

**Biological Evaluation of Impacts to Federally Listed Species
under the U.S. Fish and Wildlife's Jurisdiction**

Waterford Steam Electric Station, Unit 3

Proposed License Renewal

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Abbreviations, Acronyms, and Symbols

°C	degrees Celsius
°F	degrees Fahrenheit
ac	acre(s)
ADAMS	Agencywide Documents Access and Management System
CFR	<i>Code of Federal Regulations</i>
cfs	cubic feet per second
cm	centimeter(s)
cm/sec	centimeters per second
CPMU	Coastal Plain Management Unit
ECOS	Environmental Conservation Online System
Entergy	Entergy Louisiana, LLC and Entergy Operations, Inc., collectively
ER	Environmental Report
ESA	Endangered Species Act of 1973, as amended
FL	fork length
fps	feet per second
FR	<i>Federal Register</i>
ft	foot (feet)
FWS	U.S. Fish and Wildlife Service
g	gram(s)
GEIS	generic environmental impact statement
gpm	gallons per minute
ha	hectare(s)
kV	kilovolt
IPaC	Information for Planning and Conservation
in.	inch(es)
in./sec	inches per second
km	kilometer(s)
lb	pound(s)
LDEQ	Louisiana Department of Environmental Quality
LPDES	Louisiana Pollutant Discharge Elimination System
LP&L	Louisiana Power & Light Company
m	meter(s)
m ³	cubic meter(s)
m/s	meters per second
m ³ /s	cubic meters per second
mi	mile(s)
MMPA	Marine Mammal Protection Act of 1972, as amended
MSL	mean sea level

MWe	megawatt-electric
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
NRC	U.S. Nuclear Regulatory Commission
RM	river mile
SL	standard length
WF3	Waterford Steam Electric Station, Unit 3
yd ³	cubic yard(s)

1.0 Introduction

The U.S. Nuclear Regulatory Commission (NRC) staff has prepared this evaluation to comply with the provisions of Section 7 of the Endangered Species Act of 1973, as amended (ESA), in support of the NRC staff's review of Entergy Louisiana, LLC and Entergy Operations, Inc.'s (collectively referred to as "Entergy") application for renewal of Facility Operating License NPF-38. The proposed license renewal would allow Entergy to operate Waterford Steam Electric Station, Unit 3 (WF3) for an additional 20 years. This document examines the potential impacts of the proposed WF3 license renewal on federally listed species under the jurisdiction of the U.S. Fish and Wildlife Service (FWS).

2.0 Description of the Proposed Action

2.1 Proposed Action

The proposed action is the continued operation of WF3 under the terms of the renewed license, if granted by the NRC. The NRC issued the initial WF3 operating license on March 16, 1985, with an expiration date of December 18, 2024. If approved, the license renewal would allow Entergy to continue to operate WF3 through December 18, 2044.

WF3 is a Combustion Engineering pressurized water nuclear power reactor located on a 3,560-acre (ac) (1,440-hectare (ha)) Entergy-owned property in St. Charles Parish, Louisiana, that borders the west bank of the Mississippi River. The property lies 25 miles (mi) (40 kilometers (km)) west of New Orleans, Louisiana, and 50 mi (80 km) southeast of Baton Rouge, Louisiana. WF3 shares the property with three other energy-generating units: Waterford 1 and 2, which are 411-megawatt-electric (MWe) oil/gas-fired generating plants, and Waterford 4, which is a 33-MWe oil-fired peaking generating plant. St. Charles Parish has zoned the Entergy property for industrial use and regulates it as an M-2 Heavy Manufacturing Zoning District, a designation applicable to energy generating facilities.

WF3 uses a once-through (open-cycle) cooling water system to dissipate waste heat. Cooling water for the system is withdrawn and discharged directly from and to the Mississippi River. The description of the cooling water system below is derived from Entergy's (2016) Environmental Report (ER) submitted to NRC as part of the license renewal application unless otherwise noted.

The WF3 cooling water intake system consists of an intake canal, intake structure, eight trash racks, and eight traveling water screens. The WF3 intake canal and intake structure are located on the west (right descending) bank of the Mississippi River at River Mile (RM) 129.6. The canal is formed from steel sheet piling driven into the river bottom and extending 162 feet (ft) (49.4 meters (m)) out from the face of the intake structure and to a height of 15 ft (4.6 m) above mean sea level (MSL). The canal entrance at the river is 36.9 ft (11.2 m) by 34 ft (10.4 m), and a fixed skimmer wall protects the entrance of the intake canal from floating debris. The normal water level elevation of the Mississippi River averages 4.0 ft (1.2 m) above MSL, and water is drawn into the intake canal below the river's surface at a rate of up to 1.9 feet per second (fps) (0.6 meters per second (m/s)) at maximum pump operation.

Heated cooling water from the main condenser along with other comingled effluents from auxiliary systems is discharged back to the Mississippi River through the discharge structure, which lies on the river shoreline approximately 600 ft (183 m) downstream of

WF3's intake structure. Discharged water temperatures average 18.6 °F (10.3 °C) above the river water intake temperature. The WF3 Louisiana Pollutant Discharge Elimination System (LPDES) permit (LDEQ 2010), issued by the Louisiana Department of Environmental Quality (LDEQ), limits the temperature of discharged water to 118 °F (47.8 °C). From the discharge structure, the combined effluent flows to the sheet-pile-formed, 177-ft (54-m)-long discharge canal that opens up to the river. When operated at the design flow rate, the discharge structure and canal are configured to prevent recirculation of heated water and to promote rapid mixing of the combined effluent with a design discharge velocity of 7 fps (2.1 m/s) to the river at average low-water level.

WF3 operations are further described in Chapter 2 of the ER (Entergy 2016). Appendix A of this evaluation contains figures of the Entergy property, WF3 plant area, and schematics of the cooling system.

3.0 Proposed Action Area

The implementing regulations for Section 7(a)(2) of the ESA define "action area" to mean all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). The action area effectively bounds the analysis of federally listed species and critical habitats because only species and habitats that occur within the action area may be affected by the Federal action.

For the purposes of this ESA analysis, the NRC staff considers the action area to be the 3,560-ac (1,440-ha) Entergy property and the Mississippi River from the WF3 intake at RM 129.6 to the downstream extent of the 2.8 degrees Celsius (°C) (5 degrees Fahrenheit (°F)) isotherm within WF3's thermal plume. The WF3 thermal plume varies with season, but the plume generally increases as flow decreases such that the thermal plume is largest under low flow conditions.

The NRC staff recognizes that while the action area is stationary, federally listed species can move in and out of the action area. For instance, a migratory fish species could occur in the action area seasonally as it travels up or down the Mississippi River past WF3. Similarly, a flowering plant known to occur near, but outside, of the action area could appear within the action area over time if its seeds are carried into the action area by wind, water, or animals. Thus, in its analysis, the NRC staff considers not only those species known to occur directly within the action area, but those species that may passively or actively move into the action area. The staff then considers whether the life history of each species makes the species likely to move into the action area where it could be affected by the proposed WF3 license renewal.

Within the action area, terrestrial biota could experience impacts such as habitat disturbance associated with ground-disturbing activities, collisions with transmission lines, exposure to radionuclides, and other direct and indirect impacts associated with station, cooling system, and in-scope transmission line operation and maintenance (NRC 2013). The proposed action has the potential to affect aquatic biota in several ways, including impingement or entrainment of individuals into the cooling system, thermal discharges from cooling system operation, and exposure to radionuclides or other contaminants (NRC 2013).

The terrestrial and aquatic environments within the action area are described below. These environments are further described in Chapter 3 of the ER (Entergy 2016). The descriptions below are derived from the ER unless otherwise cited, and Appendix A contains figures of the Entergy property and surrounding area, including depictions of land use/land cover. Because all of the Federally listed species with the potential to

occur in the action area are aquatic (see Section 5.0 of this evaluation), the aquatic portion of the action area is described in more detail than the terrestrial portion.

3.1 Terrestrial Action Area

As previously described, WF3 is located on a 3,560-ac (1440-ha) Entergy-owned property in St. Charles Parish, Louisiana, that borders the west bank of the Mississippi River. The WF3 plant area encompasses 40.1 ac (16 ha) within the northern portion of the property and adjacent to the Mississippi River. The principle structure within the WF3 plant area is the nuclear plant island structure, which is a reinforced concrete box structure that houses all safety-related components, including the reactor building, reactor auxiliary building, fuel handling building, and component cooling water system structures. The property also houses an independent spent fuel storage installation adjacent and to the south of the nuclear plant island structure. Two meteorological towers lie to the east, and a 230-kilovolt (kV) switchyard and 500-kV switchyard lie to the south. The WF3 cooling water intake and discharge structures are located at the northern end of the property off the western shore of the Mississippi River.

Approximately 2,345 ac (949 ha) of the Entergy property are undeveloped natural areas consisting of the following land cover types: woody wetlands, emergent herbaceous wetlands, grasslands, shrub/scrub, barren land, and open water. The principle plant communities on the Entergy property include agricultural land; cypress-gum swamp; and batture, wax myrtle, and marsh communities. These communities as well as the commonly associated plant and animal species of each community are described in detail in Chapter 3 of the ER (Entergy 2016).

The remainder of the Entergy property is leased for agricultural use or is occupied by Waterford 1 and 2 and maintained for associated industrial uses.

3.2 Aquatic Action Area

As previously described WF3 borders the west bank of the Mississippi River; the intake structure is located at RM 129.6; and the discharge structure is located 600 ft (183 m) downstream of the intake. Four types of aquatic habitats occur near WF3: seasonally inundated floodplains along the river levee, revetments, natural steep river banks, and the channel. Brief descriptions of each habitat follow.

3.2.1 Aquatic Habitats

Floodplains

Floodplains are one of the most biologically important habitats in the Lower Mississippi River because the shallow water and habitat structure from trees and plants support use as spawning grounds, nursery habitats, refuges from predators, and foraging grounds. Seasonally inundated floodplains near WF3 contain some areas of forested wetlands. However, the habitat quality is degraded because it is routinely cleared for security reasons. In addition, no oxbow lakes, sloughs, borrow pits, or ponds occur within the floodplains. Therefore, limited spawning likely occurs near WF3 (NRC 1981).

Steep River Banks

Steep river banks occur on the sides of river bends where the main channel current flows against them (Baker et al. 1991). The fast flow of the Lower Mississippi River often increases erosion along the river bank. Eddies (i.e., areas of upstream flow) are common along the river bank and may provide an important refuge of slower moving

water for some fish species. Fallen trees and brush alongside the river provide substrate on which macroinvertebrates attach and grow as well as high quality habitat for fish.

Revetments

Revetments are river banks that are usually cleared and lined with human-modified materials to prevent erosion (Baker et al. 1991). The revetment banks downstream of the WF3 intake are lined with crushed concrete both above and below the water surface (ENSR 2007). While revetments provide a hard substance to support the growth of macroinvertebrates, habitat quality is lower than river banks for fish due to the lack of structure and refuges that would normally be provided by fallen trees and brush.

Channel

The channel near WF3 is characterized by deep water, high current speeds, high levels of suspended solids, high turbidity, high levels of nutrients, low algal biomass, and uniform bottom habitat consisting of sand and/or gravel (Baker et al. 1991; ENSR 2007). The channel typically supports the lowest amount of biological richness because of the high levels of suspended solids that prevent primary production and lack of refuge to hide from predators. In addition, high current speeds limit biological productivity because mobile organisms need to expend additional energy to move, hover feeding is not possible, and sessile organisms may not be able to stay attached to hard surfaces. These conditions also do not provide suitable habitat for spawning.

3.2.2 Aquatic Communities

Human activities, such as channelization of the river, replacing trees with artificial materials to line the river, construction of levees, polluted land runoff, and the influx of municipal and industrial water effluents, has degraded the habitat quality surrounding WF3, and influenced the relatively low biological productivity near WF3, as described below.

