2013). As discussed in the GEIS Section 3.12.2, the observed global change in average surface temperature and precipitation has been accompanied by an increase in sea surface temperatures, a decrease in global glacier ice, an increase in sea level, and changes in extreme weather events. With an increase in sea level, cooling water availability is not expected to be impacted at PSL.

Using a GWL 2°C scenario, the surface water temperature on the coastline of Florida is expected to increase by 3.6°F. (USGCRP 2023)

PSL operations thermal discharge is to the Atlantic Ocean. PSL operates under a NPDES permit (included as Attachment B to the PSL SLR ER) that includes thermal discharge limits from the discharge canal (FPL 2021). The heated water is then conveyed through two pipes along the ocean bottom to diffuser ports where the water is introduced into ocean water at approximately 1,500 feet and 2,000 feet offshore. The discharge of heated water through the Y-port and multiport diffusers distribute the heated water over a wide area and allows for rapid and efficient mixing with ambient waters. PSL's Atlantic Ocean discharge is the sole thermal discharge along PSL's approximately 2.35-mile-long oceanfront. As discussed in PSL SLR ER Section 2.2.3.5, FPL performed a thermal discharge study to study the impact of the plant's extended power uprate. The difference in the extent of the thermal plume attributable to the increase in discharge temperature from 113°F to 115° F is relatively small. For the Y-nozzle diffuser, the increase ranges from about 2,000 cubic feet at the highest temperature (111°F) to about 1,000 cubic feet at the lowest temperature (96°F). For the multiport diffuser, the range is on the order of 50 cubic feet at 111°F to 350 cubic feet at 96°F. The heated water exiting the diffusers at 115°F would be cooled down to 96°F within about 12.5 seconds. The design of PSL's discharge system and compliance with NPDES permit discharge limits provides reasonable assurance that PSL thermal discharge would have a negligible additive impact to climate change due to increases in surface water temperature for the SLR term.

PSL's thermal discharge is examined periodically through the NPDES permit renewal process. PSL's NPDES permit establishes a thermal discharge limit in accordance with CWA 316(a) and PSL operates in compliance with the limit. (FPL 2021) Adherence to these limits will avoid any potential impacts that would lead to surface water temperature increase in addition to that caused by regional climate change.

In addition to thermal discharge limits, PSL's NPDES permit also defines limits on discharge of chemicals and other potential pollutants into the Atlantic Ocean. Continued adherence to these limits would mitigate any potential impacts, regardless of how climate change affects the ocean. Any incremental changes due to water use and water quality impacts from PSL's discharge would not be discernable due to these factors.

5.14 Cumulative Effects

PSL SLR ER Section 4.12

5.14.1 Supplemental Information

5.14.1.1 Findings from 10 CFR Part 51, Subpart A, Appendix B, Table B-1

Cumulative effects or impacts of continued operations and refurbishment associated with license renewal must be considered on a nuclear plant-specific basis. The effects depend on regional resource characteristics, the incremental resource-specific effects of license renewal, and the cumulative significance of other factors affecting the environmental resource.

5.14.1.2 Requirement [10 CFR 51.53(c)(3)(ii)(O)]

Applicants shall provide information about other past, present, and future reasonably foreseeable actions occurring in the vicinity of the nuclear plant that may result in a cumulative effect.

5.14.1.3 Background [GEIS Section 4.13]

Actions considered in the cumulative effects (impacts) analysis include the proposed license renewal action (initial LR or SLR) when added to past, present, and reasonably foreseeable actions, including projects and programs that are conducted, regulated, or approved by a federal agency. The analysis takes into account all actions, however minor, because the effects of individually minor actions may be significant when considered collectively over time. The goal of the cumulative effects analysis is to identify potentially significant impacts. The analysis considers the following factors with regards to the proposed action and past, present, and reasonably foreseeable actions:

- The geographic region of influence on a resource which varies based upon resource or environmental effect that maybe experienced, as well as the distance.
- The timeframe considers the incremental effects of the proposed action (license renewal) because these combined effects may accumulate or develop over time. Past and present actions include all actions up to and including the date of the license renewal request. The timeframe for the consideration of reasonably foreseeable actions is the 20-year license renewal (initial LR or SLR) term. Reasonably foreseeable actions include current and ongoing planned activities, approved, and funded for implementation.
- The environmental effects from past and present actions are accounted for in baseline assessments presented in affected environment discussions and the incremental effects or impacts of the proposed action (license renewal).
- The incremental effects of the proposed action (license renewal) when added to the effects from past, present, and reasonably foreseeable actions, and other actions result in the overall cumulative effect. A qualitative cumulative effects analysis is conducted in instances where the incremental effects of the proposed action (license renewal) and past, present, and reasonably foreseeable actions are uncertain or not well known.

