Appendix F
Evaluation of Federally Listed Species in Louisiana

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Appendix F
Evaluation of Federally Listed Species in Louisiana

F.1 INTRODUCTION

This evaluation of federally listed species was prepared in conjunction with the draft environmental impact statement (EIS) for expansion of the Strategic Petroleum Reserve (SPR). The draft EIS evaluates the expansion of the SPR by developing additional storage capacity at two or three existing sites (West Hackberry and Bayou Choctaw in Louisiana and Big Hill in Texas) or developing one of five new sites (Chacahoula and Clovelly in Louisiana; Richton and Bruinsburg in Mississippi; and Stratton Ridge in Texas), or a combination of the Clovelly and Bruinsburg sites.

This appendix analyzes potential effects on federally endangered and threatened species, and marine mammals protected under the Endangered Species Act (ESA) and Marine Mammal Protection Act (special status species), respectively, from the proposed development of sites in Louisiana. Potential effects on endangered and threatened species and marine mammals from development of sites in Mississippi and Texas are analyzed in appendices G and H, respectively.

The Department of Energy (DOE) prepared this evaluation of federally listed species to review and document its findings of “no effect” and “may affect” in accordance with the definitions found in the Final ESA Section 7 Consultation Handbook dated March 1998 (Consultation Handbook) (USFWS and NMFS 1998), a letter from U.S. Fish and Wildlife Service (USFWS) dated September 29, 2005 (Werner 2005), and consultations with the USFWS field offices. The evaluation was based on the following definitions of the effects to endangered or threatened species in the Handbook and letter:

- **No effect**. The proposed action would not affect federally listed species or critical habitat (i.e., suitable habitat for the species occurring in the project county is not present in or adjacent to the action area).

- **Is not likely to adversely affect**. The proposed project may affect listed species or critical habitat, or both; however, the effects would be discountable, insignificant, or completely beneficial. Certain avoidance and minimization measures may need to be implemented to reach this level of effects.

- **Is likely to adversely affect**. Adverse effects to listed species may occur as a direct or indirect result of the proposed action or its interrelated or interdependent actions, and the effect would not be discountable, insignificant, or beneficial. If the overall effect of the proposed action would be beneficial to the listed species, but it also would be likely to cause some adverse effects to individuals of that species, then the proposed action "is likely to adversely affect" the listed species.

DOE is evaluating the impacts associated with five proposed new sites and three proposed expansion sites, some of which would have more than 100 miles (160 kilometers) of new pipelines, new tank farms, and brine disposal systems (offshore diffuser or injection wells) associated with it. When DOE issues a record of decision, it will select either one new site (or a combination of the Bruinsburg and Clovelly sites) and two or three expansion sites for future development, or the no-action alternative. For these reasons, DOE has not conducted comprehensive field surveys and can only reach “no effect” or “may affect” conclusions for this evaluation of special status species instead of using all of the classifications described earlier. For the finding of “may affect,” DOE has not completed onsite surveys to support a finding of “is not likely to adversely affect” or “is likely to adversely affect”; therefore, a finding of “no effect” or “may affect” is the conclusion that DOE can reach at this time.

After the record of decision is issued that specifies the new site or sites and the expansion sites that would be developed, DOE would perform site- and species-specific surveys for all the federally listed species that received a finding of "may affect." DOE would perform the evaluation of the federally listed species in consultation with USFWS and in accordance with section 7 of the ESA and the Final ESA section 7 Consultation Handbook dated, March 1998.

F.1.1 Purpose

This evaluation analyzes the potential effects of construction, operation, and maintenance of additional SPR storage capacity on federally listed threatened and endangered species. In Louisiana, this additional capacity could be added by developing one of two new sites (Chacahoula or Clovelly) or expanding capacity at one or two existing sites (West Hackberry and Bayou Choctaw). Proposed activities vary by site (e.g., based on existing infrastructure) and may include: construction of underground storage caverns and surface facilities at the storage sites; construction of pipelines for crude oil distribution, raw water supply and brine disposal; surface or groundwater withdrawals to support solution mining of new caverns; discharge of brine in the Gulf of Mexico; and construction of miscellaneous facilities at oil distribution sites.

F.1.2 Threatened and Endangered Species Terminology

The USFWS lists a species on the Federal Endangered Species List as "threatened" when it is likely to become endangered throughout all or a significant portion of its range in the foreseeable future, and lists a species as "endangered" when it is in danger of extinction throughout all or a significant portion of its range. In addition, the USFWS maintains a list of what are called "candidate species" that are being considered for listing under the Endangered Species Act. A candidate species is a species that the USFWS has on file sufficient information to support a proposal to list as endangered or threatened, but for which preparation and publication of a proposal is precluded by higher-priority listing actions. Federal agencies are encouraged to consider these species in preparing environmental impact analysis done under NEPA in order to alleviate threats to them and thereby possibly eliminate the need to list the species as endangered or threatened.

To define all the species that are required to be addressed in the biological assessment, DOE contacted and obtained information from the USFWS and the Louisiana Department of Wildlife and Fisheries (LDWF). Appendix K, Consultants with Agencies, contains the consultation letters and lists the consultation meetings held.

F.1.3 Organization

This biological assessment includes the following information: a brief literature review for each of the species addressed (section F.2), observations made during site visits (section F.3), an assessment of the potential effects of the proposed action on the threatened and endangered species (section F.4), and recommendations for minimizing potential adverse effects on the subject species and other biological resources (section F.5). References cited in the biological assessment are identified in section F.6.

F.2 LITERATURE REVIEW

The literature review describes the natural histories of all species federally listed as threatened or endangered *and* identified as present or potentially present (e.g., based on historical records) in at least one parish where proposed new or expanded SPR facilities and associated infrastructure would be located. Although candidate species (i.e., those listed as candidates for Federal listing as threatened or endangered) are within the scope of this assessment, there were no candidate species identified in the

literature review for the Louisiana parishes with proposed new and expanded SPR facilities. Table F.2-1 lists the species evaluated in this appendix.

Table F.2-1: Federally Listed Threatened or Endangered Species in Louisiana Parishes with Proposed SPR Sites

Common Name	Scientific Name	Federal Status	Louisiana Status	Parish Where Species May Exist[a]
Birds				
Bald Eagle	*Haliaeetus leucocephalus*	Threatened	Endangered	Calcasieu, Cameron, Iberville, Lafourche, St. James Terrebonne
Brown Pelican	*Pelecanus occidentalis*	Endangered	Endangered	Cameron, Lafourche, Terrebonne
Peregrine Falcon[b]	*Falco peregrinus*	Endangered	Threatened/ Endangered	Lafourche, Terrebonne
Piping Plover	*Charadrius melodus*	Threatened	Threatened/ Endangered	Cameron, Lafourche, Terrebonne
Red-Cockaded Woodpecker	*Picoides borealis*	Endangered	Endangered	Calcasieu
Fish				
Gulf Sturgeon	*Acipenser oxyrinchus desotoi*	Threatened	Threatened	Lafourche, Terrebonne, St. James, Cameron
Pallid Sturgeon	*Scaphirhynchus albus*	Endangered	Endangered	St. James, Iberville
Mammals				
Louisiana Black Bear	*Ursus americanus luteolus*	Threatened	Threatened	Iberville
Red Wolf	*Canis rufus*	Endangered	Not Listed	Calcasieu, Cameron, Terrebonne
Marine Mammals				
Gervais Beaked Whale	*Mesoplodon europaeus*	Protected	Threatened	All coastal Parishes
Goose-Beaked Whale	*Ziphius cavirostris*	Protected	Threatened	All coastal Parishes
Pygmy Sperm Whale	*Kogia breviceps*	Protected	Threatened	All coastal Parishes
Dwarf Sperm Whale	*Kogia simus*	Protected	Threatened	All coastal Parishes
Sperm Whale	*Physeter macrophalus*	Endangered	Endangered	All coastal Parishes
Atlantic Spotted Dolphin	*Stenella frontalis*	Protected	Threatened	All coastal Parishes
Rough-Toothed Dolphin	*Steno bredanensis*	Protected	Threatened	All coastal Parishes
Killer Whale	*Orcinus orca*	Protected	Threatened	All coastal Parishes
False Killer Whale	*Pseudorca crassidens*	Protected	Threatened	All coastal Parishes
Short-finned Pilot Whale	*Globicephala macrorhynchus*	Protected	Threatened	All coastal Parishes
Pygmy Killer Whale	*Feresa attenuata*	Protected	Threatened	All coastal Parishes
West Indian Manatee	*Trichechus manatus*	Endangered	Endangered	All coastal Parishes
Bottlenose Dolphin	(*Tursiops truncatus*)	Protected	Not Listed	All coastal Parishes
Reptiles				
Atlantic Hawksbill Sea Turtle	*Eretmochelys imbricata*	Endangered	Endangered	Cameron, Lafourche, Terrebonne
Green Sea Turtle	*Chelonia mydas*	Threatened	Threatened	Cameron, Lafourche, Terrebonne

Table F.2-1: Federally Listed Threatened or Endangered Species in Louisiana Parishes with Proposed SPR Sites

Common Name	Scientific Name	Federal Status	Louisiana Status	Parish Where Species May Exist[a]
Kemp's Ridley Sea Turtle	*Lepidochelys kempii*	Endangered	Endangered	Cameron, Lafourche, Terrebonne
Leatherback Sea Turtle	*Dermochelys coriacea*	Endangered	Endangered	Cameron, Lafourche, Terrebonne
Loggerhead Sea Turtle	*Caretta caretta*	Threatened	Threatened	Cameron, Lafourche, Terrebonne

Not Listed: No state status; species is not classified as threatened or endangered by Louisiana.
[a] Includes only parishes in Louisiana where SPR facilities are proposed.
[b] Federal endangered status of the peregrine falcon varies by subspecies; one subspecies is endangered and the other two are recovered.

F.2.1 Birds

F.2.1.1 Bald Eagle

The bald eagle (*Haliaeetus leucocephalus*) is a large bird of prey with an average wingspan of 7 feet (2 meters). Adult males and females are similar in appearance, with a dark brown body and wings and a distinctive white head and tail. This species is federally listed as threatened, although a proposal to de-list it has been made.

The bald eagle can be found throughout the continental United States and Alaska. It is most likely to be found in areas with large expanses of aquatic habitat with forested shorelines or cliffs where it selects supercanopy roost trees. The bald eagle is an opportunistic forager. Although it prefers fish, it will eat a great variety of mammals, amphibians, crustaceans, and birds, including many species of waterfowl (Buehler 2000).

The bald eagle nests almost exclusively at the edges of lakes, rivers, or seacoasts. It generally nests in tall trees or cliffs near the water's edge, although it occasionally nests on the ground. Nests are often reused in successive years. The breeding season generally begins in the spring (earlier in southern states), with the young fledging after about 6 months (USFWS 1983; USFWS 1995). According to comments submitted to DOE by the USFWS (James 2005), nesting activity occurs from September to January with young fledging usually by midsummer. The bald eagle is highly sensitive to human noise and interference (USFWS 1983; USFWS 1995). It is most sensitive during the first 12 weeks of the nesting cycle. Disturbance during nesting may lead to nest abandonment or reduced hatching and survival rates. Human activity near a nest late in the nesting cycle may also cause flightless birds to jump from the nest, lessening their likelihood of survival (Watson 2005).

F.2.1.2 Brown Pelican

The brown pelican (*Pelecanus occidentalis*) is a large water bird with a massive bill and throat pouch. Its wings and body are grayish-brown. Nonbreeding adults have a whitish head and neck, often with some yellow. The hindnecks of breeding adults are dark chestnut (NGS 1983; Palmer 1962). Larger individuals have a wing spread of more than 7 feet (2 meters) (USFWS 2005).