Plankton

Plankton are small organisms that float or drift in rivers and other water bodies and are a primary food source for many fish and other animals. Plankton include bacteria, protozoans, certain algae, tiny crustaceans such as copepods, and many other organisms. High turbidity and fluctuating water levels near WF3 limit primary production for plankton that are dependent upon light for growth, such as phytoplankton and periphyton (NRC 1981). Low levels of primary production may also limit the growth of zooplankton and other organisms that feed upon phytoplankton and periphyton.

Preoperational studies in the 1970s documented extremely low concentrations of phytoplankton near WF3, which is likely due to the high suspended sediment load that blocks light from entering the water and prevents photosynthesis, and therefore growth, of phytoplankton (LP&L 1978). In its final environmental statement related to operation of WF3, the NRC (1981) suggested that locally present phytoplankton likely grew in nearby backwaters or tributaries and drifted downstream to WF3. Preoperational studies documented a total of 20 genera of phytoplankton, and diatoms, including *Cyclotella* and *Melosira*, were most common (LP&L 1978).

Preoperational studies also documented extremely low concentrations of periphyton. Cynobacteria were most dominant periphyton and occurred during summer months (LP&L 1978).

Preoperational studies found low levels of zooplankton, including ichthyoplankton, rotifers, protozoa, and copepods (LP&L 1978; NRC 1981). Given the lack of spawning grounds near WF3, high current flows, and high levels of suspended solids, LP&L (1978) suggested that most zooplankton originated in backwaters or shallow habitats and then drifted towards the WF3 site. Peak densities of ichthyoplankton of 0.043 organisms/m³ (0.033 organisms/yd³) occurred from May through July (LP&L 1978; NRC 1981). Commonly collected ichthyoplankton taxa included the following groups and taxa (Entergy 2016; LP&L 1978; NRC 1981).

- Clupeidae or herrings, including threadfin shad (*Dorosoma petenense*), gizzard shad (*D. cepedianum*), and skipjack herring (*Alosa chrysochloris*)
- Cyprinidae or minnow family (carp, chubs, minnows, and shiners)
- Ictaluridae or catfish family, including blue catfish (*Ictalurus furcatus furcatus*) and channel catfish (*I. punctatus*) larvae
- Centrarchidae or sunfish family (sunfish, bass, and crappies)
- Sciaenidae, including freshwater drum (*Aplodinotus grunniens*)
- River shrimp (*Macrobrachium ohione*) larvae

Fish

Between 100 to 200 fish species are known to occur within the Lower Mississippi River (Baker et al. 1991). Prior to WF3 operations, LP&L conducted preoperational surveys near WF3 from 1973 through 1980 (ENSR 2007). Although Entergy has not conducted fish surveys near WF3 since operations began in 1985, impingement studies at the adjacent Waterford 1 and 2 provide information regarding the ambient fish populations near WF3. In order to gather additional data regarding nearby fish populations, the NRC staff also reviewed survey data available through the online database FishNet (2014). The database includes fish surveys within the vicinity of WF3 from 1953, 1982, 1997, 1998, and 2000. The NRC staff notes that the surveys used different methodologies, sampling locations, sampling protocols, and equipment than one another. Therefore, a species may have occurred near WF3 at the time of a particular survey but not been captured due to the various survey methods and sampling regimes. Table 1 lists fish species that have been observed during three time periods (1953, 1972–1982, and 1997–2007) in the available surveys.

The available fish survey data indicates that common fish species near WF3 include gizzard shad, threadfin shad, skipjack herring, Gulf menhaden (*Brevoortia patronus*), bay anchovy (*Anchoa mitchilli*), blue and channel catfish, river carpsucker (*Carpionodes carpio*), hogchoker (*Trinectes maculatus*), silverband shiner (*Notropis shumardi*), white bass (*Morone chrysops*), striped mullet (*Mugil cephalus*), and freshwater drum. Commercially important fish species include blue catfish, bigmouth buffalo (*Ictiobus cyprinellus*), smallmouth buffalo (*Ictiobus bubalus*), channel catfish, flathead catfish (*Pylodictis olivaris*), and freshwater drum (LDWF 2015).

Table 1. Fish Species Collected Near WF3 in Surveys Conducted in 1953, 1972–1982, and 1997–2007

Species	Common Name ^(a)	Survey Year(s) Collected		
		1953 ^(b)	1973–1982 ^(c)	1997–2007 ^(d)
Achiridae				
<i>Trinectes maculatus</i>	hogchoker		X	X
Acipenseridae				
<i>Scaphirhynchus platyrhynchus</i>	shovelnose sturgeon		X	X
Atherinidae				
<i>Menidia audens</i>	Mississippi silverside	X	X	
Catostomidae				
<i>Carpiodes carpio</i>	river carpsucker	X	X	
<i>Cycleptus elongatus</i>	blue sucker			X
<i>Ictiobus bubalus</i>	smallmouth buffalo	X	X	X
<i>Ictiobus cyprinellus</i>	bigmouth buffalo		X	X
Centrarchidae				
<i>Lepomis cyanellus</i>	green sunfish		X	
<i>Lepomis gulosus</i>	warmouth		X	
<i>Lepomis humilis</i>	orangespotted sunfish	X	X	X
<i>Lepomis macrochirus</i>	bluegill		X	X
<i>Lepomis megalotis</i>	longear sunfish		X	
<i>Lepomis symmetricus</i>	bantam sunfish		X	
<i>Micropterus dolomieu</i>	smallmouth bass			X
<i>Micropterus salmoides</i>	largemouth bass		X	
<i>Pomoxis annularis</i>	white crappie		X	
<i>Pomoxis nigromaculatus</i>	black crappie		X	X
Clupeidae				
<i>Alosa chrysochloris</i>	skipjack herring	X	X	X
<i>Brevoortia patronus</i>	gulf menhaden		X	
<i>Dorosoma cepedianum</i>	gizzard shad		X	X
<i>Dorosoma petenense</i>	threadfin shad	X	X	X
Cyprinidae				
<i>Carassius auratus</i>	goldfish			X
<i>Cyprinella lutrensis</i>	red shiner			X
<i>Cyprinella spiloptera</i>	spotfin (spottail) shiner			X
<i>Cyprinus carpio</i>	common carp			X
<i>Hypophthalmichthys nobilis</i>	bighead carp			X
<i>Notropis atherinoides</i>	emerald shiner		X	X
<i>Notropis blennioides</i>	river shiner		X	X
<i>Notropis dorsalis</i>	bigmouth shiner			X
<i>Notropis shumardi</i>	silverband shiner	X	X	X
<i>Notropis texanus</i>	weed shiner	X		
<i>Notropis volucellus</i>	mimic shiner			X

Species	Common Name ^(a)	Survey Year(s) Collected		
		1953 ^(b)	1973– 1982 ^(c)	1997– 2007 ^(d)
<i>Opsopoeodus emiliae</i>	pugnose minnow	X	X	
<i>Pimephales vigilax</i>	bullhead minnow		X	
Engraulidae				
<i>Anchoa mitchilli</i>	bay anchovy		X	X
Fundulidae				
<i>Fundulus chrysotus</i>	golden topminnow		X	
Hiodontidae				
<i>Hiodon alosoides</i>	mooneyes			X
Ictaluridae				
<i>Ameiurus melas</i>	black bullhead	X	X	
<i>Ictalurus furcatus</i>	blue catfish	X	X	X
<i>Ictalurus punctatus</i>	channel catfish		X	X
<i>Pylodictis olivaris</i>	flatheaded catfish		X	X
Lepisosteidae				
<i>Lepisosteus osseus</i>	longnose gar		X	X
Moronidae				
<i>Morone chrysops</i>	white bass		X	X
<i>Morone saxatilis</i>	striped bass		X	X
Mugilidae				
<i>Mugil cephalus</i>	striped mullet		X	X
Percidae				
<i>Sander canadensis</i>	sauger		X	X
Poeciliidae				
<i>Gambusia affinis</i>	mosquitofish		X	
<i>Heterandria formosa</i>	least killifish		X	
Polyodontidae				
<i>Polyodon spathula</i>	paddlefish		X	X
Sciaenidae				
<i>Aplodinotus grunniens</i>	freshwater drum	X	X	X

^(a) Bold = species consisted more than 10% of the reported survey collection

^(b) Collection data from FishNet 2014: Survey conducted by R.D. Suttkus & Webb in 1953 in Mississippi River near the Bonnet Carre Spillway.

^(c) Collection data from LP&L 1978, ENSR 2007, and FishNet 2014. LP&L 1978: aquatic sampling within the vicinity of WF3 from 1973–1980. ENSR 2007: commonly impinged species at Waterford 1 and 2 in 1976-1977. FishNet 2014: Survey conducted by E.B. Pebbles & D.L. Rome in 1982 in Mississippi River near the Bonnet Carre Spillway

^(d) Collection data from ENSR 2007 and FishNet 2014. ENSR 2007: impinged species at Waterford 1 and 2 during 2006–2007 surveys. FishNet 2014: surveys conducted by Atwood and Walsh in 1997, Atwood in 1998, and Atwood and Walsh in 2000 in the Mississippi River by Little Rock Ferry (RM 125.3).

Invertebrates

At least 200 macroinvertebrate species occur in the Lower Mississippi River (Harrison and Morse 2012). LP&L (1978) conducted macroinvertebrate sampling from 1973–1976 near WF3 and reported relatively low numbers of macroinvertebrates, which was likely due to the fast current, scouring, and shifting bottom surfaces that prevent sessile macroinvertebrates from attaching to hard surfaces in order to grow. The most common benthic taxa were aquatic worms (Oligochaetes) and Asian clams (*Corbicula* spp.). River shrimp and grass shrimp (*Palaemonetes* spp.), both decapods, have also been commonly observed near WF3 (ENSR 2007; Entergy 2016; LP&L 1978). During preoperational sampling, LP&L (1978) observed female river shrimp carrying eggs near WF3.

Blue crabs (*Callinectes sapidus*) are a commercially important benthic invertebrate that infrequently occur near WF3 during periods of extremely low river discharge (ENSR 2007; LDWF 2015). Blue crabs typically occur within estuarine waters but may travel upriver, especially for spawning activities. No suitable spawning for blue crabs occur near WF3.

4.0 FWS Section 7 Consultation History

The NRC consulted with the FWS during the initial licensing stage. During that environmental review, the NRC (1981) concluded that no federally listed species were known to inhabit the Entergy property and that consequently, none were likely to be impacted by the construction and operation of WF3. In a letter dated January 30, 1980, the FWS (1980) confirmed that no federally listed species were present in the area of WF3. Since that time, no Federal actions or other information have triggered further consultation under ESA Section 7 between the NRC and FWS related to WF3.

5.0 Federally Listed Species and Critical Habitats Considered

The NRC staff used the FWS's Environmental Conservation Online System (ECOS) Information for Planning and Conservation (IPaC) tool to determine species that may be present in the WF3 action area. The ECOS IPaC tool identified three species under the FWS's (2017) jurisdiction as potentially occurring in the action area: the gulf subspecies of Atlantic sturgeon (*Acipenser oxyrinchus desotoi*), pallid sturgeon (*Scaphirhynchus albus*), and West Indian manatee (*Trichechus manatus*). No proposed species, candidate species, or proposed or designated critical habitat occurs within the action area (FWS 2017). The following sections briefly describe the three species' life histories and evaluate the potential for each species to occur within the action area.

5.1 Atlantic Sturgeon, Gulf Subspecies

On September 30, 1991, the FWS listed the gulf sturgeon as threatened wherever found (56 FR 49653). The FWS designated critical habitat for the species on March 19, 2003 (68 FR 13370). In 2014, the FWS reclassified the gulf sturgeon as a subspecies of the Atlantic sturgeon. Overfishing, damming on rivers containing spawning habitat, dredging and other channel improvement and maintenance activities, water quality degradation through point and non-point discharges, and climate change are the primary factors that have contributed to this species' decline (FWS and NMFS 2009). Unless otherwise noted, information about this species is derived from the FWS's final critical habitat rule (68 FR 13370).