For some resource areas (e.g., water resources, aquatic resources, and human health), the incremental contributions of ongoing actions within a region are managed and/or monitored through an established regulatory process (e.g., permitting process, NPDES) under State and/or Federal authority. In these cases, it may be assumed that cumulative effects are managed in their respective permits or licenses.

5.14.1.4 Analysis

Cumulative effects analysis involves determining if there is an overlapping or compounding of the anticipated impacts of the operation of PSL during the proposed SLR operating term with past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such actions. FPL considered potential cumulative impacts during the license renewal period in its environmental analysis associated with the resources discussed in the above sections. For the purposes of this analysis, past actions are those related to the resources at the time of plant licensing and construction, present actions are those related to the resources at the time of current operation of the power plant, and future actions are considered to be those that are reasonably foreseeable through the end of plant operation, which would include the 20-year license renewal term. These criteria are in line with Regulatory Guide 4.2, Supplement 1, Rev. 2 (NRC 2024b). The geographic area over which past, present, and future actions would occur is dependent on the type of action considered and is described below for each impact area.

The impacts of the proposed action are combined with other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. These combined impacts are defined as "cumulative" in 40 CFR 1508.7 and include individually minor, but collectively significant, actions taking place over a period of time. It is possible that an impact that may be SMALL by itself could result in a MODERATE or LARGE impact when considered in combination with the impacts of other actions on the affected resource. Likewise, if a resource is regionally declining or imperiled, even a SMALL individual impact could be important if it contributes to or accelerates the overall resource decline.

As presented in Section 2.3 of the PSL SLR ER, no SLR-related refurbishment activities have been identified. As discussed in Section 4.12 of the PSL SLR ER, expansion of the PSL ISFSI for the proposed SLR operating term is not reasonably foreseeable. The FPL response to RCI LU-3 confirmed that if an ISFSI expansion occurs during the subsequent period of extended operation, there exists sufficient land on the PSL site to accommodate the construction and operation of the ISFSI expansion (FPL 2022b). As discussed in Section 1.0, two onsite projects with an environmental interface have been identified since the preparation of the PSL SLR ER: removal of the West Test Facility and Quality Control Building, and the addition of a second switchyard on previously disturbed land. These projects would not impact offsite land and would not require land use conversion.

A desktop review of relevant websites, including local government sites and newspapers, was performed to identify upcoming offsite projects in the PSL area. Brightline remains in the process of choosing a station location for its commercial train service from Miami to Orlando, launched in September 2023. The station would be located in either St. Lucie County or Martin County, Florida, along the rail corridor, located on the mainland. (WPFB 2023; FLDOT 2023).

Other offsite projects identified since the August 2021 preparation of the PSL SLR ER include the construction of King's Landing development in St. Lucie County in downtown Fort Pierce. This development will include 100+ hotel rooms, condominiums, and shops. (TCP 2023a) Additionally, Oak Ridge Ranches, one of the largest housing developments to be built in St. Lucie County, is scheduled to complete permitting in 2024. This development is expected to provide homes for 8,600 families in the county and will include commercial real estate space. (TCP 2023b) The development would be on the mainland west of I-95 (TCMLSS 2023).

FPL has no plans for developing facilities offsite and no SLR-related refurbishment activities have been identified (FPL 2021). Offsite land uses would also be influenced by plant-related changes, such as changes in onsite land use, plant operations, or the plant workforce. The proposed action does not include changes in plant operations, or a significant increase or decrease in the PSL workforce (FPL 2021). Given that the proposed action would not impact offsite land or involve significant increases in the workforce as well as the location of these offsite projects being on the mainland, no cumulative impacts would be expected.

5.14.2 Conclusion

The significance of all license renewal issues presented in the PSL SLR ER were determined to have a SMALL impact on the environment (FPL 2021). FPL did not identify any new and significant information with regards to Category 1 issues during the preparation of this supplemental information. For Category 2 issues, FPL's impact determination of SMALL in the PSL SLR ER remains valid and FPL determined the new Category 2 issues would have a SMALL impact on the environment surrounding PSL. Area developments would not have an appreciable impact on any of the resource areas. While the offsite projects identified by PSL, specifically the King's Landing development, represent new information, they are not significant and would not change the impact level for cumulative impacts. FPL's impact determination in the PSL SLR ER remains valid.

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