The brown pelican is a fish eater, and it is found almost exclusively in coastal areas along the southeast coast, the Gulf of Mexico, and throughout the west coast. It prefers to feed in shallow estuarine waters and use sand spits, offshore sand bars, and islets for nocturnal roosting. Dry roosting sites are essential to

suitable habitat (NatureServe 2005). Nests usually are built on coastal islands, on the ground, or in small bushes and trees (Palmer 1962).

The brown pelican is a federally listed endangered species. Populations in California, Texas, and Louisiana were devastated by pesticide poisoning from dichlorodiphenyltrichloroethane (DDT), dichlorodiphenyldichloroethylene (DDE), and other compounds throughout the 1950s and 1960s. Eastern and Gulf Coast populations of the brown pelican appear to be stable and possibly increasing in recent years. Contaminant levels in both populations are below the threshold for reproductive failure, but the populations are still very vulnerable to pesticide pollution (Anderson and Hickey 1970). Other threats include the disturbance of nesting birds by humans, declining fish populations, increased water turbidity resulting from dredging, oil and chemical spills, entanglement in fishing gear, and extreme weather conditions. Recently, habitat degradation has affected both roosting and nesting. For example, nesting efforts have failed in the Gulf Coast because of erosion at the nesting sites (NatureServe 2005).

In Louisiana, the brown pelican is found in the Lower Calcasieu, Lower Mississippi-New Orleans, Eastern Louisiana Coastal, East Central Louisiana Coastal, and West Central Louisiana Coastal watersheds (NatureServe 2005).

F.2.1.3 Peregrine Falcon

The peregrine falcon (*Falco peregrinus*) is a medium-sized falcon with long, pointed wings and a dark crown and nape. Juveniles have pale foreheads and are mostly brown in color; adults are predominantly black or gray. Adults average 16.1 to 20.1 inches (41 to 51 centimeters) in length, with a 35.8- to 44.1-inches (91- to 112-centimeter) wingspan (NGS 1983).

There are three subspecies of peregrine falcons: the American peregrine falcon (*Falco peregrinus anatum*), the Arctic peregrine falcon (*Falco peregrinus tundrius*), and the Eurasian peregrine falcon (*Falco peregrinus peregrinus*). Of these three subspecies, only the Eurasian peregrine falcon, which is not found in the United States, is federally listed as an endangered species. Both the American and Arctic peregrine have been federally delisted (USFWS 2005).

These birds are carnivores and feed primarily on other birds, but they also feed on small mammals, lizards, fishes, and insects (particularly the young birds) (NatureServe 2005). Peregrine populations nesting in northern latitudes are highly migratory, while those nesting in northern maritime climates, at mid-latitudes, and in the southern hemisphere are much less migratory (Cade 1982).

The peregrine falcon typically nests on ledges of vertical rocky cliffs, usually with a sheltering overhang (Palmer 1988; Campbell et al. 1990). In the United States, parts of the Atlantic Coast and the barrier islands in the Gulf Coast are important feeding areas for long-distance migrants (NatureServe 2005). The average clutch size is four hatchlings, and incubation lasts between 32 and 35 days. The peregrine falcon usually mates for the first time at 2 or 3 years of age, and most often it mates for life (Palmer 1988).

F.2.1.4 Piping Plover

The piping plover (*Charadrius melodus*) is a small, sandy-colored shorebird similar in appearance to a sandpiper. Distinguishing field marks of this species include yellow-orange legs, a black band across the forehead from eye to eye, and a black ring around the base of its neck (USFWS undated). The piping plover is federally listed as threatened in Louisiana.

A migratory species, the piping plover overwinters on beaches, mudflats, and sandflats along the Atlantic Coast and the Gulf of Mexico, including barrier island beaches and spoil islands on the Gulf Intracoastal

Waterway (ICW) (USFWS 2005). In Louisiana, the piping plover has been observed in numerous locations along the Gulf Coast (NatureServe 2005). Critical habitat for wintering piping plovers has been established for several specific locations in Louisiana parishes where proposed SPR elements would be located (USFWS 2001a):

- **Unit LA–1:** Texas-Louisiana border to Cheniere au Tigre. 6,548 acres (2,650 hectares) in Cameron and Vermilion Parishes. This unit extends in three adjacent (but slightly separated) sections from the east side of Sabine Pass (Texas-Louisiana border) to 0.81 miles (1.3 kilometers) east of where the boundary of the Paul J. Rainey Wildlife Sanctuary (National Audubon Society) meets the shoreline. All three sections of this unit include the land from the seaward boundary of the mean lower low water level (MLLW), which is defined as the annual average of the lower low water height of each tidal day, to where densely vegetated habitat, not used by the piping plover, begins and where the constituent elements no longer occur. The shoreline in this unit is owned both by the state and privately.

- **Unit LA–3:** Point Au Fer Island. 482 acres (195 hectares) in Terrebonne Parish. This unit includes the entire small island at the northwest tip of Point Au Fer Island to MLLW, then extends from the northwest tip of Point Au Fer Island following the shoreline southeast approximately 4.8 miles (7.7 kilometers) to the point where the unnamed oil and gas canal extending southeast from Locust Bayou meets the shoreline 0.5 miles (0.8 kilometers) southeast from Locust Bayou. This shoreline is bounded on the seaward side by MLLW and on the landward side to where densely vegetated habitat, not used by the piping plover, begins and where the constituent elements no longer occur. This entire unit is privately owned.

- **Unit LA–4:** Isles Dernieres. 1,964 acres (795 hectares) in Terrebonne Parish. This unit includes the state-owned Isles Dernieres chain, including Raccoon, Whiskey, Trinity, and East Islands. This unit includes the entire islands where primary constituent elements occur to the MLLW.

- **Unit LA–5:** Timbalier Island to East Grand Terre Island. 5,735 acres (2,321 hectares) in Terrebonne, Lafourche, Jefferson, and Plaquemines Parishes. Most of the sections in this area are bounded on the seaward side by MLLW and on the landward side by densely vegetated habitat, not used by the piping plover, where the constituent elements no longer occur.

The piping plover begins to arrive at wintering habitats in July through September. Although a few plovers remain throughout the year, sightings are rare in late May, June, and early July (USFWS 2000).

F.2.1.5 Red-Cockaded Woodpecker

The red-cockaded woodpecker (*Picoides borealis*) is a federally listed endangered species. It is found in mature and old-growth pine forests in the southeastern United States. Red-cockaded woodpeckers are black and white with ladder backs and distinctive white cheek patches (USFWS 2003c). The species is named for barely visible red streaks called “cockades” on the heads of adult males (NatureServe 2005).

The red-cockaded woodpecker has specific habitat requirements that include open pine woodlands or savannahs with large, old pines. Large pines are required because cavity nests are built only in inactive pine heartwood. Nesting trees must be in open stands with little or no hardwood midstory and few or no overstory hardwoods (USFWS 2003c). Foraging occurs in older pine stands within 0.5 mile (0.8 kilometer) of a colony (Aycock 2005).

The red-cockaded woodpecker lives in family groups that usually include a breeding pair and nonbreeding helpers. Most helpers are male. Mating typically occurs between November and December

and March to May, and egg laying usually occurs April to early May. Incubation lasts about 10 to 12 days (Hooper et al. 1980), and hatchlings remain in the nest for 26 to 29 days (NatureServe 2005).

According to the 1985 revision of the recovery plan for this species, there were approximately 14,068 red-cockaded woodpeckers living in 5,627 groups in 11 states (USFWS 2003c). One of the six largest remaining resident populations is located in or near the Kisatchie National Forest in Louisiana (James 1995). USFWS established criteria for delisting the species based on the status and size of primary and secondary core populations named in the recovery plan. Table F.2.1.5-1 shows the locations of core populations of the red-cockaded woodpecker in Louisiana.

Table F.2.1.5-1: Louisiana Locations of Designated Core Red-Cockaded Woodpecker Populations

Designated Core Population Type	Population Locations in Louisiana
Primary	Fort Polk (includes parts of Vernon Parish)
	Vernon Unit, Calcasieu Ranger District, Kisatchie National Forest (includes parts of Vernon Parish)
Secondary	Catahoula Ranger District, Kisatchie National Forest (includes parts of Grant and Rapides Parishes)
	Winn Ranger District (portion), Kisatchie National Forest (includes parts of Grant, Natchitoches, and Winn Parishes)

F.2.2 Fish

F.2.2.1 Gulf Sturgeon

The Gulf sturgeon (*Acipenser oxyrinchus desotoi*) is an anadromous fish species found in Gulf coastal waters from Louisiana to Florida. Primitive in appearance, the Gulf sturgeon has external bony plates, an extended snout, and four large barbels. Adults range from 4 to 8 feet (1.2 to 2.4 meters) in length, with adult females measuring larger than males (USFWS 2003a). This species is federally listed as threatened.

The Gulf sturgeon preys on benthic invertebrates and small fishes. Feeding is believed to occur only during the winter and spring in offshore or estuarine waters (Cross 1992).

USFWS has designated certain Gulf of Mexico tributaries as critical habitat for the Gulf sturgeon. In these locations, the Gulf sturgeon spends the first 2 years of its life and later returns to breed. Spawning habitats generally are fresh water (sometimes tidal) and usually are over a bottom of hard clay, rubble, gravel, or shell (USFWS 2003a). In Louisiana, the critical habitats include Lake Pontchartrain and the Pearl River system (USFWS 2003a).

F.2.2.2 Pallid Sturgeon

The pallid sturgeon (*Scaphirhynchus albus*) is a large fish measuring 73.2 inches (186 centimeters) with a flat, shovel-like snout that has four fringed barbells and 37 to 43 dorsal rays and 24 to 28 anal rays. The pallid sturgeon is similar to the shovelnose sturgeon, but there are several distinct differences such as the paucity of scale-like scutes on the belly, the larger head, the wider mouth, the smaller eye, and the paler gray-white color above and on sides (Page and Burr 1991). The pallid sturgeon is one of the largest fish

species found in the Missouri and Mississippi River drainage (Gilbraith et al. 1988). Its diet consists of aquatic invertebrates (Carlson et al. 1985). This species is federally listed as endangered.

The pallid sturgeon's habitat consists of large, turbid free-flowing rivers or reservoirs. In rivers or reservoirs, the pallid sturgeon is most often found in strong currents over firm gravel or sandy substrate (USFWS 1989; Kallemeyn 1981). The pallid sturgeon's preferred temperature range is from 32 to 86 ˚Fahrenheit (0 to 30 ˚Celsius) (USFWS 1993).

The pallid sturgeon's range is quite large and includes approximately 3,515 miles (5,656 kilometers) of river encompassing 13 states including Louisiana and Mississippi (USFWS 1993). In Louisiana, the most frequent occurrence of the pallid sturgeon is in the Mississippi and Atchafalaya Rivers, where the Atchafalaya diverges from the Mississippi River (Dryer Undated).

The spawning season for the pallid sturgeon lasts from July to August. Males sexually mature at 3 to 4 years of age (Kallemeyn 1981), and females sexually mature at 7 years with several years for eggs to mature between spawnings (Conte et al. 1988). Little other information is available to describe the spawning requirements for the pallid sturgeon, so these requirements often are assumed to be similar to those of the shovelnose sturgeon. The shovelnose sturgeon spawns over rock, rubble, or gravel in the main channel of the Missouri and Mississippi Rivers and their major tributaries or in the wing dams in the main stem of larger rivers (Christiansen 1975; Elser et al. 1977; Moos 1978; Helms 1974). In addition, in June the shovelnose sturgeon responds to increased water flow from melting snow by migrating to spawn (Berg 1981).