The gulf subspecies of the Atlantic sturgeon (“gulf sturgeon”) is an anadromous fish that inhabits coastal rivers from Louisiana to Florida during the warmer months and overwinters in estuaries, bays, and the Gulf of Mexico. The species is a nearly cylindrical primitive fish with embedded bony plates or scutes, an extended snout, and an asymmetrical tail. Adults range from 1.2 to 2.4 m (4 to 8 ft) in length, and females are larger than males. The gulf sturgeon is geographically separated from the Atlantic coast subspecies (*Acipenser oxyrinchus oxyrinchus*) and is morphologically distinguished by its longer head and pectoral fins.

Historically, the gulf sturgeon occurred from the Mississippi River east to Tampa Bay. Its present range extends from Lake Pontchartrain and the Pearl River system in Louisiana and Mississippi east to the Suwannee River in Florida. Spawning currently occurs in seven river systems: the Pearl, Pascagoula, Escambia, Yellow, Choctawhatchee, Apalachicola, and Suwannee (FWS and NMFS 2009).

Gulf sturgeon can reach 42 years of age. Females reach maturity at 8 to 17 years, and males reach maturity at 7 to 21 years. Females spawn at intervals from every 3 to 5 years and males every 1 to 5 years. Mature females produce an average of 400,000 eggs, which they typically lay on limestone bluff and outcroppings, cobble, limestone bedrock covered with gravel and small cobble, gravel, or sand in waters 1.4 to 7.9 m (4.6 to 26 ft) in depth and 18.2 to 23.9 °C (64.8 to 75.0 °F) in temperature. Eggs are demersal, adhesive, and gray to brown to black in color. Larval survival is optimal at water temperatures of 15 to 20 °C (59 to 68 °F) according to laboratory tests. Young-of-the-year disperse widely throughout their natal river and are typically found on sandbars and sand shoals over rippled bottom and in shallow, relatively open waters.

Migratory behavior of gulf sturgeon appears to be influenced by a number of factors including sex, reproductive status, water temperature, and river flow. Gulf sturgeon spend their adult lives in marine and estuarine environments and migrate upriver to freshwater to breed and spawn. In the spring (March to May), adults and subadults return to the upper reaches of their natal river, where sexually mature sturgeon spawn. Once adults spawn, individuals typically move downriver to summer resting or holding areas, where they remain until October or November. Individuals spend late-fall through early-spring in estuarine areas, bays, or in the Gulf of Mexico.

Although the historic range of the gulf sturgeon includes the Mississippi River, individuals rarely migrate far into the Mississippi River due to a lack of spawning habitat (Nature Conservancy 2016), and no known spawning sites presently occur within the Mississippi River (68 FR 13370; FWS and NMFS 2009). The NRC staff reviewed available impingement studies that were conducted 0.4 mi (0.6 km) west-northwest of WF3 at Waterford 1 and 2 from 1976–1977 and 2006–2007 (ENSR 2007; Espey Huston & Associates 1977). The gulf sturgeon was not collected during either of these studies. In its review of aquatic data from other Lower Mississippi River energy generating facilities, ENSR (2007) stated that no Entergy plant in the area has recorded impingement of gulf sturgeon. Based on the available information, the NRC staff concludes that adult gulf sturgeon may occasionally occur in the Mississippi River downriver of WF3, but that individuals are unlikely to travel as far upriver as the Entergy property. Therefore, the gulf sturgeon is unlikely to occur in the action area.

5.2 Pallid Sturgeon

On September 6, 1990, the FWS listed the pallid sturgeon as endangered wherever found (55 FR 36641). The FWS has not designated critical habitat for the species.

Overfishing, curtailment of range, habitat destruction and modification, altered flow regimes, water quality issues, low population size, and lack of recruitment are the primary factors that have contributed to this species' decline (55 FR 36641; FWS 2014a). Unless otherwise noted, information about this species is derived from the FWS's (2014a) revised recovery plan.

Pallid sturgeon is a benthic, riverine fish with a flattened shovel-shaped snout and a long, slender, and armored peduncle (the tapered portion of the body that terminates at the tail). Adults can reach lengths of 1.8 m (6 ft). The species is similar in appearance to the more common shovelnose sturgeon (*Scaphirhynchus platyrhynchus*), which is federally listed as threatened due to similarity of appearance.

The pallid sturgeon is native to the Mississippi River Basin, including the Mississippi River, Missouri River, and their major tributaries (*i.e.*, Platte, Yellowstone, and Atchafalaya Rivers). Historically, the species' range encompassed about 3,515 continuous river miles in these rivers and its tributaries within Montana, North Dakota, South Dakota, Nebraska, Iowa, Kansas, Missouri, Kentucky, Tennessee, Arkansas, Louisiana, and Mississippi. The present known range spans the length of the historical range, but consists of disconnected reaches of these rivers as a result of damming and other obstructions to fish passage.

Pallid sturgeon can reach ages of 60 years or more. Females reach maturity at 15 to 20 years, and males reach maturity at approximately 5 years. Females spawn at intervals of every 2 to 3 years. Mature females in the upper reaches of the Missouri River produce 150,000 to 170,000 eggs, while females in the southern extent of the range typically produce significantly fewer eggs (43,000 to 58,000). Females spawn adjacent to or over coarse substrate such as boulder, gravel, or cobble or in bedrock within deeper water with relatively fast, converging flows. Incubation is approximately 5 to 7 day, and newly hatched larvae are pelagic and drift downstream in currents for 11 to 13 days.

Habitat requirements for larvae and young-of-the-year are unknown due to low populations of spawning adults and poor recruitment across the species' range. However, requirements may be similar to other *Scaphirhynchus* species. *Scaphirhynchus* young-of-year in the Middle Mississippi River are often found in channel border and island-side channel habitats with low velocities (1 m/s or 0.33 fps), moderate depths (2 to 5 m or 6.6 to 16.4 ft), and sand substrate.

Adults prefer bottom habitats of large river systems. Juveniles and adults are almost always observed in flowing portions of main channels in the upper reaches of the species' range and in channel border habitats and inundated floodplain habitats with flowing water in the more channelized lower Mississippi River. Pallid sturgeon are most often associated with sandy and fine bottom substrates, and individuals exhibit a selection for sand over mud, silt, or vegetation. Across their range, individuals have been documented in waters of varying depths and velocities that range from 0.58 m to >20 m (1.9 to >65 ft) and velocities of <1.5 m/s (<4.9 fps) and an average of 0.58 m/s to 0.88 m/s (1.9 fps to 2.9 fps). Pallid sturgeon have been collected from a variety of turbidity conditions, including highly altered systems with low turbidity and relatively natural systems with seasonally high turbidity.

Age-0 pallid sturgeon eat zooplankton, mayflies (Ephemeroptera) and midge (Chironomidae) larvae, and small invertebrates. Juveniles and adults eat fish and aquatic insect larvae with a trend toward piscivory as individuals increase in size.

Cyprinidae, Sciaenidae, and Clupeidae make up the majority of the adult diet, although diet varies by season and location (Hoover et al. 2007).

Prior to 1990, when this species was federally listed under the ESA, pallid sturgeon collections on the Lower Mississippi River were rare, so the historical baseline population size is undocumented (FWS 2013). A few juveniles were collected in the 1970s during impingement and entrainment studies associated with Lower Mississippi River energy generating facilities near WF3 as described below, but no pallid sturgeon have been collected at WF3 itself.

- Between April 1973 and September 1976, LP&L (1979) collected four juvenile pallid sturgeon in the Mississippi River mainstem during a CWA 316(b) Demonstration study associated with WF3. LP&L collected samples via surface trawl, otter trawl, electrofishing, and gill net at five locations both upstream and downstream of WF3. Gear type and specific collection sites associated with the pallid sturgeon collections are not specified in the study.
- In 1976, Espey Huston & Associates (1977) collected two juvenile pallid sturgeon during the May 18-19, 1976, and July 27-28, 1976, 24-hour sampling periods of a Waterford 1 and 2 screen impingement study. Waterford 1 and 2 lies at RM 129.9 directly upstream and on the same side (west bank) of the Mississippi River as WF3.
- Between January 1976 and January 1977, one juvenile pallid sturgeon was impinged over the course of a CWA 316(a) and 316(b) impingement and entrainment study associated with Willow Glen Power Station, which lies upstream of WF3 at RM 201 (ENSR 2007).

Pallid sturgeon in the Lower Mississippi River belong to the Coastal Plain Management Unit (CPMU), which includes the Lower Mississippi River from the confluence of the Ohio River, Illinois, to the Gulf of Mexico in Louisiana. As of 2013, over 1,100 pallid sturgeon had been captured in the CPMU since listing (>500 from the Lower Mississippi River and >600 from the Atchafalaya River) (FWS 2013). The southernmost collection of pallid sturgeon has been at RM 95.5, which is 34.1 RM downstream of where WF3 withdraws Mississippi River water for cooling.

Given the location of the WF3 intake and the fact that pallid sturgeon have been collected in historical studies at other Lower Mississippi River energy generating plants, pallid sturgeon individuals have the potential to occur in the WF3 action area. For instance, in 2008, during an emergency opening of the Bonnet Carre Spillway, which lies 1 mi (1.6 km) east-northeast and downstream of WF3, the FWS (2013) estimated that up to 92 pallid sturgeon were injured or killed by entrainment.

Based on the available information, the NRC staff concludes that pallid sturgeon may occur in the Mississippi River within the WF3 action area.

5.3 West Indian Manatee

The FWS listed the West Indian manatee as endangered in the first Endangered Species List under the Endangered Species Preservation Act of 1966, a predecessor to the ESA. Following the promulgation of the ESA in 1973, the FWS designated critical habitat in 1976 (41 FR 41914), which was subsequently amended in 1977 (42 FR 47840). All critical habitat units lie within Florida and its coastal waters, which is beyond the WF3 action area. On April 5, 2017, the FWS downlisted the species from endangered to threatened due to the species' partial recovery (82 FR 16668). Within the

United States, primary threats to the species include watercraft collisions and the loss of winter warm-water habitat; outside the United States, primary threats are habitat fragmentation and loss (82 FR 16668). The West Indian manatee is also protected under the Marine Mammal Protection Act of 1972, as amended (16 U.S.C. § 1361 et seq.), which established a moratorium on the direct or indirect taking of all species of marine mammals in the United States.

The West Indian manatee is a marine species. Although it occurs in the Gulf of Mexico, it does not occur in the Mississippi River, and therefore, would not occur in the WF3 action area.

6.0 Proposed Action Effects Analysis

This section describes the potential direct and indirect impacts of the proposed action, WF3 license renewal, on federally listed species.

6.1 Atlantic Sturgeon, Gulf Subspecies

In the previous section of this evaluation, the NRC staff determined that the gulf sturgeon is unlikely to occur in the action area based on habitat requirements, life history, occurrence records, and other available information. Accordingly, the NRC staff concludes that the proposed action would have no effect on the gulf sturgeon, and this species is not considered in any further detail in this evaluation.

6.2 Pallid Sturgeon

In the previous section of this evaluation, the NRC staff determined that the pallid sturgeon may occur in the action area based on FWS data from the Lower Mississippi River, data from studies conducted at other Lower Mississippi River energy generating facilities, and the results of a 2008 ESA Section 7 consultation between the U.S. Army Corps of Engineers and the FWS related to an emergency opening on the Bonnet Carre Spillway.

The proposed action would allow WF3 to continue to operate through 2044. During the proposed license renewal term, pallid sturgeon in the action area could experience the following effects: (1) entrainment; (2) impingement; (3) thermal effects; (4) exposure to radionuclides and other contaminants; and (5) reduction in available prey due to impingement and entrainment or thermal impacts to prey species. These impacts are described below in terms of direct, indirect, interrelated, and interdependent effects.

6.2.1 Direct Effects

Entrainment

Entrainment is the incorporation of all life stages of fish and shellfish with intake water flow entering and passing through a cooling-water intake structure and into a circulating water intake structure (40 CFR 125.83). Organisms susceptible to entrainment generally include ichthyoplankton, larval stages of shellfish and other macroinvertebrates, zooplankton, and phytoplankton.