F.2.3 Mammals

F.2.3.1 Louisiana Black Bear

The Louisiana black bear (*Ursus americanus luteolus*) is one of 16 recognized subspecies of the American black bear (Hall 1981). The Louisiana black bear is federally listed as threatened. Like other black bears, the Louisiana black bear has long black hair, and it can weigh more than 600 pounds (272 kilograms) (USFWS 1992). It is distinguished from other black bears by its longer, narrower, and flatter skull, and by its proportionately large molar teeth (Nowak 1986).

The Louisiana black bear prefers bottomland hardwood forests. It is found primarily in the Tensas and Atchafalaya River basins in Louisiana, areas that have been proposed as critical habitat. In fact, these areas of Louisiana are the locations of the only known breeding populations (Bowker and Jacobson 1995). Other areas with suspected occurrences of Louisiana black bears include the Loess Bluffs portion of the Mississippi River corridor in southwestern Mississippi and the adjacent Tunica Hills of Louisiana, as well as smaller areas in the lower East Pearl River and lower Pascagoula River basins of southern Mississippi (Wooding et al. 1993).

F.2.3.2 Red Wolf

The red wolf's (*Canis rufus*) range formerly included most of the southeastern states (NatureServe 2005), but now red wolf populations only occur in the wild in a few reintroduction sites. The red wolf is federally listed as endangered. Its diet is opportunistic and consists of a variety of invertebrates and vertebrates such as rabbits, rodents, deer, and birds, but it favors marsh rabbits, nutria, and carrion (Matthews and Moseley 1990).

The red wolf inhabits herbaceous and forested wetlands and riparian areas, coniferous, hardwood, and mixed forest, herbaceous grassland, and chaparral (NatureServe 2005). Home ranges vary depending on

the environment, but typically they are approximately 16,000 to 32,000 acres (6,500 to 13,000 hectares) (Riley and McBride 1975), or approximately 29,000 acres (11,700 hectares) for males and approximately 19,000 acres (7,800 hectares) for females (Carley 1979). The red wolf mates once a year in a season from January to February. The average gestation is 60 to 63 days. Litters average six or seven pups that reach sexual maturity in 3 years (NatureServe 2005).

F.2.4 Marine Mammals

The onshore portion, including the directional drilling from onshore to open water in the Gulf of Mexico, associated with the proposed SPR Chacahoula site and Clovelly site would not affect the marine mammals. The construction and operation of the offshore brine disposal pipeline and operation of the brine diffusion system for the Chacahoula site and the Clovelly site may affect the marine mammal species. The dispersion of the brine discharge into the Gulf of Mexico would dissipate before reaching these depths as well.

F.2.4.1 Gervais Beaked Whale

The Gervais' beaked whale (*Ziphius cavirostris*) is a pelagic species that is associated with the continental shelf and deep oceanic waters, but it is also closely associated with the Gulf Stream waters. Little is known about this species, but it is believed that sexual maturity occurs when the whale reaches 15 feet (4.5 meters) in length. The life span is believed to be about 27 years. The diet consists mainly of squid and deepwater fishes (Wynne et al. 1999).

F.2.4.2 Goose-Beaked Whale

The goose-beaked whale (*Ziphius cavirostris*), also known as Cuvier's beaked whale, typically is found in waters that are greater than 3,280 feet (1,000 meters). The goose-beak is a pelagic species that is associated with the continental shelf and deep oceanic waters, but it is also closely associated with the Gulf Stream waters. Little is known about the goose-beaked whale, but it is believed to travel in pods of 2 to 25 animals, and it typically avoids vessels. Sexual maturity is believed to occur at about 7 to 11 years. Breeding occurs in the spring, with a calf born every 2 to 3 years after a 12-month gestation. The goose-beaked whale is believed to lactate for 12 months and live more than 35 years. Its diet consists mainly of deepwater fish and squid (Wynne et al. 1999).

F.2.4.3 Pygmy Sperm Whale

The pygmy sperm whale (*Kogia breviceps*) is a pelagic, deep-water species that inhabits the areas near the continental shelf edge, slope, and deep oceanic waters. It is found throughout the Gulf of Mexico in these waters. The pygmy sperm whale is not as social as other species, and it typically is found alone or in small groups. The male reaches sexual maturity at 8.9 to 9.8 feet (2.7 to 3.0 meters) in length, and the female reaches sexual maturity at a length of 8.5 to 9.1 feet (2.6 to 2.8 meters). A single calf is born after an 11-month gestation period, and lactation lasts about 12 months. The diet of the pygmy sperm whale consists mainly of squid, fish, and crustaceans (Wynne et al. 1999).

F.2.4.4 Dwarf Sperm Whale

The dwarf sperm whale (*Kogia simus*) is a pelagic, deep-water species that inhabits the areas near the continental shelf edge, slope, and deep oceanic waters. It is found throughout the Gulf of Mexico in these waters. The dwarf sperm whale is not as social as other species, and it typically is found alone or in small groups. Sexual maturity occurs at a length of about 6.9 to 7.2 feet (2.1 to 2.2 meters) in length. A single

calf is born after a 9.5 month gestation period, and lactation lasts about 12 months. The diet of the dwarf sperm whale consists mainly of squid, fish, and crustaceans (Wynne et al. 1999).

F.2.4.5 Sperm Whale

The sperm whale (*Physeter macrophalus*) is a pelagic, deep-water species that inhabits areas near the continental slope. It is found throughout the Gulf of Mexico along the continental slope and along the Atlantic seaboard associated with Gulf Stream features. Female and young male sperm whales form breeding schools of 10 to 80 animals, while sexually inactive males form bachelor schools and older males are typically solitary. The female reaches sexual maturity at 7 to 11 years; the male reaches maturity at 19 years. A single calf is born every 3 to 6 years after a 14-month gestation period, and lactation lasts between 12 to 24 months. The diet of the sperm whale consists mainly of squid, but it can also include fish (Wynne et al. 1999).

F.2.4.6 Atlantic Spotted Dolphin

The Atlantic spotted dolphin (*Stenella frontalis*) is a tropical species that can be found in a variety of areas throughout the Gulf of Mexico ranging from coastal to pelagic environments, typically over the continental shelf and slope. It usually is associated with the Gulf Stream. The Atlantic spotted dolphin reaches sexual maturity at 8 to 15 years, and it breeds during the fall and spring. One calf is born every 1 to 2 years after a 12-month gestation period. Lactation typically lasts 3 to 5 years. The dolphin can live 25 to 30 years. The Atlantic spotted dolphin is a gregarious species, and it can be found in groups (less than 20) of other dolphins and small whales along the coast and in larger groups (less than 100) offshore. The diet of the Atlantic spotted dolphin consists of squid and a variety of fish (Wynne et al. 1999).

F.2.4.7 Rough-Toothed Dolphin

The rough-toothed dolphin (*Steno bredanensis*) is a tropical, pelagic species that is found seaward of the continental slope. Little is known about the rough-toothed dolphin, but it is thought to be sexually mature at about 10 to 14 years, and it may live as long as 32 years. The dolphin is believed to travel in pods of 10 to more than 100 and to associate with other species such as spinner dolphins, bottlenose dolphins, and pilot whales. Sometimes the rough-toothed dolphin can be found associated with large mats of Sargassum. The diet of the rough-toothed dolphin consists of deepwater octopus, squid, and fish (Wynne et al. 1999).

F.2.4.8 Killer Whale

The killer whale (*Orcinus orca*) can be found in both coastal and oceanic waters, ranging from tropical to polar waters. The killer whale is a highly social animal that travels in pods of between 3 to 55 animals, and it often cooperates in hunting and feeding efforts. The killer whale is sexually mature at 10 to 15 years and mates year round. A single calf is born every 3 to 8 years after a 17-month gestation period. Lactation lasts about 12 months. The killer whale can live more than 50 years. The diet of the killer whale is diverse and includes fish, birds, squid, turtle, and other marine mammals (Wynne et al. 1999).

F.2.4.9 False Killer Whale

The false killer whale (*Pseudorca crassidens*) is pelagic species found in the deeper waters of the Gulf of Mexico, seaward of the continental shelf. The false killer whale is a social species that can be found in groups from 10 to more than 100 with the same species or with other dolphin species. It is sexually mature at 8 to 14 years. A single calf is born every 3 to 4 years after a 16-month gestation period. This

species has been known to be aggressive toward other smaller dolphins. The diet of the false killer whale consists mainly of squid and fish (Wynne et al. 1999).

F.2.4.10 Short-Finned Pilot Whale

The short-finned pilot whale (*Globicephala macrorhynchus*) can be found in a variety of water depths, and typically it is associated with squid, its main prey. It is a tropical species that is usually associated with the Gulf Stream, and it can be found in pelagic or coastal environments, possibly moving inshore during the summer months. The short-finned pilot whale is a social species that can be found in groups of 10 to more than 100, and often it is associated with bottlenose dolphins. The short-finned pilot whale is believed to be sexually mature at 6 to 12 years, and it breeds every 3 years, giving birth to a single calf after a 15- to 16-month gestation period. Lactation lasts about 20 months Individual whales can live between 50 to 70 years. Its diet consists primarily of squid, but it has been known to prey on fish (Wynne et al. 1999).

F.2.4.11 Pygmy Killer Whale

The pygmy killer whale (*Feresa attenuata*) is a pelagic species found in the deeper waters of the Gulf of Mexico, seaward of the continental shelf. Little is known about the pygmy killer whale, but its diet is believed to consist mostly of fish, and it has been observed preying on squid. The pygmy killer whale is a gregarious species that typically associates in groups of 10 to 50 individuals. The pygmy killer whale has shown aggressive tendencies, but typically it is wary of boats (Wynne et al. 1999).

F.2.4.12 West Indian Manatee

The West Indian manatee (*Trichechus manatus*) is a slow-moving aquatic mammal with gray to brown skin, a small head, flexible flippers, and a large tail. Its large rounded body weighs on average 441 to 1,102 pounds (200 to 500 kilograms) and it is approximately 9.8 to 13 feet (3 to 4 meters) in length (Nowak 1991). Its diet is primarily submergent, emergent, and floating vegetation, although it varies according to plant availability. West Indian manatees may live several decades (O'Shea and Ludlow 1992).

The West Indian manatee is present in the coastal areas from the southeastern United States to northeastern South America. In the southeastern United States, the manatee occurs primarily in Florida and southeastern Georgia; individuals may occur as far north as Rhode Island on the Atlantic Coast (Reid 1996) and as far west as Texas on the Gulf Coast, but these sightings are rare. The West Indian manatee is federally listed as endangered in its entire range (Florida, Georgia, Puerto Rico, and Texas).

Shallow coastal waters, estuaries, bays, rivers, and lakes comprise the West Indian manatee's habitat, although it seems to prefer rivers and estuaries to marine habitats (Lefebvre et al. 1989). In addition, the West Indian manatee sometimes travels through dredged canals or quiet marinas. In the north during October to April, the manatee congregates in warmer waters because it cannot tolerate prolonged exposure to water colder than 68 ˚Fahrenheit (20 ˚Celsius). The West Indian manatee prefers waters at least 3.3 to 6.6 feet (1 to 2 meters) in depth; however, along the coast, the manatee often can be found in water 9.8 to 16.4 feet (3 to 5 meters) deep. In addition, it prefers not to be in water with strong currents, and it is consistently associated with freshwater (Lefebvre et al. 1989). Because its young are born in the water, sheltered bays, coves, and canals are important for the West Indian manatee's reproductive success (O'Shea and Ludlow 1992).