Pallid sturgeon are unlikely to be subject to entrainment at WF3 because pallid sturgeon are not currently known to spawn in the Mississippi River main channel (FWS and NMFS 2009). Thus, eggs and larvae would not occur in the action area. Additionally, pallid sturgeon eggs are demersal and adhesive, and would therefore not be expected to drift downstream from any upstream spawning grounds. ENSR (2007) has also found that

ichthyoplankton densities for all species in the region of the Mississippi River in which WF3 is located are very low. For these reasons, the NRC staff does not expect pallid sturgeon eggs and larvae to be entrained into the WF3 cooling water intake system. Therefore, entrainment would not affect pallid sturgeon during the proposed license renewal term.

Impingement

Impingement is the entrapment of all life stages of fish and shellfish on the outer part of an intake structure or against a screening device during periods of water withdrawal (40 CFR 125.83). Because juvenile and adult pallid sturgeon have been collected in the Lower Mississippi River, it is possible that individuals are susceptible to impingement at WF3. To evaluate this impact, the NRC staff considered pallid sturgeon swimming speeds, historical impingement records at other Lower Mississippi River energy generating facilities, and past FWS reviews associated with Entergy's request for the FWS to review its license renewal application and with LDEQ's ongoing WF3 LPDES permit renewal review.

An important factor that influences a species' ability to avoid impingement into a cooling water intake structure is its swimming speed. In general, fish can avoid impingement if their swim speed is greater than the intake speed. In swimming stamina tests of hatchery-reared juvenile pallid sturgeon at Gavins Point National Fish Hatchery in South Dakota, Adams et al. (1999) observed maximum sustained swimming speed with no fatigue after 480 minutes of 25 centimeters per second (cm/sec) (9.8 inches per second (in./sec)) for juveniles of 17.0 to 20.5 centimeters (cm) (6.7 to 8.1 inches (in.)) fork length (FL) and 10 cm/sec (3.9 in./sec) for juveniles of 13.0 to 16.8 cm (5.1 to 6.6 in.) FL. Burst speeds, which are the highest speeds attained by fish and are used to capture prey, avoid predators, or negotiate short-term fast currents, were measured for the two groups at 55 to 70 and 40 to 70 cm/sec (22 to 28 and 16 to 28 in./sec), respectively. Notably, juvenile pallid sturgeon in this study demonstrated a higher capacity for burst swimming than had been demonstrated in studies of other sturgeon species. Because of the various swimming behaviors observed during the study, Adams et al. (1999) concluded that observed swimming speeds do not solely represent steady-state swimming speeds. Similar to other lotic, benthic fish, pallid sturgeon juveniles were able to use their pectoral fins and overall body morphology to maintain station against velocity without swimming (Adams et al. 1999).

Impingement of healthy juvenile pallid sturgeon can reasonably be assumed to occur in situations where a facility's intake velocity is higher than juvenile burst swimming speeds. Burst swimming speeds are an appropriate comparison because juveniles would likely navigate the draw of an intake current similar to short-term fast currents that individuals would encounter while migrating through long stretches of a river. Thus, juvenile pallid sturgeon are most likely to be susceptible to impingement at facilities with intake velocities greater than 70 cm/sec (28 in./sec), and smaller or weaker individuals would also be susceptible to impingement at facilities with intake velocities as low as 40 cm/sec (16 in./sec).

WF3's approach velocity ranges from 1.09 to 1.78 fps (33 to 55 cm/sec; 13.08 to 21.36 in./sec). With these approach velocities, juveniles of >17 cm (>6.7 in.) FL would likely be able to avoid impingement into the WF3 cooling system based on observed burst speeds in Adams et al.'s (1999) study. Smaller juveniles of <16.8 cm (<6.6 in.) FL, however, may not be able to avoid the intake when the intake velocity is ≥ 1.3 fps (≥ 40 cm/sec; ≥ 16 in./sec). These individuals could be susceptible to impingement.

Additionally, individuals within the larger FL range could exhibit slower burst swimming speeds if weakened, injured, or diseased, which could increase susceptibility to impingement.

No impingement studies have been conducted at WF3 to verify the above assumptions regarding juvenile susceptibility to impingement. Therefore, the NRC staff reviewed impingement data from other Lower Mississippi River energy generating facilities, including data from Waterford 1 and 2, which lies just upriver of WF3.

Like WF3, Waterford 1 and 2 have an offshore intake structure that withdraws water from the main stem of the Mississippi River within fast flowing water that has relatively low densities of ichthyoplankton (ENSR 2007). Waterford 1 and 2's approach velocity is slightly lower than WF3 and varies from 0.95 to 1.5 fps (29.0 to 45.7 cm/sec; 11.4 to 18 in./sec). Therefore, based on the above discussion of swimming speeds, juveniles of <16.8 cm (<6.6 in.) FL could be occasionally impinged when the facility is drawing water at the upper end of the velocity range (1.3 to 1.5 fps; 40 to 45.7 cm/sec; 16 to 18 in./sec). Larger but weakened, injured, or diseased juveniles could also be impinged. To validate these assumptions, the NRC staff reviewed two Waterford 1 and 2 impingement studies, which were conducted in 1976–1977 and 2006–2007.

From February 1976 through January 1977, Huston & Associates collected 24 bi-weekly impingement samples at set 24-hour intervals in the sluiceway of the Waterford 1 and 2 intake structure with three baskets that collected biota and debris following travel screen washing and clearing. The baskets were lined with hardware cloth that had 0.25- to 0.5-in. (0.64- to 1.3-cm) mesh openings. Out of 22,123 individuals of 46 fish and 3 invertebrate species, Espey, Huston & Associates (1977) collected two juvenile pallid sturgeon. The first juvenile was collected during the May 18–19, 1976, sample period. The individual was 42 cm (16.5 in.) standard length (SL) and 211.8 grams (g) (0.47 pounds (lbs)). The second was collected during the July 27–28, 1976, sample period. The individual was 28.3 cm (11.1 in.) SL and 66.4 g (0.15 lbs). While a clear comparison cannot be made because Espey, Huston & Associates (1978) recorded SL and not FL, the SLs indicate that these individuals were likely of FLs greater than >17 cm (>6.7 in.). However, the study qualitatively noted that physical injury to ray-finned fish, including shredding and abrading of the soft rays, was common, and that spines were sometimes broken. Thus, the two collected juveniles may have been weakened or injured, which may have accounted for their impingement despite their larger size.

Beginning in 2006, ENSR (2007) conducted a similar impingement study at Waterford 1 and 2. ENSR collected bi-weekly samples within set 24-hour collection periods from September 2006 through August 2007. As with the previous study, biological samples were collected in the sluiceway with baskets. ENSR collected 18,608 individuals of 32 fish and shellfish species during the study. ENSR (2007) did not collect any pallid sturgeon during the study.

In addition to data from Waterford 1 and 2, Espey, Huston & Associates conducted impingement and entrainment sampling at three of the five units at Willow Glen Power Station from January 1975 through January 1976. This facility lies approximately 71 RM upstream of WF3 at RM 201, and like WF3, it has an offshore intake structure in the main stem of the Mississippi River within fast flowing water with low densities of ichthyoplankton. ENSR (2005) summarizes the Willow Glen study and reports that impingement rates during the study were relatively low with 126,000 organisms per year estimated to be impinged with all five units in operation. One juvenile pallid sturgeon was impinged over the course of the study. Because the original study was unavailable for

NRC staff review, the intake velocities and the size of the impinged juvenile are unknown.

Unlike juveniles, adult pallid sturgeon are expected to have sufficient swimming ability to avoid impingement. The NRC staff did not identify any impingement studies on the Lower Mississippi River that reported collections of adult pallid sturgeon. Accordingly, the NRC staff believes that adult pallid sturgeon are unlikely to be susceptible to impingement at WF3.

In 2015 and 2016, the FWS reviewed the potential impacts of continued operation of the WF3 cooling water intake system upon two occasions: following Entergy's request for comments on the WF3 license renewal application and during the Louisiana Department of Environmental Quality's (LDEQ) review of Entergy's LPDES permit renewal application.

On May 28, 2015, Entergy (2015) requested the FWS's review of the WF3 license renewal application. The FWS (2015) replied on June 26, 2015, and stated that the project had been reviewed for effects to federally listed species under its jurisdiction and currently protected by the ESA and that the proposed license renewal would have no effect on those species. On March 1, 2016, the LDEQ (2016) submitted a copy of Entergy's LPDES permit renewal application to the FWS for its review in accordance with the biological opinion associated with the final CWA 316(b) Rule for Existing Facilities. The FWS (2016) replied on March 31, 2016, and stated that the renewal of the permit is not likely to adversely affect resources under its jurisdiction, including the pallid sturgeon, and that the FWS's finding fulfilled the requirements under Section 7(a)(2) of the ESA for the LDEQ's renewal of the WF3 LPDES permit. The FWS's responses to Entergy and to LDEQ indicate that the FWS does not expect continued operation of WF3 to result in impingement of pallid sturgeon individuals. Appendix B of this evaluation includes copies of the correspondence described in this paragraph.

Based on the above review of pallid sturgeon swimming speeds, historical impingement records at other Lower Mississippi River energy generating facilities, and past FWS reviews of effects to federally listed species associated with Entergy's request for the FWS to review its license renewal application and with LDEQ's ongoing WF3 LPDES permit renewal review, the NRC staff concludes that pallid sturgeon impingement during the license renewal term is a discountable impact because it is extremely unlikely to occur.

Thermal Effects

Within the action area, Mississippi River surface water temperatures fluctuate seasonally with lowest temperatures typically occurring in January and highest temperatures typically occurring in August. In the 2006–2007 impingement study conducted at Waterford 1 and 2, ENSR (2007) recorded temperatures between 6.4 °C (43.5 °F) and 32.7 °C (90.9 °F). The WF3 thermal plume also varies with season. Generally, the WF3 thermal plume increases as flow decreases such that the thermal plume is largest under low flow conditions. The NRC (1981) conducted an independent analysis of the WF3 thermal plume based on typical low flow conditions (200,000 cfs; 5,600 m³/sec), which occur approximately once every 6.7 years. The NRC (1981) found that the 2.8°C (5°F) thermal plume isotherm would cover about 7.3 percent of the river's cross-section area. Since that time, the LDEQ has increased the allowable effluent discharge temperature limit in the WF3 LPDES permit from 110°F (43°C) to 118°F (48°C). Under the 118°F (48°C) limit, the LDEQ estimates a zone of passage of 81 percent of the cross-sectional

river area assuming conservative assumptions, such as extreme low flow and all four plants (WF3, Waterford 1 and 2, and Little Gypsy Power Plant) operating.

North American sturgeon species generally prefer cooler waters, and most prefer and perform optimally at water temperatures of 25 °C (77 °F) or less (Blevins 2011). Activity and growth of young sturgeon generally increases with temperature until an optimal temperature, usually below 25 °C (77 °F), is reached (Blevins 2011). Eggs and larval stages are likely more sensitive to high temperatures than juveniles and adults, which can find refuge in microhabitats with cooler water. In a study of 1,000 juvenile shovelnose sturgeon in the upper Missouri River, Kapperman et al. (2009) found that temperature tolerances range from 10.0 to 30.0 °C (50 to 86°F) with optimal growth occurring at 22.0 °C (71.6 °F). However, available literature suggests that pallid sturgeon likely tolerate higher water temperatures than shovelnose and other sturgeon species. For instance, data from a small bioenergetics model study of pallid sturgeon on the Lower Missouri River indicate that 25 to 28 °C (77 to 82.4 °F) is the optimal temperature range for feeding and growth (Chipps et al. 2010). Temperatures from 30 to 33 °C (86 to 91.4 °F) appear to be stressful, while temperatures above 33 °C (91.4 °F) begin to result in death (Chipps et al. 2010). At 33 °C (91.4 °F), four-day survival of pallid sturgeon individuals was 83 percent, whereas at 35 °C (95 °F), all fish lost equilibrium within 30 seconds, and all individuals died within two hours (Chipps et al. 2010).

The NRC expects that pallid sturgeon juveniles and adults would not be measurably affected by the WF3 thermal plume for the following reasons.