While the female manatee is sexually mature at a minimum age of 4 to 5 years, most females do not breed successfully until the age of 7 to 9 years. The male manatee breeds at 9 to 10 years, although it may

mature physically a few years earlier. Males and females mate promiscuously. Young are born after a gestational period of approximately 12 to 14 months, and typically an interval of 3 to 5 years passes before the individual female gives birth to another calf. Usually 2 years pass if a calf is lost early. Calves are born in spring or early summer, and normally a female gives birth to one calf. Young are weaned by the age of 1 to 2 years (O'Shea and Ludlow 1992).

F.2.4.13 Bottlenose Dolphin

The bottlenose dolphin (*Tursiops truncatus*) typically can be found in coastal or offshore waters. In the coastal environment, the bottlenose dolphin can be found in warm, sallow inshore waters of bays and rivers. When offshore, it is usually in deep waters over the continental shelf and slope. The female bottlenose dolphin reaches sexual maturity at 5 to 10 years of age, while the male reaches maturity at 8 to 12 years of age. The bottlenose dolphin breeds during the fall and spring, and produces one calf every 3 to 6 years after a 12-month gestation period. Lactation typically lasts 12 to 18 months. The dolphin may live more than 50 years. The bottlenose dolphin is a social species, and along the coast it can be found in small groups (less than 10) and in larger groups (10 to more than 100) offshore. This species usually can be found in mixed groups with pilot whales and right whales. The diet of the bottlenose dolphin consists of fish, invertebrates, and squid (Wynne et al. 1999).

F.2.5 Reptiles

F.2.5.1 Atlantic Hawksbill Sea Turtle

The Atlantic hawksbill sea turtle (*Eretmochelys imbricata*) has a large brown carapace with overlapping scutes and two claws on each flipper. Some individuals have a tortoiseshell pattern of radiating streaks. The young are all black or dark brown except for raised ridges, shell edges, and areas on the neck and flippers. Mature adults are usually 30 to 35 inches (76 to 89 centimeters) in length (Conant and Collins 1991). The Atlantic hawksbill sea turtle feeds on the ocean bottom and reef faces close to shore, eating a diet primarily consisting of crabs, sea urchins, shellfish, and jellyfish, but also including plant material and fish. This species is federally endangered.

The Atlantic hawksbill is a local and long distance migrant that prefers shallow coastal waters with rocky bottoms, coral reefs, mangrove-bordered bays, and estuaries (CSTC 1990), preferring to nest on undisturbed, deep-sand beaches on the Gulf Coast of Mexico, the West Indies, the Bahamas, and the Americas (Meylan 1992; Lund 1985). The adult female nests only once every 2 to 3 years from May to November and lays 4 to 6 clutches of 50 to more than 200 eggs at 14- to 18.5-day intervals (NatureServe 2005). Incubation lasts approximately 2 months; the age of sexual maturity is unknown (CSTC 1990).

F.2.5.2 Green Sea Turtle

The green sea turtle (*Chelonia mydas*) has a brown carapace covered in dark, wavy markings, radiating mottled markings, or large dark brown blotches; young are black or dark brown with white undersides. Mature adults are usually 35 to 48 inches (90 to 122 centimeters) up to more than 60 inches (153 centimeters) in length. The length of the hatchling carapace is usually between 1.6 and 2.4 inches (4 and 6 centimeters) (Conant and Collins 1991). This turtle most commonly feeds in shallow, low-energy waters containing abundant submerged vegetation. Adults are primarily herbivores, while juveniles are more invertivorous. The green sea turtle is federally threatened.

The green sea turtle is a long distance migrant preferring tidal flats, pelagic zones, and isolated sand dunes. It prefers to nest on high-energy beaches with deep sand (NatureServe 2005). Every 2 to 4 years, the female lays between 1 and 8 clutches, each averaging 90 to 140 eggs, at approximately 2-week

intervals. Nesting occurs between March and October in the Caribbean-Gulf of Mexico region, with a peak in May and June (Ehrhart and Witherington 1992). There are no nesting records for green sea turtles in Louisiana, and sightings are fairly rare (LNHP 2004).

F.2.5.3 Kemp's Ridley Sea Turtle

The Kemp's Ridley sea turtle (*Lepidochelys kempii*) is a small sea turtle that is federally listed as endangered. The turtle is found in shallow coastal and estuarine waters, including those of the Gulf of Mexico. Adults are olive green above and yellow below, and young are gray above and yellow below. The shell of the Kemp's Ridley sea turtle is nearly round, and its limbs are flattened flippers. The shell length is usually between 23 and 28 inches (58 and 70 centimeters) for adults and 1.5 to 1.7 inches (3.8 to 4.4 centimeters) for hatchlings (Conant and Collins 1991).

In coastal waters, the Kemp's Ridley sea turtle is usually found over sand or mud bottoms where it feeds on crabs. Nests are built on elevated dunes, especially on beaches backed up by large swamps or bodies of open water with seasonal, narrow ocean connections (NatureServe 2005).

During the nesting season from April to July, the female lays 1 to 4 clutches of about 100 eggs at intervals of 10 to 28 days. Eggs hatch in an average of 50 to 55 days (CSTC 1990).

F.2.5.4 Leatherback Sea Turtle

The leatherback sea turtle (*Dermochelys coricea*) has a black or dark blue carapace, often with irregular white or pink blotches, and seven prominent longitudinal ridges. The adult is usually 53 to 70 inches (135 to 178 centimeters) in length, with some as long as 74 inches (189 centimeters). The leatherback hatchling is about 2.4 to 3 inches (6 to 7.5 centimeters) long, and it is black and white and covered with small beady scales that are later shed (Conant and Collins 1991). It feeds primarily on jellyfish. This species is federally listed as endangered.

Mainly pelagic, the leatherback tends to approach land exclusively for nesting (Eckert 1992). This turtle is a long-distance migrant that prefers the open ocean, particularly along the edge of continental shelves; but it is also found in seas, gulfs, bays, and estuaries. When nesting, the leatherback seeks moist sand on sloping sandy beaches backed by vegetation near deep water and rough seas (CSTC 1990). Every 2 to 3 years, the female leatherback lays up to 10 (possibly more) clutches of 50 to 170 eggs at intervals of about 1 to 2 weeks. Nesting occurs between March and August in the Western hemisphere; eggs hatch in 8 to 10 weeks (Eckert 1992). Due to its preference for open water, this sea turtle is one of the least recorded sea turtles in Louisiana; however, it may be found anywhere along the coast (LNHP 2004).

F.2.5.5 Loggerhead Sea Turtle

The loggerhead (*Caretta caretta*) is a reddish-brown sea turtle found in a variety of habitats, including open seas to more than 500 miles (805 kilometers) from shore, bays, estuaries, lagoons, creeks, and mouths of rivers, mainly in warm temperate and subtropical regions (NatureServe 2005). Adults have a carapace length typically between 28 to 49 inches (70 to 125 centimeters); hatchlings have a shell length of 1.6 to 2 inches (4 to 5 centimeters) (Dodd 1988 and 1992; Conant and Collins 1991). The loggerhead sea turtle is federally listed as threatened.

The female loggerhead sea turtle nests on open sandy beaches above the high-tide mark, seaward of well-developed dunes. This turtle favors high-energy and steeply sloped beaches with gradually sloped offshore approaches (CSTC 1990).

Between 50,000 to 70,000 clutches are deposited each year in southeastern states (Meylan et al. 1995). Despite some natural fluctuation in the size of the loggerhead population, numbers appear to be declining in some areas, largely because of habitat destruction and incidental take by shrimp trawlers. The nesting population in the southeastern United States is believed to be declining (CSTC 1990, Taylor 1992).

Every 2 to 3 years, a mature female lays between 1 and 9 clutches of around 120 eggs at intervals of 2 weeks. Nesting occurs mainly at night, often at high tide, from April to early September. The eggs hatch in 8 to 9 weeks in the southeastern states. The sex of the hatchlings is determined by incubation temperatures, with the ratio strongly biased toward females in Atlantic coastal waters. Hatchlings emerge from the nest a few days after hatching, typically during darkness (Wibbels et al. 1991; Mrosovsky and Provancha 1992).

F.3 FIELD OBSERVATIONS

This section presents observations made during field visits to the proposed Chacahoula and Clovelly storage sites.

F.3.1 Chacahoula, Louisiana

Biologists from ICF Consulting were unable to access land within the proposed Chacahoula site boundaries due to deep water and limited time. On October 21, 2005, observations were made from two points located south of the site boundary.

F.3.1.1 Proposed Chacahoula Storage Site

The proposed Chacahoula storage site area consists mainly of bottom hardwood swamp dominated by bald cypress. Other tree species observed were red maple, coastal plain willow, water tupelo, and Chinese tallow (an invasive species). The hardwood swamp is interspersed with open areas of deeper water covered in a vegetative mat. The National Wetlands Inventory describes the area as palustrine, semipermanently flooded, broadleaf deciduous or needleleaf deciduous wetland.

Table F.3.1.1-1: Plant Species Observed at the Chacahoula Candidate Site

Common name	Scientific Name	Vegetative Layer
Bald Cypress	*Taxodium distichum*	Canopy
Sweet Gum	*Liquidambar styraciflua*	Canopy
Eastern Cottonwood	*Populus deltoids*	Canopy
Oaks	*Quercus* spp.	Canopy
Black Willow	*Salix nigra*	Canopy
Ash	*Fraxinus* spp.	Canopy
Red Maple	*Acer rubrum*	Canopy
Box Elder	*Acer negundo*	Canopy
Hackberry	*Celtis occidentalis L.*	Canopy
Pecan	*Carya illinoensis*	Canopy
Tupelo	*Nyssa aquatica*	Canopy
Spanish Moss	*Tillandsia usneoides*	Epiphyte

F.3.1.2 Proposed Chacahoula Raw Water Intake Structure

The proposed location for the raw water intake (RWI) structure is on the ICW. The biologists were unable to visit this area during the visit due to limited access and time constraints.

F.3.2 Clovelly, Louisiana

Four biologists from ICF consulting visited the proposed Clovelly site on October 20, 2005.

F.3.2.1 Existing Clovelly Storage Site

The Louisiana Offshore Oil Port (LOOP) would operate the proposed Clovelly SPR site. LOOP has an existing storage facility at the Clovelly site consisting of eight crude oil caverns and a 25-million-barrel brine reservoir for brine used to displace oil from the caverns for distribution. The storage facility is located in a brackish, tidally influenced marsh. Areas that would be dredged for site expansion are spoil banks from LOOP construction. These areas support native marsh species and a significant amount of invasive species. LOOP monitors habitat changes in and around the facility and reported no inconsistencies with control areas in beach elevation, vegetation biomass, or vegetation land area in 2003.