- Individuals could avoid the plume and swim through the large zone of passage.
- Swim time through the thermal plume would be of short duration.
- The thermal plume would not exceed thermal tolerance during cooler portions of the year.
- The plume would only potentially exceed pallid sturgeon thermal tolerances during limited periods of each year (May through October).

While pallid sturgeon individuals may exhibit altered behavior to avoid the thermal plume, effects are unlikely to reach the scale of a take and would, therefore, be insignificant. Pallid sturgeon eggs and larvae do not occur in the action area, and would, therefore, be unaffected. Additionally, the FWS (2016) determined that renewal of the WF3 LPDES permit, which authorizes heated discharge and sets corresponding temperature limitations, is not likely to adversely affect pallid sturgeon. Accordingly, the NRC staff concludes that thermal effects on pallid sturgeon during the proposed license renewal term represent an insignificant impact.

Exposure to Radionuclides and Other Contaminants

In its *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS), the NRC (2013) determined that exposure to radionuclides would be of SMALL significance for aquatic resources during the license renewal term for all nuclear power plants because exposure would be well below U.S. Environmental Protection Agency guidelines developed to protect aquatic biota. The NRC defines “SMALL” to mean that environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource (10 CFR 51, Appendix B to Subpart A, Table B-1). The GEIS also concludes that effects of non-radiological contaminants on aquatic organisms would be SMALL because best management practices and discharge limitations contained in applicable State-issued National

Pollutant Discharge Elimination System (NPDES) permits would minimize the potential for impacts to aquatic resources.

Specific to sturgeon species, in biological opinions associated with the continued operation of three other nuclear power plants (Indian Point Nuclear Generating Unit Nos. 2 and 3 in New York and Salem and Hope Creek Nuclear Generating Stations in New Jersey), the National Marine Fisheries Service (NMFS) (2013, 2014) determined that measurable exposure of sturgeon (Atlantic and shortnose (*Acipenser brevirostrum*) sturgeons) to radionuclides and other contaminants resulting from continued operation of a nuclear power plant would be extremely unlikely and, therefore, represented an insignificant and discountable impact.

The NRC staff did not identify any scientific studies or other information indicating that pallid sturgeon could experience measurable adverse effects from the minimal discharges of radionuclides and other contaminants that would occur during the proposed WF3 license renewal period. Based on the above information, the NRC staff finds that exposure to radionuclides and other contaminants during the proposed license renewal period represents a discountable impact because it would not be able to be meaningfully detected, measured, or evaluated and insignificant because exposure would never reach the scale where a take would occur.

Reduction in Available Prey Due to Impingement and Entrainment or Thermal Impacts

The diet of pallid sturgeon changes with age as previously described in this evaluation. The most commonly impinged species at WF3 that are potential prey for pallid sturgeon are three clupids: threadfin shad, freshwater drum, and skipjack herring (ENSR 2007; Espey et al. 1977). However, the continued presence and relative abundance of these and other commonly impinged species in the action area suggests that the aquatic community surrounding WF3 has not substantially changed as a result of impingement since WF3 operations began. Entrainment is also unlikely to noticeably affect important attributes of the aquatic community near WF3 because of the lack of suitable spawning habitat near the plant. As such, impingement and entrainment impacts on pallid sturgeon prey species are unlikely to be detectable or would be so minor as to neither destabilize nor noticeably alter the aquatic community. Thermal impacts on prey species would also be minor for the same reasons described above for the pallid sturgeon. Accordingly, because WF3 operations do not result in detectable impingement and entrainment or thermal impacts on the aquatic community, any small reductions in available prey that could result in effects on pallid sturgeon through the food web would not be able to be meaningfully measured, detected, or evaluated, and would, therefore, result in a discountable impact.

6.2.2 Indirect Effects

Under the ESA, indirect effects are those that are caused by the proposed action that are later in time but are still reasonably certain to occur (50 CFR 402.02). The NRC did not identify any indirect effects associated with the proposed action that could affect the pallid sturgeon. Termination of WF3 operations and associated decommissioning of each reactor would occur eventually regardless of license renewal. While the proposed license renewal would delay the date of reactor shutdown, it would not significantly alter decommissioning impacts. Future effects to pallid sturgeon associated with decommissioning of WF3 at the end of the proposed license renewal term would be addressed through Section 7 consultation, if needed, at the time of decommissioning.

6.2.3 Interrelated and Interdependent Effects

Interrelated actions are those actions that are part of a larger action and depend on the larger action for their justification (50 CFR 402.02). Interdependent actions are those actions having no independent utility apart from the proposed action (50 CFR 402.02). The NRC staff has not identified any information that would indicate that there would be any interrelated or interdependent actions associated with the proposed license renewal that might affect the pallid sturgeon.

6.2.4 Summary of Effects to Pallid Sturgeon

The NRC staff finds that entrainment of pallid sturgeon into the WF3 intake during the proposed license renewal term is unlikely because the species is not currently known to spawn in the Mississippi River main channel. While impingement of juveniles and adults is possible, the NRC staff concludes that this impact is unlikely and discountable because pallid sturgeon impingement has been relatively rare at other Lower Mississippi River energy generating facilities and because the FWS previously determined in March 2016 that the WF3 LPDES permit renewal, which authorizes continued withdrawal and discharge of cooling water, is not likely to adversely affect pallid sturgeon. Although pallid sturgeon individuals may exhibit altered behavior to avoid the WF3 thermal plume, thermal impacts would never reach the scale where a take would occur due to the limited size of the plume and would, therefore, be insignificant. Some reductions in available prey due to impingement and entrainment or thermal effects could occur during the proposed license renewal term, but these impacts would be discountable because they are unlikely to be detectable or would be so minor as to neither destabilize nor noticeably alter the aquatic community. Because the NRC staff finds that all of the potential effects of WF3 license renewal on the pallid sturgeon would be insignificant and/or discountable, the NRC staff concludes that the proposed action may affect, but is not likely to adversely affect this species.

6.3 West Indian Manatee

In the previous section of this evaluation, the NRC staff determined that the West Indian manatee is unlikely to occur in the action area based on habitat requirements, life history, occurrence records, and other available information. Accordingly, the NRC staff concludes that the proposed action would have no effect on the West Indian manatee, and this species is not considered in any further detail in this evaluation.

6.4 Cumulative Effects

Cumulative effects are those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR 402.02). When formulating biological opinions during formal Section 7 consultation, the FWS and NMFS (1998) consider cumulative effects when determining the likelihood of jeopardy or adverse modification. Therefore, consideration of cumulative effects under the ESA is necessary only if listed species will be adversely affected by the proposed action and formal Section 7 consultation is necessary (FWS 2014b). Because the NRC staff concluded earlier in this evaluation that the proposed license renewal is not likely to adversely affect the pallid sturgeon and that it would have no effect on all other federally listed species and on critical habitat, consideration of cumulative effects is not necessary. Additionally, the NRC staff did not identify any actions within the action area that meet the definition of cumulative effects under the ESA.

7.0 ESA Effect Determinations

7.1 Summary of Effects to Federally Listed Species

The proposed action, WF3 license renewal, has the potential to affect the endangered pallid sturgeon. The action area includes the Mississippi River from the WF3 intake at RM 129.6 to the downstream extent of the 2.8 degrees Celsius (°C) (5 degrees Fahrenheit (°F)) isotherm of WF3's thermal plume. The NRC staff evaluated the impacts of entrainment, impingement, thermal effects, exposure to radionuclides and other contaminants, and reduction in available prey on the pallid sturgeon during the proposed WF3 license renewal term and found that these impacts would be insignificant, discountable, or both. Although the FWS's ECOS IPaC database lists two additional species, the gulf sturgeon and West Indian Manatee, as potentially occurring in the action area, the NRC staff determined that these species do not occur in the action area based on a review of the species' life histories, available studies, and other species occurrence information.

7.2 ESA Effect Determinations

Based on the foregoing evaluation, the NRC staff makes the following ESA effect determinations for the gulf sturgeon, pallid sturgeon, and West Indian manatee.

7.2.1 Atlantic Sturgeon, Gulf Subspecies

The NRC staff concludes that the proposed action would have *no effect* on the gulf sturgeon.

7.2.2 Pallid Sturgeon

The NRC staff concludes that the proposed action *may affect, but is not likely to adversely affect* the pallid sturgeon.

7.2.3 West Indian Manatee

The NRC staff concludes that the proposed action would have *no effect* on the West Indian manatee.

8.0 References

References with Agencywide Documents Access and Management System (ADAMS) accession numbers can be accessed through NRC's web-based ADAMS search engine at <http://adams.nrc.gov/wba/>. Click on the "Advanced Search" tab and choose the following criteria under Document Properties: "Accession Number" in the Property box, "is equal to" in the Operator box, and the ADAMS Accession Number of the document in the "Value" box.

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Appendix A: Figures

Table A–1 below lists the figures in this appendix. All figures have been reproduced in their original form from Entergy’s (2016) ER submitted to the NRC as part of the license renewal application. For more information on each figure, refer to the ER (Entergy 2016).

Table A–1. List of WF3 Figures

Figure No.	ER Figure No. ^(a)	Figure Title ^(b)
A-1	3.0-1	WF3 Plant Layout
A-2	3.0-3	6-Mile Radius of WF3
A-3	3.1-1	Land Use/Land Cover, Entergy Louisiana, LLC Property
A-4	3.1-2	Land Use/Land Cover, 6-Mile Radius of WF3
A-5	2.2-2	WF3 Cooling Water Intake Structure Location
A-6	2.2-3	WF3 Cooling Water Intake Structure
A-7	2.2-4	WF3 Cooling Water Intake Canal
A-8	2.2-5	WF3 Intake Bay and Traveling Screens
A-9	2.2-6	WF3 Discharge Structure and Canal

^(a) Figure numbers in this column correspond to the original figure numbers provided in the license renewal ER (Entergy 2016).

^(b) Figure titles have not been modified from the titles that appear in the license renewal ER (Entergy 2016).



Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User

(Entergy 2013a; ESRI 2014; USCB 2014c; WF3 2009)

Legend

- Property Boundary
- +— Railroad
- - - Protected Area
- ▭ Exclusion Area Boundary
- ▭ WF3 Structure
- ▭ Waterford 1, 2 & 4 Structures