Table F.3.2.1-1: Plant Species Typical of LOOP

Common name	Scientific Name	Vegetative Layer
Salt Meadow Cordgrass	*Spartina patens*	Emergent
Smooth Cordgrass	*Spartina alterniflora*	Emergent
Bitter Panicgrass	*Panicum amarum*	Emergent
Seaside Purslane	*Sesuvium portulacastrum*	Emergent
Salt Grass	*Distichlis spicata*	Emergent
Seaside Goldenrod	*Solidago sempervirens*	Emergent
Coast Drop Seed	*Sporobolus virginicus*	Emergent
Large Leaf Pennywort	*Centella javanica*	Emergent
Deer Pea Vetch	*Vicia ludoviclana*	Emergent
Common Reed	*Phragmites australis*	Emergent
Narrowleaf Baccharis	*Baccharis angustifolia*	Emergent
Catchfly Gentian	*Eustoma exaltatum*	Emergent
Torpedo Grass	*Panicum repens*	Emergent
Groundnut	*Apios Americana*	Emergent
Seashore Paspalum	*Paspalum vaginatum*	Emergent
Virginia Glasswort	*Salicornia virginica*	Emergent
Roseau Cane	*Phragmites communis*	Emergent
Sea Rocket	*Cakile edentula*	Emergent
Eastern Baccharis	*Baccharis halimifolia*	Emergent
Prostate Spurge	*Euphorbia supine*	Emergent
Seashore Elder	*Iva Imbricata*	Emergent
Beach Morning Glory	*Ipomoea imperati*	Emergent
Saltmarsh Morning Glory	*Ipomoea sagittata*	Emergent
Saltwort	*Batis maritima*	Emergent
Sea Oxeye	*Borrichia frutescens*	Emergent
Slender-Leafed Goldenrod	*Solidago tenuifolia*	Emergent

Table F.3.2.1-1: Plant Species Typical of LOOP

Common name	Scientific Name	Vegetative Layer
Yellow Nutgrass	*Cyperus esculentus*	Emergent
Bushy Beardgrass	*Andropogon glomeratus*	Emergent
Northern Fogfruit	*Phyla lanceolata*	Emergent
Saltmarsh Fimbry	*Fimbristylis castanea*	Emergent
Black Mangrove	*Avicennia germinans*	Emergent
Common Threesquare Bulrush	*Scirpus pungens*	Emergent
Shortleaf Flatsedge	*Cyperus brevifolius*	Emergent
Pointed Broom Sedge	*Carex scoparia*	Emergent
Coast Roast Gentian	*Sabatia calycina*	Emergent
Common Frogfruit	*Phyla nodiflora*	Emergent
Irisleaf Yellow Eye Grass	*Xyris laxifolia*	Emergent
Joint Grass	*Calamagrostis canadensis*	Emergent
Lamb's Quarters	*Chenopodium album*	Emergent
Marsh Elder	*Iva frutescens*	Emergent
Marsh Swallow Wort	*Cynanchum angustifolium*	Emergent
Perennial Salt Marsh Aster	*Aster tenuifolius*	Emergent
Sea Lavender	*Limonium carolinianum*	Emergent
Sea Oats	*Uniola Paniculata*	Emergent
Seabeach Grass	*Panicum Amarulum*	Emergent
Silverhead	*Philoxerus vermicularis*	Emergent

F.3.2.2 Existing Clovelly RWI Structure

The RWI structure is located onsite at the LOOP facility; it is used as needed for cavern development.

F.4 HABITAT ASSESSMENT AND POTENTIAL IMPACTS

This section evaluates whether the proposed SPR development activities would take place in areas where threatened and endangered species are known to exist or where they may exist based on the natural history information presented in section F.2. For any component of the SPR proposal located in known or potential threatened, endangered, or candidate species habitat, the nature of potential impacts are described. The assessment considers potential mitigation measures that DOE would implement for selected development alternatives.

In the following sections, a separate assessment is provided for each of the proposed SPR candidate and expansion sites.

F.4.1 Chacahoula, Louisiana

The proposed Chacahoula site assessment evaluates the potential effects on threatened, endangered, and candidate species by each of the elements of the proposed action listed in table F.4.1-1.

Assessment findings for these components of the Chacahoula site proposal are presented for each of the following species.

Table F.4.1-1: Elements of the Proposed Action and Location on Chacahoula Candidate Site

Element of Proposed Action	Location by Parish or Offshore Area
Chacahoula candidate site	Lafourche
Power lines and associated rights-of-way (ROWs) to Chacahoula candidate site	Lafourche and Terrebonne
Pipeline ROWs from Chacahoula to St. James terminal	Lafourche and St. James
Pipeline ROWs from Chacahoula to LOOP storage facility at Clovelly	Lafourche
RWI in ICW and associated access road and pipeline and power line ROWs	Lafourche and Terrebonne
Brine disposal pipeline ROW to Gulf of Mexico	Lafourche, Terrebonne, Gulf of Mexico

F.4.1.1 Birds

F.4.1.1.1 Bald Eagle

The bald eagle has been recorded in all of the parishes containing elements of the proposed Chacahoula development (Lafourche, St. James, and Terrebonne). All of the proposed elements have the potential to affect bald eagles. Data provided by LDFW (Lester 2006) suggest there are 14 recorded nesting sites within 1 mile (2 kilometers) of the proposed Chacahoula site and facilities. Five of these nests are within 1,500 feet (460 meters) of a proposed element – one near the crude oil pipeline to Clovelly; two near the crude oil pipeline to St. James; and two near the RWI. Bald eagle nests in bald cypress trees near fresh to intermediate marshes or open water in the southeastern parishes (Carloss 2005); much of the habitat surrounding the site and associated infrastructure (i.e., cypress-tupelo swamp) is potential high quality habitat for this species.

Construction Impacts

All proposed ROWs have at least one documented nesting area within 1 mile (2 kilometers). The USFWS and LDWF recommend against construction activities that would occur during nesting periods in Louisiana (i.e., October to mid-May) within 1 mile (2 kilometers) of nest sites. They also recommend that large trees be saved for potential roost and perch trees (Carloss 2005). During preconstruction surveys, DOE would have a biologist identify and map all bald eagle nests within 1 mile (2 kilometers) of a proposed ROW. DOE would coordinate with the USFWS and LDWF to avoid adverse impacts. This coordination would include implementing a construction schedule and large tree preservation plan. Trees within the ROW construction easement would be cleared, but DOE would re-seed with native species within this area to re-establish native habitat.

Construction of the Chacahoula storage site would remove all trees in the 350 acre (140 hectare) site and security buffer. This would be a large area of potential nesting, roosting, and foraging habitat within 1 mile (2 kilometers) of a recorded nesting area. Because of the complexity of this site, DOE would not be able to avoid all construction activities during nesting periods. DOE would consult with USFWS and LDWF to avoid, minimize, or mitigate for affects to bald eagles.

Data provided by LDWF indicate that the proposed RWI, RWI pipeline, crude oil pipeline to Clovelly, and crude oil pipeline to St. James have recorded nesting areas within 1,500 feet (460 meters). USFWS and LDWF recommends against any activity taking place within this buffer area of an active nesting site (Carloss 2005; Watson 2005). DOE would have a biologist survey the area to identify the exact locations

of nests near the proposed RWI and ROWs. Where feasible, DOE would adjust proposed locations to avoid crossing within 1,500 feet (460 meters) of a nest tree. If nests can not be avoided, DOE would complete a biological assessment and formal Section 7 consultations. DOE would follow all recommendations provided in the Biological Opinion from USFWS.

Operation and Maintenance Impacts

Operation and maintenance activities at the site may affect the bald eagle because noise, human activities, and lights near nesting and perching sites can disturb normal behavior or render sites unsuitable for continued use by this species. DOE would use lowmast lighting and downshield lights to minimize the impacts of photopollution. The presence of the power lines leading to the site may affect the bald eagle by obstructing its flight path.

Along the RWI and brine disposal pipeline ROWs, maintenance activity would be restricted during nesting season; therefore, operation and maintenance activities would have no effect on the bald eagle. Most of the pipelines would be built along existing ROWs, and operation and maintenance of the proposed expansion would be similar to existing conditions and should have negligible impact on the bald eagle. Near the RWI structure, DOE would enclose the raw water pump station to minimize noise impacts on wildlife, including the bald eagle. Normal operation and maintenance activities at the RWI would be restricted during nesting seasons. Operation activities associated with a drawdown of oil may happen at any time of the year, and may affect bald eagles near the RWI.

F.4.1.1.2 Brown Pelican

Of the locations listed in table F.4.1-1, Lafourche and Terrebonne Parishes have recorded brown pelicans. All elements of the development associated with the Chacahoula site would be located in these parishes, with the exception of portions of the crude oil pipeline to St. James Terminal and the offshore portion of the brine pipeline. Suitable habitat for the brown pelican is confined to the Gulf shore and associated barrier islands, sandbars, and wetlands. Consequently, the pipelines near the shore, which are the brine disposal pipeline ROW and the crude oil pipeline ROW to the storage facility at Clovelly, are the elements of the proposed development most likely to impact the brown pelican. According to USFWS, the brown pelican may roost in the vicinity of the Chacahoula ROWs close to the coast.

Construction Impacts

Nesting brown pelicans can be disturbed by human noise and activity nearby, especially if activity is closer than 330 to 1,970 feet (100 to 600 meters) to nests (NatureServe 2005). If the Chacahoula site is chosen for development, a biologist would identify brown pelican roosts along the proposed pipeline ROWs. If brown pelicans are identified in or near a pipeline ROW, construction would be scheduled to occur during periods when they are not present, if possible.

Operation and Maintenance Impacts

Operation and maintenance activities for these portions of the pipelines are expected to be infrequent and have no effect on the brown pelican. Operation and maintenance of the crude oil pipeline would be comparable to existing activities associated with the crude oil pipeline in the existing ROW. Along all pipelines, human activity would be minimal.

F.4.1.1.3 Peregrine Falcon

The peregrine falcon is a winter migratory visitor to Lafourche and Terrebonne Parishes. Barrier islands along the Gulf Coast are important feeding areas for this long-distance migrant. Based on this habitat, the only part of the development that potentially would affect the peregrine falcon is the brine disposal pipeline and ROW through Terrebonne Parish; however, because the construction of the pipeline and ROW would be fairly small in scope, and the species does not nest in Louisiana, it is expected that the construction, operation, and maintenance of the pipeline would have no effect on the peregrine falcon.

F.4.1.1.4 Piping Plover

Piping plovers have been identified in both Lafourche and Terrebonne Parishes. The piping plover overwinters on beaches, mudflats, and sandflats along the Gulf of Mexico, including barrier island beaches and spoil islands on the ICW. The piping plover uses these habitats for feeding, but not nesting. There is no beach habitat along the ROWs or at the Chacahoula site. The offshore portion of the brine disposal pipeline passes 7 miles (12 kilometers) to the west of designated critical habitat units (i.e., Unit LA–3, Point Au Fer Island, and Unit LA–4, Isles Dernieres). Construction, operation and maintenance of this ROW would not affect the piping plover since it would be located underwater and away from piping plover habitat.

F.4.1.2 Fish

F.4.1.2.1 Gulf Sturgeon

Historically, the gulf sturgeon has been found in coastal rivers in the northeastern Gulf of Mexico region. Although it is listed in all three parishes that would contain elements of the proposed Chacahoula development, none of the Federal critical habitats for gulf sturgeon in Louisiana are in these parishes (USFWS 2003a); therefore, it is expected that the Chacahoula development would have no effect on gulf sturgeon.

F.4.1.2.2 Pallid Sturgeon

Of the locations with proposed development for the Chacahoula site, only St. James Parish lists the pallid sturgeon species. The proposed element located in St. James Parish is the crude oil pipeline from the Chacahoula site to the existing St. James Terminal. The pallid sturgeon is reported to be present in the Mississippi River in St. James Parish, and it is found in other major free-flowing rivers within the Mississippi and Atchafalaya River systems in Louisiana. The proposed construction related to this element of the Chacahoula site would not cross the Mississippi River or any major tributaries, and there would be no effect on the pallid sturgeon.