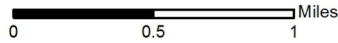
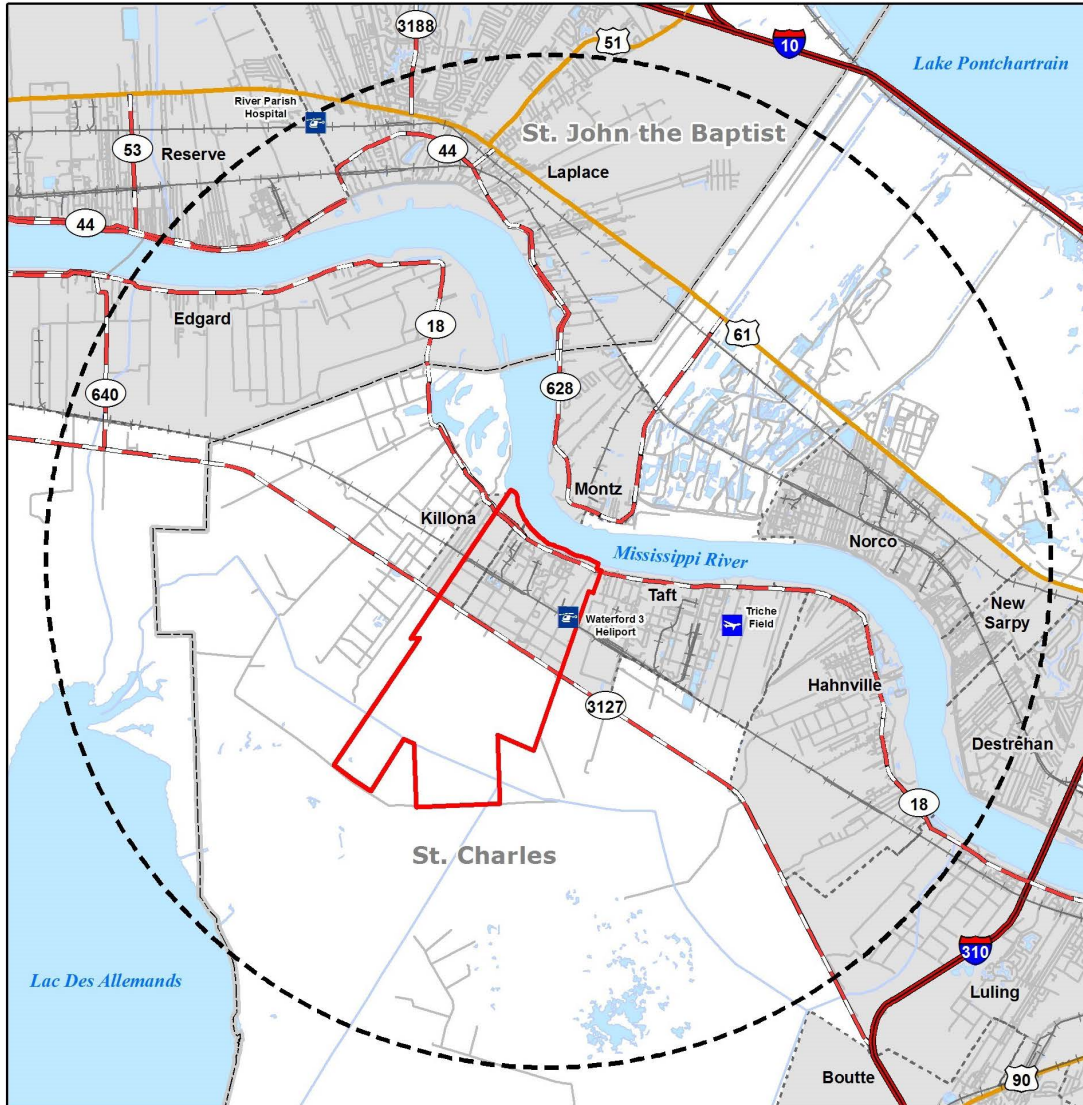














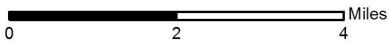
Figure A-1. WF3 Plant Layout



(Entergy 2013a; USCB 2014c; USDOT 2014; USGS 2014a)

Legend

- | | | | |
|---|---------------|---|-------------------|
|  | Airport |  | Property Boundary |
|  | Heliport |  | Interstate |
|  | Surface Water |  | U.S. Route |
|  | 6-Mile Radius |  | State Route |
|  | Census Place |  | Local Roads |
|  | Parish |  | Railroad |



**Figure 3.0-3
6-Mile Radius of WF3**

Figure A-2. 6-Mile Radius of WF3



(Entergy 2013a; ESRI 2014; USDA 2014a)

Legend

- | | |
|------------------------------|------------------------------|
| Property Boundary | Shrub/Scrub |
| Open Water | Grassland/Herbaceous |
| Developed, Open Space | Pasture/Hay |
| Developed, Low Intensity | Cultivated Crops |
| Developed, Medium Intensity | Woody Wetlands |
| Developed, High Intensity | Emergent Herbaceous Wetlands |
| Barren Land (Rock/Sand/Clay) | |

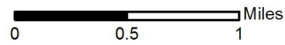
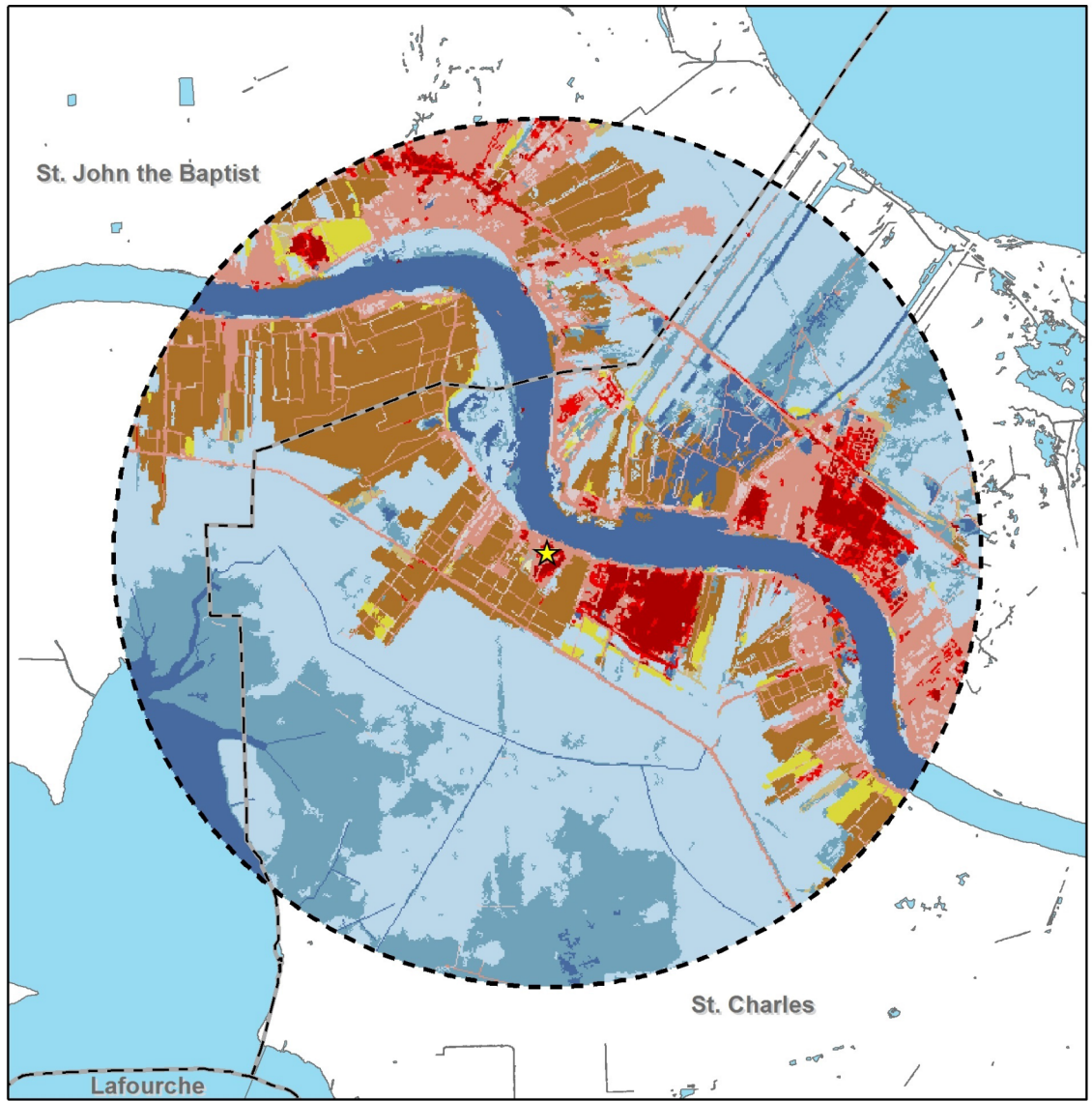


Figure A-3. Land Use/Land Cover, Entergy Louisiana, LLC Property



(USCB 2014c; USDA 2014a; USGS 2014a)

- Legend**
- ★ WF3 Centerpoint
 - ⊖ 6-Mile Radius
 - ▭ Parish
 - Open Water
 - Developed, Open Space
 - Developed, Low Intensity
 - Developed, Medium Intensity
 - Developed, High Intensity
 - Barren Land (Rock/Sand/Clay)
 - Deciduous Forest
 - Mixed Forest
 - Shrub/Scrub
 - Grassland/Herbaceous
 - Pasture/Hay
 - Cultivated Crops
 - Woody Wetlands
 - Emergent Herbaceous Wetlands

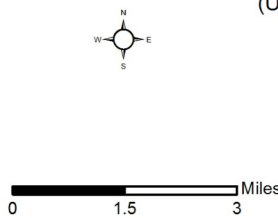


Figure A-4. Land Use/Land Cover, 6-Mile Radius of WF3



(Entergy 1983; Entergy 2013a; ESRI 2014; WF3 2009)

Legend

- Property Boundary
- WF3 Structure

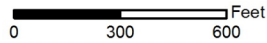


Figure A-5. WF3 Cooling Water Intake Structure Location

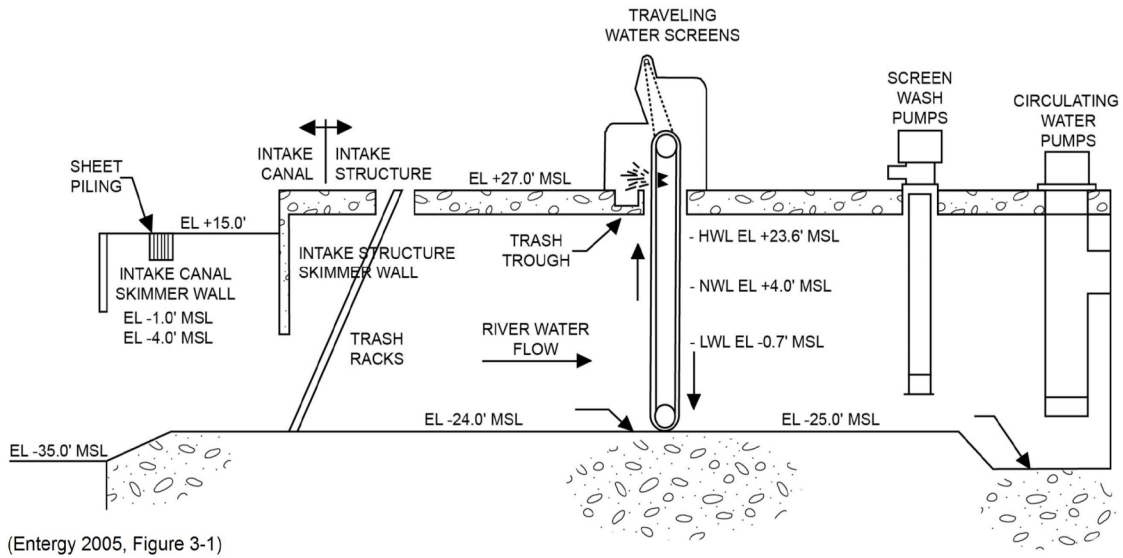


Figure A-6. WF3 Cooling Water Intake Structure

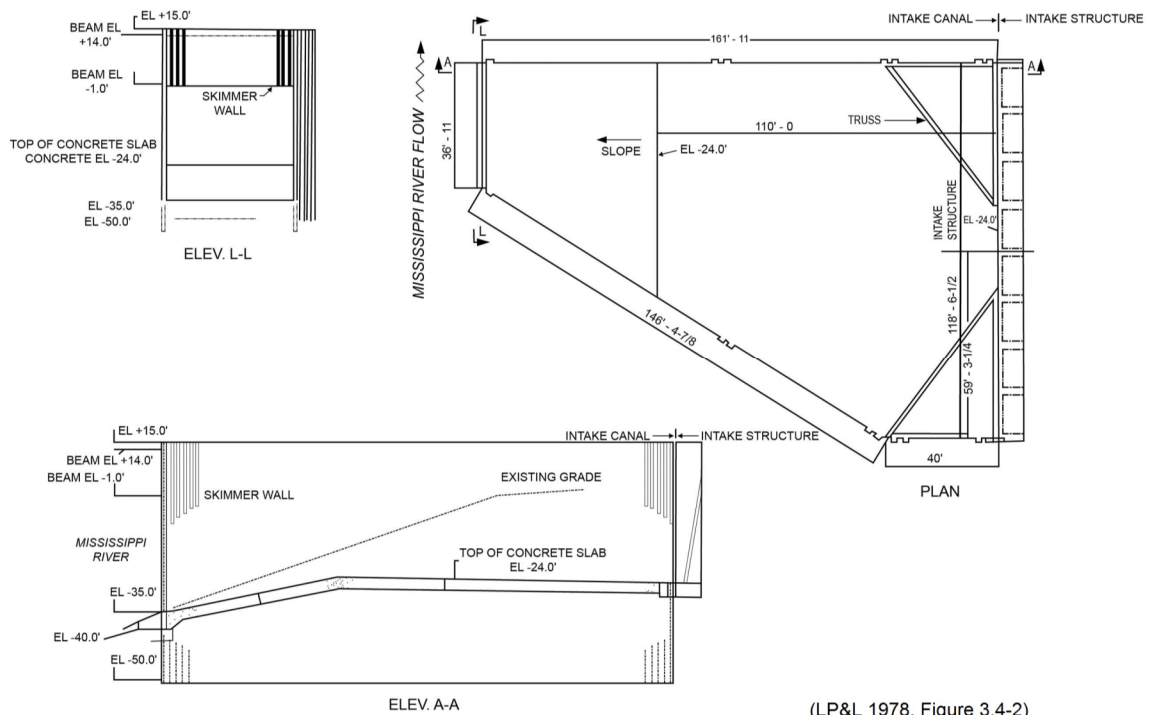


Figure A-7. WF3 Cooling Water Intake Canal

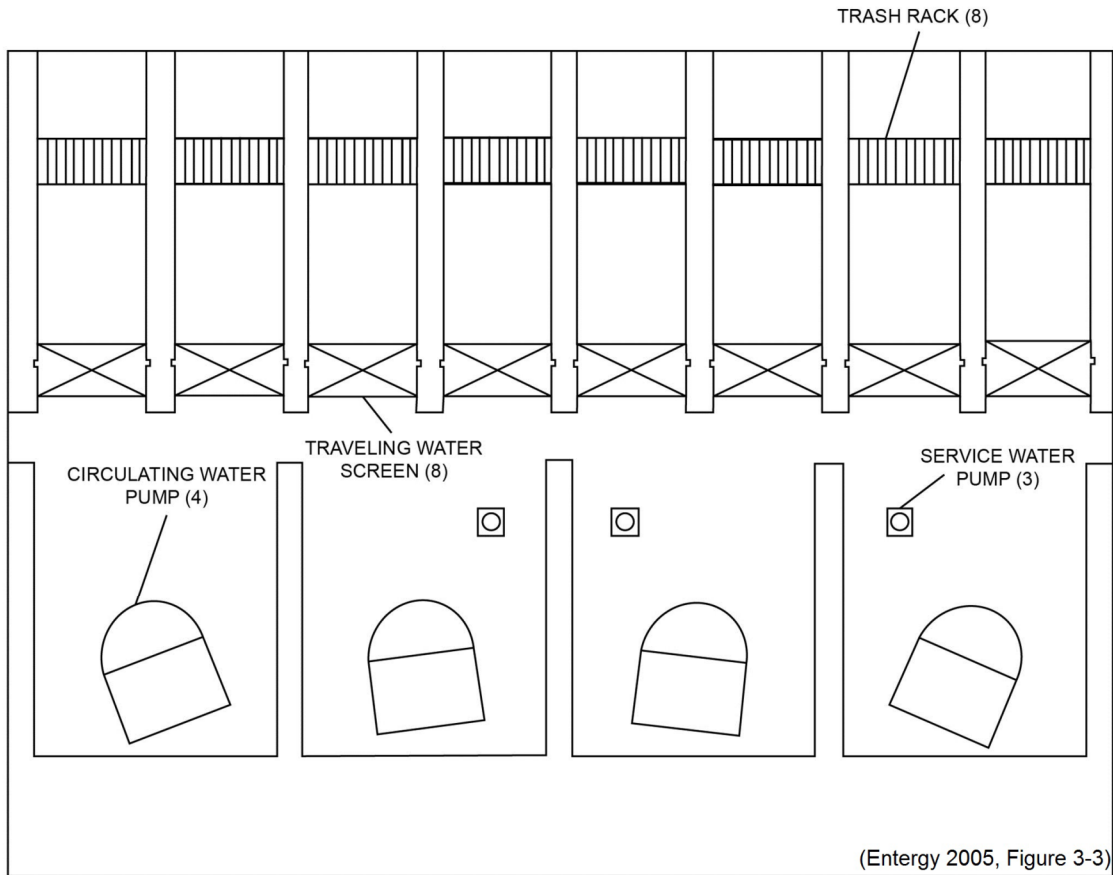


Figure A-8. WF3 Intake Bay and Traveling Screens

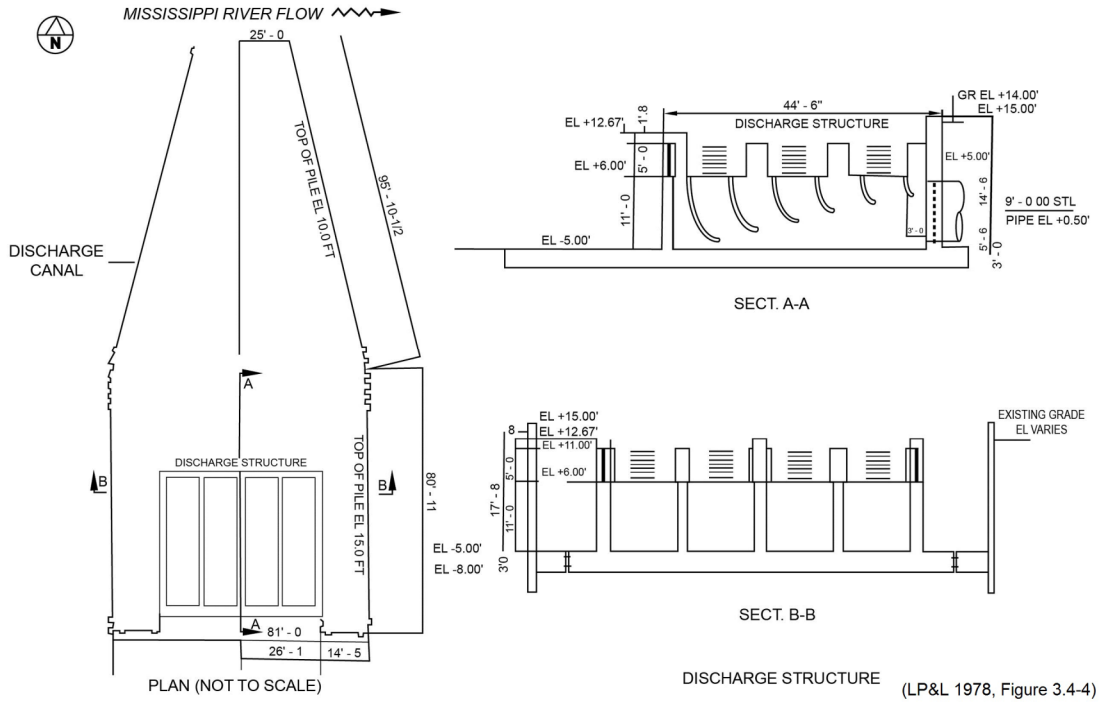


Figure A-9. WF3 Discharge Structure and Canal

Appendix B: Past FWS Correspondence Related to WF3

As described in Section 6.2.1 of this evaluation, the FWS has reviewed the potential impacts of continued operation of the WF3 cooling water intake system upon two occasions: following Entergy's request for comments on the WF3 license renewal application in 2015 and during the LDEQ's review of Entergy's LPDES permit renewal application in 2016. This appendix contains copies of the correspondence between FWS, Entergy, and LDEQ related to these reviews as identified below in chronological order.

- May 28, 2015, Letter from R. Buckley, Entergy, to B. Riech, FWS. Subject: Waterford 3 Steam Electric Station Unit 3 License Renewal Application.
- June 26, 2015, Letter from D. Fuller, FWS, to R. Buckley, Entergy. Reply to Entergy's May 28, 2015, letter concerning Waterford 3 Steam Electric Station Unit 3 License Renewal Application.
- March 1, 2016, E-mail from K. Hamilton, LDEQ, to A. Trahan and D. Walther, FWS. Subject: Renewal application for facility subject to 316(b) requirements for existing facilities; Entergy Louisiana LLC – Waterford 3 Steam Electric Station; AI 35260; LA0007374.
- March 31, 2016, Letter from D. Fuller, FWS, to K. Hamilton, LDEQ. Subject: Renewal application for facility subject to 316(b) requirements for existing facilities; Entergy Louisiana, LLC – Waterford 3 Steam Electric Station; AI 35260 LA0007374.



Entergy Services, Inc
1340 Echelon Parkway
Jackson, Mississippi 39213

May 28, 2015

Mr. Brad Rieck
Deputy Field Supervisor
U.S. Fish and Wildlife Service
Louisiana Field Office
646 Cajundome Blvd., Suite 400
Lafayette, LA 70506

SUBJECT: Waterford 3 Steam Electric Station Unit 3
License Renewal Application

CEO 2015-00052

Dear Mr. Rieck,

In 2016, Entergy Louisiana, LLC and Entergy Operations, Inc. (collectively referred to as "Entergy") plans to apply to the Nuclear Regulatory Commission (NRC) for renewal of the operating license for the Waterford Steam Electric Station Unit 3 (WF3), which is located in St. Charles Parish, Louisiana on the west (right descending) bank of the Mississippi River at River Mile 129.6, approximately 25 miles west of New Orleans, Louisiana and 50 miles southeast of Baton Rouge, Louisiana. The existing operating license for WF3 was issued for a 40-year term that expires in 2024. If the NRC approves the application, Entergy will then have the option to continue operating WF3 for an additional 20 years until 2044. In conjunction with this effort, Entergy is gathering information relative to this license renewal project to assist with the preparation of the application.

The NRC requires that the license renewal application for WF3 include an environmental report that assesses potential environmental impacts from plant operations during the license renewal term. One of these potential environmental impacts would be the effect of license renewal on Federally-listed threatened,

B-6

endangered or candidate species and designated critical habitat located on the WF3 property and its immediate environs (Figure 1). Accordingly, the NRC requires that the environmental report for each license renewal application assess such a potential effect (10 CFR 51.53). Later, during its review of the license renewal environmental report pursuant to the National Environmental Policy Act, the NRC may request information from your office to ensure compliance with Section 7 of the Endangered Species Act.

Entergy is contacting you now in order to obtain input regarding issues that may need to be addressed in the WF3 license renewal environmental report, and to assist in identifying any information your staff believes would be helpful to expedite NRC's review.

WF3 is located on approximately 3,560 acres of Entergy Louisiana, LLC (ELL) owned property that consists primarily of wetlands, agriculture, and developed areas. The WF3 plant area itself covers 40.1 acres and is zoned as an industrial area by St. Charles Parish. The land in the vicinity of the WF3 site is mostly wetlands. Transmission lines that connect WF3 to the regional electricity grid which the NRC considers to be within the scope of its environmental review for renewal of the WF3 operating license are located entirely within the ELL property. The length of these transmission lines is approximately 0.6 miles, and there is limited right-of-way since the lines cross the WF3 industrial area where vegetation is sparse.

Based on review of information available, Entergy has included in Table 1 threatened, endangered and candidate species identified as being Federally-listed in St. Charles and St. John the Baptist parishes, of which portions of are included within a 6-mile radius of WF3 (Figure 1). As shown in Table 1, no suitable habitat for these species was identified on the ELL property during a pedestrian survey conducted on October 29, 2014, or was any species observed during the survey. Entergy does not anticipate that the one Federally-listed species identified only in St. John the Baptist Parish (Alabama heelsplitter mussel, *Lasmigona alabamensis*) would be affected by the renewal of the WF3 operating license since the Mississippi River does not provide suitable habitat for this species. In addition during Entergy's review, no designated critical habitat was identified for the species listed in Table 1 within the immediate environs (6-mile radius) of WF3.