F.4.1.3 Mammals

F.4.1.3.1 Red Wolf

Terrebonne Parish, which would contain portions of the proposed brine disposal pipeline, is within the historical range of the red wolf; however, the species currently exists only in a few reintroduction sites in North Carolina and Tennessee. Development of the Chacahoula site and associated infrastructure would have no effect on the red wolf species.

F.4.1.3.2 West Indian Manatee

The West Indian manatee has been reported in all three of the parishes that encompass the proposed Chacahoula site development. However, sightings of the West Indian manatee in Louisiana are rare. Consultations with USFWS and LDWF did not indicate any concerns that the proposed SPR facilities in would have any affect to the manatees (Carloss 2005; Watson 2005; Lester 2006).

F.4.1.4 Marine Mammals

The construction of the brine disposal pipeline and the operation of the brine disposal system would have no effect on the Gervais beaked whale, goose-beaked whale, pygmy sperm whale, dwarf sperm whale, sperm whale, rough-toothed dolphin, killer whale, false killer whale, short-finned pilot whale, pygmy killer whale, and the bottlenose dolphin. These species are found in deeper waters than the terminus of the offshore pipelines and the brine diffuser contours (see Appendix B, Brine Discharge Modeling).

A description of the potential impacts on the Atlantic spotted dolphin follow; impacts on the West Indian manatee were discussed earlier.

F.4.1.4.1 Atlantic Spotted Dolphin

The Atlantic spotted dolphin is a tropical species that can be found in a variety of areas through the Gulf of Mexico. It ranges from coastal to pelagic environments, typically over the continental shelf and slope. The Atlantic spotted dolphin is usually associated with the Gulf Stream.

Construction Impacts

The Atlantic spotted dolphin is usually found in deeper waters than the extent of the brine disposal system, but it is known to venture into shallower waters. The species likely would avoid or leave any construction area, and then return after construction was complete. Due to the limited construction time and the relatively small area of the Gulf of Mexico that would be impacted, no effect would result on the Atlantic spotted dolphin.

Operation and Maintenance Impacts

The Atlantic spotted dolphin may occur in the location of the brine diffusion; however, it is unlikely that the species would remain in the area for an extended period. Because the dissipation of the brine would occur in a relatively small area of the Gulf of Mexico and the species would not be restricted to such areas, there would be no effect on the Atlantic spotted dolphin.

F.4.1.5 Reptiles

F.4.1.5.1 Atlantic Hawksbill Sea Turtle

The Atlantic hawksbill sea turtle has been reported in Lafourche and Terrebonne Parishes, but the only component of the Chacahoula development with the potential to affect the Atlantic hawksbill sea turtle and its habitat is the brine disposal pipeline and ROW. The hawksbill turtle nests from May to November on sandy beaches, often in the proximity of coral reefs. The turtle is seen occasionally in Louisiana, but more commonly it is seen in more tropical waters.

Construction Impacts

Construction of the brine disposal pipeline onshore would have no effect on the Atlantic hawksbill sea turtle because the pipeline near the coast crosses through only wetland habitat, not beach. Offshore pipeline construction temporarily would disturb potential feeding habitat for Atlantic hawksbill sea turtle; however, the total area affected would be a small portion of the total available area of suitable habitat, and the species would suffer no effect.

Operation and Maintenance Impacts

Operation and maintenance of the onshore portion of the brine disposal pipeline would have no effect on the Atlantic hawksbill turtle because the pipeline does not cross beach habitat. Operation of the offshore component of the brine disposal system would have no effect on the feeding habits or habitat of the sea turtle because the dissipation of the concentrated brine would allow for ambient or near-ambient conditions to exist in a short distance (see Appendix E, Essential Fish Habitat Assessment). Maintenance of the pipeline offshore would be infrequent, and it would not affect the Atlantic hawksbill sea turtle.

F.4.1.5.2 Green Sea Turtle

The green sea turtle has been reported in Lafourche and Terrebonne Parishes, but the only component of the Chacahoula development with the potential to affect the green sea turtle is the brine disposal pipeline and ROW. The green sea turtle nests from March to October, with a peak in May and June, on beaches with deep sand.

Construction Impacts

The Louisiana National Heritage Program (LNHP 2004) reports no nesting records of the green sea turtle in the state. Even if the green sea turtle is in the area, construction of the brine disposal pipeline onshore would have no effect on the species because, near the coast, the pipeline crosses only through wetland habitat, not beach. Offshore pipeline construction temporarily would disturb potential feeding habitat for the green sea turtle; however, the total area affected would be a small portion of the total available area of suitable habitat, and there would be no effect on the species.

Operation and Maintenance Impacts

Operation and maintenance of the onshore portion of the brine disposal pipeline would have no effect on the green sea turtle because the pipeline does not cross beach habitat. Operation of the offshore component of the brine disposal system would have no effect on the feeding and habitat of the green sea turtle because the dissipation of the concentrated brine would allow for ambient or near-ambient conditions to exist in a short distance (see Appendix E, Essential Fish Habitat Assessment). Maintenance of the pipeline offshore would be infrequent, and it would not affect the green sea turtle.

F.4.1.5.3 Kemp's Ridley Sea Turtle

Kemp's Ridley sea turtle has been reported in Lafourche and Terrebonne Parishes, but the only component of the Chacahoula development with the potential to affect the Kemp's Ridley sea turtle is the brine disposal pipeline and ROW. The Kemp's Ridley sea turtle nests from April to July.

Construction Impacts

Construction of the brine disposal pipeline onshore would have no effect on the Kemp's Ridley sea turtle because, near the coast, the pipeline crosses only through wetland habitat, not beach. Offshore pipeline construction temporarily would disturb potential feeding habitat for the Kemp's Ridley sea turtle; however, the total area affected would be a small portion of the total available area of suitable habitat, and there would be no effect on the species.

Operation and Maintenance Impacts

Operation and maintenance of the onshore portion of the brine disposal pipeline would have no effect on the Kemp's Ridley sea turtle because the pipeline does not cross beach habitat. Operation of the offshore component of the brine disposal system would have no effect on the feeding and habitat of the species because the dissipation of the concentrated brine would allow for ambient or near-ambient conditions to exist in a short distance (see Appendix E, Essential Fish Habitat Assessment). Maintenance of the pipeline offshore would be infrequent and would not affect the Kemp's Ridley sea turtle.

F.4.1.5.4 Leatherback Sea Turtle

The leatherback sea turtle has been reported in Lafourche and Terrebonne Parishes, but the only component of the Chacahoula development with the potential to affect the leatherback sea turtle is the brine disposal pipeline and ROW. The leatherback sea turtle nests from March and August, and it approaches land almost exclusively for nesting (Eckert 1992), which takes place on sloping sandy beaches backed by vegetation near deep water and rough seas (CSTC 1990).

Construction Impacts

Construction of the brine disposal pipeline onshore would have no effect on the leatherback sea turtle because, near the coast, the pipeline crosses only through wetland habitat, not beach. Offshore pipeline construction temporarily would disturb potential feeding habitat for the leatherback sea turtle; however, the total area affected would be a small portion of the total available area of suitable habitat, and there would be no effect on the species.

Operation and Maintenance Impacts

Operation and maintenance of the onshore portion of the brine disposal pipeline would have no effect on the leatherback sea turtle because the pipeline does not cross beach habitat. Operation of the offshore component of the brine disposal system would have no effect on the feeding and habitat of the species because the dissipation of the concentrated brine would allow for ambient or near-ambient conditions to exist in a short distance (see Appendix E, Essential Fish Habitat Assessment). Maintenance of the pipeline offshore would be infrequent, and it would not affect the leatherback sea turtle.

F.4.1.5.5 Loggerhead Sea Turtle

The loggerhead sea turtle has been reported in Lafourche and Terrebonne Parishes, but the only component of the Chacahoula development with the potential to affect the loggerhead sea turtle is the brine disposal pipeline and ROW. The loggerhead sea turtle nests from April to early September.

Construction Impacts

Construction of the brine disposal pipeline onshore would have no effect on the loggerhead sea turtle because, near the coast, the pipeline crosses only through wetland habitat, not beach. Offshore pipeline construction temporarily would disturb potential feeding habitat for the loggerhead sea turtle; however, the total area affected would be a small portion of the total available area of suitable habitat, and there would be no effect on the species.

Operation and Maintenance Impacts

Operation and maintenance of the onshore portion of the brine disposal pipeline would have no effect on the loggerhead sea turtle because the pipeline does not cross beach habitat. Operation of the offshore component of the brine disposal system would have no effect on the feeding and habitat of the species because the dissipation of the concentrated brine would allow for ambient or near-ambient conditions to exist in a short distance (see Appendix E, Essential Fish Habitat Assessment). Maintenance of the pipeline offshore would be infrequent, and it would not affect the loggerhead sea turtle.

F.4.2 Clovelly, Louisiana

The assessment for the proposed Clovelly site evaluates the potential effects on threatened, endangered, and candidate species by each of the elements of the proposal listed in table F.4.2-1:

Table F.4.2-1: Elements of the Proposed Action and Location on the Clovelly Candidate Site

Element of Proposed Action	Location by Parish or Offshore Area
Clovelly candidate site	Lafourche
Connection to existing crude oil distribution system	Lafourche
RWI system upgrade	Lafourche
Brine disposal system upgrade	Lafourche

Development of the Clovelly candidate site would use existing infrastructure of the adjacent LOOP storage facility at Clovelly. No new construction would be required for the raw water, brine disposal, and crude oil distribution systems. Only minor upgrades and connections to these systems would be necessary; therefore, effects on threatened, endangered, and candidate species from normal operations and maintenance activities of these elements would be insignificant. This DOE evaluation of potential effects associated with the Clovelly site addresses only the potential construction, operation, and maintenance impacts.

The following paragraphs describe evaluation findings for each potentially affected species. Note that all proposed actions associated with the Clovelly site would be located in Lafourche Parish (except operation and maintenance of the offshore brine pipeline and diffuser, which would be located in the Gulf of Mexico).

F.4.2.1 Birds

F.4.2.1.1 Bald Eagle

The Clovelly site is located amidst mixed coastal wetlands and open water habitat suitable for the bald eagle, and the Louisiana Natural Heritage Program reports that the bald eagle is present in Lafourche Parish. Data from LDWF reports no bald eagle nests within 1 mile (2 kilometers) of the proposed storage

site. Further, the Clovelly site is an existing oil storage facility with frequent human activity. Bald eagles that would be near the area would be tolerant to human activity. The proposed Clovelly storage site would not affect bald eagles.

F.4.2.1.2 Brown Pelican

According to the LDWF (Carloss 2005), colonial nesting birds, including the brown pelican, are known to exist in the vicinity of the Clovelly site.

Construction Impacts

Suitable habitat for the brown pelican in Lafourche Parish would be confined to the Gulf shore and associated barrier islands, sandbars, and wetlands, and nearby shallow estuarine waters, sand spits, offshore sand bars, and islets (for nocturnal roosting). Data from LDWF did not report any rookeries within 1 mile (2 kilometers) of the site, but LDWF points out that the locations of rookeries may change from year to year (Lester 2006). Habitat at the site is considered poor quality due to previous disturbance and the existing human activity associated with the LOOP storage facility at Clovelly. Because the site is disturbed with daily human activities, any pelicans that moved into the area would be considered tolerant of human activity. The proposed Clovelly storage site would have no affect on the brown pelican.

F.4.2.1.3 Peregrine Falcon

The peregrine falcon, which is listed by the State of Louisiana as threatened/endangered, is a migratory visitor to Louisiana in the winter. Barrier islands along the Gulf Coast are important feeding areas for long-distance migrants. Nesting does not occur along the Gulf Coast. Any peregrine falcon feeding in the vicinity of proposed development would be expected to move to adjacent undisturbed areas, which are plentiful, and thus, construction at the site and associated infrastructure upgrades would have no effect on this species. Likewise, operation and maintenance activities would be comparable to those associated with the adjacent LOOP existing storage facility at Clovelly and would have no effect on the species.

F.4.2.1.4 Piping Plover

The piping plover is a migratory species that overwinters on beaches, mudflats, and sandflats along Gulf of Mexico, including barrier island beaches and spoil islands (USFWS 2005). Suitable habitat for the piping plover exists in Lafourche Parish, but has not been identified at the Clovelly storage site. The Clovelly storage site is an existing facility with daily human activity. The site is located 25 miles (40 kilometers) from the nearest designated critical habitat area. Thus, the proposed site would not affect the piping plover.

F.4.2.2 Fish

The only endangered, threatened, or candidate species of fish in Lafourche Parish is the gulf sturgeon. The USFWS has designated as critical habitat certain Gulf Coast rivers where the gulf sturgeon spawns. The Clovelly candidate site is not in critical habitat and the existing site conditions are not suitable for spawning by this species. Gulf sturgeon, particularly adults, may feed in the area of proposed development. Construction of storage caverns, surface facilities, and infrastructure would cause temporary disturbance and long-term loss of potential feeding habitat; however, any gulf sturgeon present at the site would be expected to move to adjacent undisturbed areas during construction. The loss of suitable feeding area would have no effect on the gulf sturgeon because the area disturbed would be an insignificant portion of the suitable habitat in the region. Operation and maintenance activities would be

comparable to existing activities of the LOOP existing storage facility at Clovelly, and therefore, would have no additional effect on the species.

F.4.2.3 Mammals

The only endangered, threatened, or candidate mammal species in Lafourche Parish is the West Indian manatee. Although the manatee occurs primarily along the Gulf of Mexico coast in Florida, individuals range as far west as Texas. The West Indian manatee has been reported as possibly present in Lafourche Parish. The Clovelly site includes shallow coastal waters, such as canals, that are suitable habitat for this species. If the manatee is present at the site, construction of storage caverns, surface facilities, and infrastructure potentially would cause a temporary disturbance and some minor long-term loss of suitable habitat. Any manatee present at the site would be expected to move to adjacent undisturbed areas during construction. Because suitable habitat is abundant in the vicinity of the candidate site and any manatee present in the area likely would be occasional visitors rather than long-term residents, there would be no long-term effect on the species. Operation and maintenance impacts would be comparable to those of the existing LOOP existing storage facility at Clovelly and would have no additional effect on the manatee.

F.4.2.4 Marine Mammals

The operation of the brine disposal system would have no effect on the Gervais beaked whale, goose-beaked whale, pygmy sperm whale, dwarf sperm whale, sperm whale, rough-toothed dolphin, killer whale, false killer whale, short-finned pilot whale, pygmy killer whale, and the bottlenose dolphin. These species are found in deeper waters than the brine diffuser contours (see Appendix B, Brine Discharge Modeling).

Descriptions of potential impacts on the Atlantic spotted dolphin follow; descriptions of impacts on the West Indian manatee were described in the preceding section.

F.4.2.4.1 Atlantic Spotted Dolphin

The Atlantic spotted dolphin is a tropical species that can be found in a variety of areas through the Gulf of Mexico. It ranges from coastal to pelagic environments, typically over the continental shelf and slope. The Atlantic spotted dolphin is usually associated with the Gulf Stream.

Operation Impacts

The Atlantic spotted dolphin may occur in the location of the brine diffuser; however, it is unlikely that the species would remain in the area for an extended period. Because the dissipation of the brine would occur in a relatively small area of the Gulf of Mexico and the species would not be restricted to such areas, there would be no effect on the Atlantic spotted dolphin.

F.4.2.5 Reptiles

F.4.2.5.1 Atlantic Hawksbill Sea Turtle

The Atlantic hawksbill sea turtle is a migratory species that prefers shallow coastal waters with rocky bottoms, coral reefs, mangrove-bordered bays, and estuaries (CSTC 1990). The Atlantic hawksbill sea turtle prefers to nest from May to November on undisturbed, deep-sand beaches (Meylan 1992; Lund 1985), often in the proximity of coral reefs.

Construction Impacts

Other than modifications and upgrades to the pipeline, RWI, and brine disposal systems, construction would be limited primarily to the site. The only upland habitat available for nesting at the Clovelly site is revegetated dredge spoil, which is not considered suitable for this species. Although the species is seen occasionally in Louisiana, and it has been reported in Lafourche Parish, it is more commonly found in more tropical waters. The hawksbill sea turtle is not expected to be found at the Clovelly site, and it would not be affected by construction. Because the existing LOOP brine disposal pipeline would be used, no construction would take place on the beach where the species might nest.

Operation and Maintenance Impacts

Operation and maintenance of the onshore portion of the brine disposal pipeline would have no effect on the Atlantic hawksbill turtle because the pipeline would be buried. Operation of the offshore component of the brine disposal system would have no effect on the feeding and habitat of the species because the dissipation of the concentrated brine would allow for ambient or near-ambient conditions to exist in a short distance (see Appendix E Essential Fish Habitat Assessment). Maintenance of the pipeline offshore should be infrequent and not affect the Atlantic hawksbill turtle.

F.4.2.5.2 Green Sea Turtle

The green sea turtle most commonly feeds in shallow, low-energy waters containing abundant submerged vegetation. Its preferred habitat includes tidal flats, pelagic zones, and isolated sand dunes. Nesting typically occurs from March to October on high-energy beaches with deep sand (NatureServe 2005). With these habitat preferences, this migratory species might occasionally occur at or near the Clovelly candidate site, but it is unlikely to nest there.

Construction Impacts

Other than modifications and upgrades to the pipeline, RWI, and brine disposal systems, construction would be limited primarily to the candidate site. The only upland habitat available for nesting at the Clovelly site is revegetated dredge spoil, which is not considered suitable for this species. If any green sea turtle is present at the Clovelly site, it would be expected to avoid any temporary disturbance associated with construction activities, and it would not be affected by construction. Because the existing LOOP brine disposal pipeline would be used, no construction would take place on the beach where the turtle might nest.

Operation and Maintenance Impacts

Operation and maintenance of the onshore portion of the brine disposal pipeline would have no effect on the green sea turtle because the pipeline would be buried. Operation of the offshore component of the brine disposal system would have no effect on the feeding and habitat of the species because the dissipation of the concentrated brine would allow for ambient or near-ambient conditions to exist in a short distance (see Appendix E, Essential Fish Habitat Assessment). Maintenance of the pipeline offshore should be infrequent and not affect the green sea turtle.

F.4.2.5.3 Kemp's Ridley Sea Turtle

In coastal waters, the Kemp's Ridley sea turtle usually feeds over sand or mud bottoms in shallow coastal and estuarine waters. It nests on elevated dunes, especially on beaches backed up by large swamps or bodies of open water having seasonal, narrow ocean connections (NatureServe 2005). Although canals

and open water areas on and near the Clovelly site are suitable for feeding the Kemp's Ridley sea turtle, the available habitat is not suitable for nesting.

Construction Impacts

Other than modifications and upgrades to the pipeline, RWI, and brine disposal systems, construction would be limited primarily to the candidate site. If the Kemp's Ridley sea turtle is present at the Clovelly site, it would be expected to avoid the temporary disturbance associated with construction activities, and it would not be affected by construction. Temporary construction impacts and the long-term loss of marginal quality habitat would have no effect on this species, if it is present.

Operation and Maintenance Impacts

Operation and maintenance of the onshore portion of the brine disposal pipeline would have no effect on the Kemp's Ridley sea turtle because the pipeline would be buried. Operation of the offshore component of the brine disposal system would have no effect on the feeding and habitat of the species because the dissipation of the concentrated brine would allow for ambient or near-ambient conditions to exist in a short distance (see Appendix E, Essential Fish Habitat Assessment). Maintenance of the pipeline offshore should be infrequent and not affect the Kemp's Ridley sea turtle.

F.4.2.5.4 Leatherback Sea Turtle

The leatherback sea turtle has been recorded in Lafourche Parish, but it is unlikely to be found at the Clovelly site. This species spends most of its life in open ocean waters, where it feeds primarily on jellyfish. It approaches land almost exclusively for nesting (Eckert 1992), which takes place on sloping sandy beaches backed by vegetation near deep water and rough seas (CSTC 1990).

Construction Impacts

Other than modifications and upgrades to the pipeline, RWI, and brine disposal systems, construction would be limited primarily to the Clovelly site. Because there are no suitable nesting areas in the vicinity of the Clovelly site, no effects on this species are anticipated from construction.

Operation and Maintenance Impacts

Operation and maintenance of the onshore portion of the brine disposal pipeline would have no effect on the leatherback sea turtle because the pipeline would be buried. Operation of the offshore component of the brine disposal system would not affect the feeding and habitat of the species because the dissipation of the concentrated brine would allow for ambient or near-ambient conditions to exist in a short distance (see Appendix E, Essential Fish Habitat Assessment). Maintenance of the pipeline offshore should be infrequent, and it would not affect the leatherback sea turtle.

F.4.2.5.5 Loggerhead Sea Turtle

The loggerhead sea turtle is found in a variety of habitats, including open seas, bays, estuaries, lagoons, creeks, and mouths of rivers (NatureServe 2005). It tends to nest on open and sandy, high-energy beaches with well-developed dunes (CSTC 1990). Based on these habitat preferences, portions of the Clovelly site may be suitable habitat for the loggerhead sea turtle, but not for nesting. The loggerhead has been reported in Lafourche Parish but not specifically at the Clovelly site.

Construction Impacts

Other than modifications and upgrades to the pipeline, RWI, and brine disposal systems, construction would be limited primarily to the Clovelly site. If any loggerhead sea turtle is present at the Clovelly site, it would be expected to avoid any temporary disturbance associated with construction activities, and it would not be affected by construction. Temporary construction impacts and the long-term loss of marginal quality habitat would have no effect on this species, if it is present.

Operation and Maintenance Impacts

Operation and maintenance of the onshore portion of the brine disposal pipeline would have no effect on the loggerhead sea turtle because the pipeline would be buried. Operation of the offshore component of the brine disposal system would not affect the feeding and habitat of the species because the dissipation of the concentrated brine would allow for ambient or near-ambient conditions to exist in a short distance (see Appendix E, Essential Fish Habitat Assessment). Maintenance of the pipeline offshore should be infrequent, and it would not affect the loggerhead sea turtle.

F.4.3 Bayou Choctaw, Louisiana

This assessment for the proposed Bayou Choctaw expansion site evaluates the potential effects on threatened, endangered, and candidate species by each of the elements of the proposed action listed in table F.4.3-1.

Table F.4.3-1: Elements of the Proposed Action and Location on Bayou Choctaw Site

Element of Proposed Action	Location by Parish or Offshore Area
Bayou Choctaw site	Iberville
Brine Injection Well Area	Iberville

The proposed action would involve developing two additional caverns on the existing DOE site, acquiring one existing cavern co-located on the same salt dome, and developing six new offsite brine injection wells south of the storage facility. Approximately 3,000 feet (900 meters) of new pipeline would be required to connect the existing brine injection wells to the new injection wells. No offsite construction would be required for the existing RWI and crude oil distribution pipelines; therefore the Bayou Choctaw site and the new brine injections wells are the only elements assessed for the effects of construction on threatened, endangered, and candidate species.

If DOE proceeds with expansion at the Bayou Choctaw site, regular operation and maintenance activities associated with the site would be similar to current activities associated with storage caverns currently located there, and additional effects would be negligible or none.