However, Entergy does not expect that WF3's operations during the license renewal term would result in adverse effects to threatened, endangered or candidate species and designated critical habitats even if present since there are no plans to alter current operations during the 20-year license renewal period, and any maintenance activities necessary to support continued operation of WF3 would be limited to currently developed areas of the site. Although administrative procedural controls are in place to

comply with applicable state and federal laws to preserve biological resources when facility expansion or land disturbance activities do occur, no expansion is planned or needed in support of license renewal.

After your review of the information provided in this letter, I would appreciate you sending a letter detailing any concerns you may have about potential impacts to threatened, endangered or candidate species and designated critical habitat on the property where WF3 is located, or the immediate environs, or alternatively, confirming our conclusion that these species and habitats will not be adversely affected as a result of renewing the WF3 operating license for an additional 20 years. Entergy will include copies of this letter and your response in the environmental report submitted to the NRC as part of the WF3 license renewal application.

If you have any questions, please contact me at (601) 368-5823 or through my email address, rbuckle@entergy.com.

A handwritten signature in black ink that reads "Rick Buckley". The signature is written in a cursive, slightly slanted style.

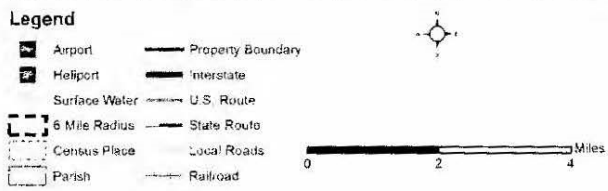
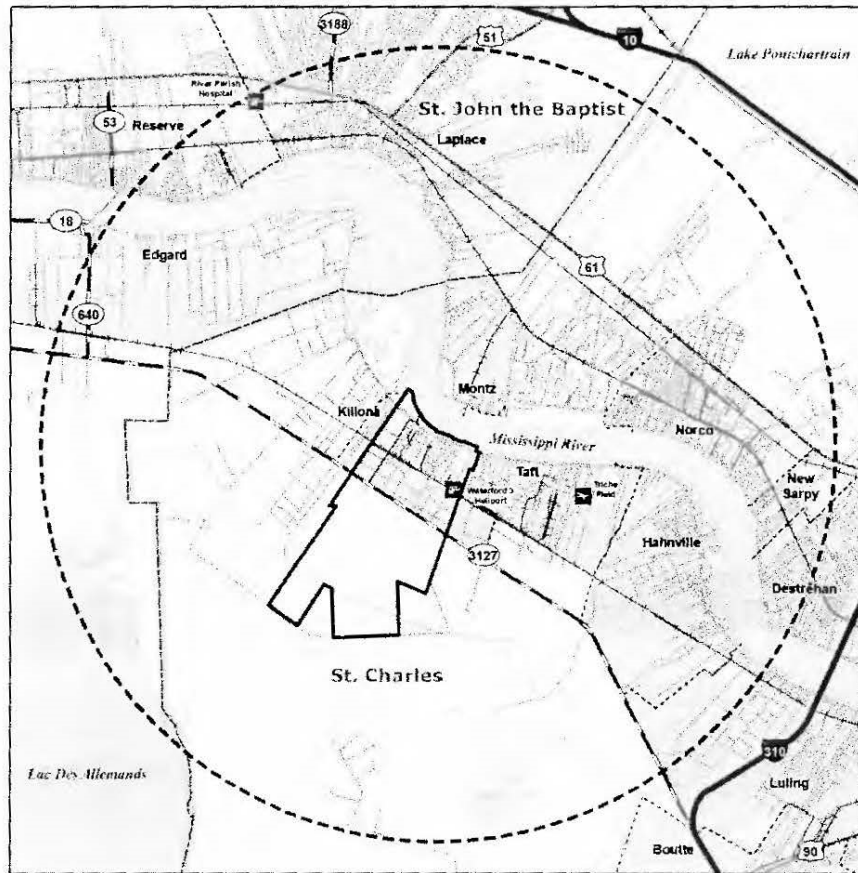
Rick Buckley, CHMM, REM
Sr. Project Manager, Environmental

Table 1
Federal-Listed Species, St. Charles and St. John the Baptist Parishes

Common Name	Scientific Name	Applicable Parish	Federal Status	Habitat Present on ELL Property	Species Present on ELL Property
<u>Mammals</u>					
West Indian Manatee	<i>Trichechus manatus</i>	SC/SJB	E	No	No
<u>Birds</u>					
Sprague's Pipit	<i>Anthus spragueii</i>	SC/SJB	C	No	No
<u>Fish</u>					
Atlantic Sturgeon	<i>Acipenser oxyrinchus desotoi</i>	SC/SJB	T	No	No
Pallid Sturgeon	<i>Scaphirhynchus albus</i>	SC/SJB	E	No	No
<u>Mollusks</u>					
Alabama Heelsplitter Mussel	<i>Lasmigona alabamensis</i>	SJB	T	No	No

SC = St. Charles Parish
SJB = St. John the Baptist Parish
T = Threatened
E = Endangered
C = Candidate Species

Figure 1
 Location of Entergy Property, 6-Mile Radius Map





Entergy Services, Inc
1340 Echelon Parkway
Jackson, Mississippi 39213

RECEIVED
JUN 01 2015
FISH & WLDL. SERV
LAFAYETTE, LA.

May 28, 2015

Mr. Brad Rieck
Deputy Field Supervisor
U.S. Fish and Wildlife Service
Louisiana Field Office
646 Cajundome Blvd., Suite 400
Lafayette, LA 70506

This project has been reviewed for effects to Federal trust resources under our jurisdiction and currently protected by the Endangered Species Act of 1973 (Act). The project as proposed, will have no effect on those resources. is not likely to adversely affect those resources. This project falls under Section 7(a)(2) of the Act.

Michelle A. Fuller June 26, 2015
Acting Supervisor
Louisiana Field Office
U.S. Fish and Wildlife Service

SUBJECT: Waterford 3 Steam Electric Station Unit 3
License Renewal Application

GEO 2015-00052

Dear Mr. Rieck,

In 2016, Entergy Louisiana, LLC and Entergy Operations, Inc. (collectively referred to as "Entergy") plans to apply to the Nuclear Regulatory Commission (NRC) for renewal of the operating license for the Waterford Steam Electric Station Unit 3 (WF3), which is located in St. Charles Parish, Louisiana on the west (right descending) bank of the Mississippi River at River Mile 129.6, approximately 25 miles west of New Orleans, Louisiana and 50 miles southeast of Baton Rouge, Louisiana. The existing operating license for WF3 was issued for a 40-year term that expires in 2024. If the NRC approves the application, Entergy will then have the option to continue operating WF3 for an additional 20 years until 2044. In conjunction with this effort, Entergy is gathering information relative to this license renewal project to assist with the preparation of the application.

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Entergy is contacting you now in order to obtain input regarding issues that may need to be addressed in the WF3 license renewal environmental report, and to assist in identifying any information your staff believes would be helpful to expedite NRC's review.

WF3 is located on approximately 3,560 acres of Entergy Louisiana, LLC (ELL) owned property that consists primarily of wetlands, agriculture, and developed areas. The WF3 plant area itself covers 40.1 acres and is zoned as an industrial area by St. Charles Parish. The land in the vicinity of the WF3 site is mostly wetlands. Transmission lines that connect WF3 to the regional electricity grid which the NRC considers to be within the scope of its environmental review for renewal of the WF3 operating license are located entirely within the ELL property. The length of these transmission lines is approximately 0.6 miles, and there is limited right-of-way since the lines cross the WF3 industrial area where vegetation is sparse.

Based on review of information available, Entergy has included in Table 1 threatened, endangered and candidate species identified as being Federally-listed in St. Charles and St. John the Baptist parishes, of which portions of are included within a 6-mile radius of WF3 (Figure 1). As shown in Table 1, no suitable habitat for these species was identified on the ELL property during a pedestrian survey conducted on October 29, 2014, or was any species observed during the survey. Entergy does not anticipate that the one Federally-listed species identified only in St. John the Baptist Parish (Alabama heelsplitter mussel, *Lasnigona alabamensis*) would be affected by the renewal of the WF3 operating license since the Mississippi River does not provide suitable habitat for this species. In addition during Entergy's review, no designated critical habitat was identified for the species listed in Table 1 within the immediate environs (6-mile radius) of WF3.

However, Entergy does not expect that WF3's operations during the license renewal term would result in adverse effects to threatened, endangered or candidate species and designated critical habitats even if present since there are no plans to alter current operations during the 20-year license renewal period, and any maintenance activities necessary to support continued operation of WF3 would be limited to currently developed areas of the site. Although administrative procedural controls are in place to

comply with applicable state and federal laws to preserve biological resources when facility expansion or land disturbance activities do occur, no expansion is planned or needed in support of license renewal.

After your review of the information provided in this letter, I would appreciate you sending a letter detailing any concerns you may have about potential impacts to threatened, endangered or candidate species and designated critical habitat on the property where WF3 is located, or the immediate environs, or alternatively, confirming our conclusion that these species and habitats will not be adversely affected as a result of renewing the WF3 operating license for an additional 20 years. Entergy will include copies of this letter and your response in the environmental report submitted to the NRC as part of the WF3 license renewal application.

If you have any questions, please contact me at (601) 368-5823 or through my email address, rbuckle@entergy.com.

Rick Buckley

Rick Buckley, CHMM, REM
Sr. Project Manager, Environmental



Trahan, Amy <amy_trahan@fws.gov>

renewal application for facility subject to 316(b) requirements for existing facilities; Entergy Louisiana, LLC - Waterford 3 Steam Electric Station; AI 35260 LA0007374

1 message

Kelli Hamilton <Kelli.Hamilton@la.gov>

Tue, Mar 1, 2016 at 10:07 AM

To: "amy_trahan@fws.gov" <amy_trahan@fws.gov>, "David_Walther@fws.gov" <David_Walther@fws.gov>

Good afternoon,

The renewal application for Entergy Louisiana, LLC - Waterford 3 Steam Electric Station is being submitted in accordance with the 316(b) Rule for Existing Facilities. According to 40 CFR 125.98(h), LDEQ must transmit all permit applications for facilities subject to this subpart to the appropriate Field Office of the US Fish and Wildlife Service and/or Regional Office of the National Marine Fisheries Service upon receipt for a 60 day review prior to public notice of the draft permit. I have included an edms link to the application (EDMS document 9722645)

PERMIT NUMBER
LA0007374

FACILITY
Entergy Louisiana, LLC - Waterford 3 Steam Electric Station

<http://edms.deq.louisiana.gov/app/doc/view.aspx?doc=9722645&ob=yes&child=yes>

In accordance with the 316(b) Rule for Existing Facilities, the Service has sixty (60) days to submit comments regarding the application. Please send official comments to Mr. Elliott B. Vega, Assistant Secretary, at the following address:

Elliott B. Vega, Assistant Secretary
Office of Environmental Services
Post Office Box 4313
Baton Rouge, Louisiana 70821-4313

It would be appreciated if you could also send a copy of your comments to me. If you have any questions regarding the attached documents, please contact me at (225) 219-3212 or e-mail at kelli.hamilton@la.gov. All future correspondence regarding this permit shall use the Agency Interest (AI) number 35260 and LPDES permit number LA0007374.

Sincerely,

MAIN FILE
MAIN FILE

3/30/2016 DEPARTMENT OF THE INTERIOR Mail - renewal application for facility subject to 316(b) requirements for existing facilities; Entergy Louisiana, LLC - ...

Kelli Hamilton

LDEQ Water Permits Division

DEQ Office of Environmental Services

Post Office Box 4313

Baton Rouge, LA 70821-4313

Telephone 225-219-3212 FAX 225-219-3309

original to Jaw

from
copy to Jnd/Bickham
Hamilton

2016 APR -6 PM 10: 21
DEQ - DES

This project has been reviewed for effects to Federal trust resources under our jurisdiction and currently protected by the Endangered Species Act of 1973 (Act). The project, as proposed,

() Will have no effect on those resources

Is not likely to adversely affect those resources. PS

This finding fulfills the requirements under Section 7(a)(2) of the Act.

Derek A Fuller March 31, 2016

Acting Supervisor
Louisiana Field Office
U.S. Fish and Wildlife Service

Date