Descriptions of evaluation findings for this element of the Bayou Choctaw site for each species follow. Note that all proposed elements associated with the Bayou Choctaw site are located in Iberville Parish.

F.4.3.1 Birds

The bald eagle is the only threatened, endangered, or candidate bird species reported in Iberville Parish. The Bayou Choctaw site is located near areas with potentially suitable habitat for the bald eagle, including open waters or wetlands adjacent to forest lands; however, no nests have been identified near the site. The Bayou Choctaw site is an existing petroleum storage site, and proposed construction

activities would be limited to the current site location. Because there are no known bald eagle nests in the area and the site is already developed, construction, operation, and maintenance activities for the proposed action would have no effect on the bald eagle.

F.4.3.2 Fish

F.4.3.2.1 Gulf Sturgeon

The gulf sturgeon can be found in some rivers, streams, and estuarine and coastal waters in Louisiana, especially in the eastern part of the state (USFWS 2003a). The gulf sturgeon reportedly occurs in Iberville Parish (USFWS 2003b); however, available information sources do not identify specific gulf sturgeon habitat areas in this parish. Critical habitat for the gulf sturgeon has been designated in riverine and estuarine areas of Louisiana (USFWS 2003a), but the areas in or near Iberville Parish are not included in the critical habitat units for the gulf sturgeon listed by USFWS. The proposed Bayou Choctaw expansion site is located on Cavern Lake, which is connected to the ICW by a canal, and potentially it would serve as habitat for the gulf sturgeon. Considering the site's location relative to the coast and the minimal effects that expansion of this site would have on aquatic habitat in Cavern Lake, the proposed action would have no effect on the gulf sturgeon.

F.4.3.2.2 Pallid Sturgeon

The pallid sturgeon inhabits larger channels of the Mississippi and Atchafalaya River systems in Louisiana. Iberville Parish, where the proposed action would be located, borders the Mississippi river, and it is reported to be within the known range of the pallid sturgeon; however, the proposed site is not located on the Mississippi River, its tributaries, or any large, free-flowing river (listed as the desired habitat of the pallid sturgeon). The proposed action would have no effect on the pallid sturgeon.

F.4.3.3 Mammals

The range of the Louisiana black bear once included all of Louisiana, including the location of the proposed Bayou Choctaw expansion site. Today, the only known breeding populations are in Louisiana in the Tensas and Atchafalaya river basins (Bowker and Jacobson 1995), areas that have been designated as critical habitat. The Bayou Choctaw site is not located in the designated critical habitat of the Louisiana black bear. All construction, operation and maintenance activities would occur within the current boundary of the Bayou Choctaw storage site. The Louisiana black bear has never been sighted at the existing facility. Thus, the expansion at the Bayou Choctaw site would have no effect on the Louisiana black bear.

F.4.3.4 Marine Mammals

No offshore elements are associated with Bayou Choctaw; no marine mammals would be affected.

F.4.4 West Hackberry, Louisiana

The assessment for the proposed West Hackberry site evaluates the potential effects on threatened, endangered, and candidate species by each of the elements of the proposed action listed in table F.4.4-1.

The proposed action would involve acquiring three existing caverns adjacent to the existing DOE site and construction at the site to connect the caverns to the existing RWI, brine disposal, and oil distribution systems. The construction associated with making the connections would be relatively minor and limited

to onsite work; therefore, the West Hackberry site is the only element assessed for effects to threatened, endangered, and candidate species.

Table F.4.4-1: Elements of the Proposed Action and Location on West Hackberry Site

Element of Proposed Action	Location by Parish or Offshore Area
West Hackberry site	Cameron and Calcasieu

If DOE proceeded with expansion at the West Hackberry site, regular operation and maintenance activities associated with the site would be comparable to current activities associated with storage caverns currently located there, and additional incremental effects would be negligible or none.

Following are descriptions of the evaluation findings for this element of the West Hackberry site for each species.

F.4.4.1 Birds

F.4.4.1.1 Bald Eagle

The bald eagle has been reported in Cameron and Calcasieu Parishes in Louisiana. The West Hackberry candidate site is located near areas with potentially suitable habitat for the bald eagle, including open waters or wetlands adjacent to forest lands. DOE has reported occurrence of the bald eagle at the West Hackberry site or on lands through which the SPR pipelines pass (DOE 2002); however there are currently no known bald eagle nests near the site. The West Hackberry site is an existing petroleum storage site. Proposed construction activities would be limited to the current site location, and operation and maintenance would be similar to current activities; therefore, construction, operation, and maintenance activities for the proposed action would have no effect on the bald eagle.

F.4.4.1.2 Brown Pelican

The brown pelican has been reported in parishes along the Gulf Coast of Louisiana including Cameron Parish where the West Hackberry site is located. The brown pelican typically is found in coastal areas, including barrier islands, sandbars, and wetlands, and nearby shallow estuarine waters, sand spits, offshore sand bars, and islets (for nocturnal roosting). Although the West Hackberry expansion site does not have ideal habitat for the brown pelican, this species has been reported by DOE in locations near or on the site (DOE 2002). Because the area is not prime habitat for the brown pelican and construction would be restricted to onsite areas, construction activities are expected to have no effect on the species. Impacts from operation and maintenance activities would be comparable to those resulting from ongoing activities, and they would also have no effect on the brown pelican.

F.4.4.1.3 Piping Plover

The piping plover is found along the Gulf Coast of Louisiana, including Cameron Parish where the West Hackberry site is located. The habitat of the piping plover consists of areas directly adjacent to the coast (e.g., beaches, mudflats, sandflats, and dune systems). Due to the inland location of the West Hackberry site, construction, operation, and maintenance of the proposed action would have no effect on the piping plover.

Unit LA-1 in Cameron Parish is on the Federal list of designated critical habitat for the piping plover; however, all piping plover critical habitat areas in Louisiana, including Unit LA-1, are restricted to areas

in the immediate vicinity of the shoreline, and they do not extend inland beyond where densely vegetated habitat is located. Construction, operation, and maintenance activities associated with the West Hackberry site (all located inland) would have no effect on any areas of critical habitat.

F.4.4.1.4 Red-Cockaded Woodpecker

The red-cockaded woodpecker is reported to be present in Calcasieu Parish where the proposed West Hackberry expansion site is located. The landscape of the storage site and area surrounding the site has emergent wetlands and open water areas, with abundant lakes, bayous, and canals. The red-cockaded woodpecker's usual habitat includes open pine woodlands or savannahs with large, old pines, and it is unlikely that the habitat in the vicinity of the West Hackberry site would be preferable to this species. There are designated primary and secondary core populations of the red-cockaded woodpecker in Louisiana, as described in section F.2.1.5; however, these populations are located in the central part of the state, more than 50 miles (80 kilometers) from the West Hackberry site.

Considering the site characteristics and the distance from known core populations of red-cockaded woodpecker, there would be no effect from construction and operation and maintenance activities on this species at the West Hackberry site.

F.4.4.2 Fish

The gulf sturgeon is potentially found in rivers, streams, estuarine, and coastal waters in Louisiana, especially in the eastern part of the state (USFWS 2003a). The gulf sturgeon reportedly occurs in Cameron Parish (USFWS 2003b). Critical habitat for the gulf sturgeon has been designated in riverine and estuarine areas of Louisiana (USFWS 2003a); however, the Federal list of designated critical habitat for the gulf sturgeon in Louisiana includes areas only in the eastern part of the state, and areas in or near Iberville Parish are not included. Available information sources do not identify specific gulf sturgeon habitat areas in this parish. The proposed West Hackberry expansion site is located near water bodies that potentially would serve as habitat for the gulf sturgeon; however, considering the site's location relative to the coast and the minimal impacts expansion of this site would have on aquatic habitat near the site, the proposed action would have no effect on the gulf sturgeon.

F.4.4.3 Mammals

F.4.4.3.1 Red Wolf

The historical range of the red wolf included coastal areas of Louisiana, including Cameron and Calcasieu Parishes; however, the red wolf is now considered to be extinct from Louisiana (Davis and Schmidly 1997). The red wolf population along the Texas and Louisiana coast was rendered functionally extinct due to hybridization with the coyote (NatureServe 2005). Based on this current range information, construction, operation, and maintenance activities at the proposed West Hackberry site and associated infrastructure would have no effect on the red wolf.

F.4.4.3.2 West Indian Manatee

The West Indian manatee has been reported to occasionally inhabit the coastal waters off of Louisiana, including coastal areas of Cameron Parish. Construction activities associated with expansion at the West Hackberry site would occur only on land, and it would not affect the aquatic habitat of the manatee. Operation and maintenance activities also would have no effect on the manatee.

F.4.4.4 Marine Mammals

No offshore elements are associated with West Hackberry; no marine mammals would be affected.

F.4.4.5 Reptiles

There are five species of endangered or threatened sea turtles that have been reported to inhabit coastal parishes in Louisiana, including Cameron Parish:

- Atlantic hawksbill sea turtle,
- Green sea turtle,
- Kemp's Ridley sea turtle,
- Leatherback sea turtle, and
- Loggerhead sea turtle.

These turtles all inhabit open ocean waters and nest on beaches or similar regions (e.g., tidal flats, pelagic zones, and isolated sand dunes). Loggerhead and Kemp's Ridley sea turtles also are occasionally found in near-shore or estuarine waters.

Because the West Hackberry site is located on the north side of Cameron Parish away from the coast, construction activities at the site would not affect areas inhabited by these species of sea turtles. Regular operation and maintenance activities at the site and the associated existing oil pipelines and RWI would also have no effect on these species.

F.4.5 Assessment Summary

Tables F.4.5-1 though F.4.5-8 identify the threatened, endangered, and candidate species that may be affected by each element of the four proposed new and expansion Louisiana sites. The potential for effects for each element was estimated based on information about the presence or absence of the species or suitable habitat in areas that would be affected. The evaluation also considered the potential mitigation factors. Tables F.4.5-1, F.4.5-3, F.4.5-5, and F.4.5-7 identify whether construction activities for each site may affect species. Tables F.4.5-2, F.4.5-4, F.4.5-6, and F.4.5-8 summarize whether operation and maintenance activities for each site may affect species.

Tables F.4.5-9 and F.4.5-10 summarize the number of species that may be affected by construction and operation and maintenance for the four sites. This summary is presented in table F.4.5-9 for the Chacahoula and Clovelly sites and in table F.4.5-10 for the Bayou Choctaw and West Hackberry expansion sites. Based on current information, only two species (bald eagle and brown pelican) may be affected by the Chacahoula site proposal and no species are expected to be affected at the other two sites.

F.5 RECOMMENDATIONS

The evaluation summarized in section F.4 considered how some potential effects would be minimized, avoided, or more accurately forecasted by the use of preconstruction field investigations, mitigation measures, and other precautionary measures. The recommendations below summarize the types of measures identified in section F.4 that would lessen the potential for effects resulting from the development of the SPR candidate sites in Louisiana. Additional measures may be identified during detailed planning if either the Chacahoula or Clovelly site is selected for development.

Table F.4.5-1: Summary of Potential Construction-Related Impacts to Threatened, Endangered, and Candidate Species from Development of the Chacahoula Site

Species	Site	Power lines to Site	Chacahoula to St. James ROW	Chacahoula to Clovelly ROW	RWI and ROW to ICW	ROW to Gulf of Mexico	Offshore Brine Diffuser
Birds							
Bald Eagle	May affect	May affect	May affect	May affect	May affect	No effect	No effect
Brown Pelican	No effect	No effect	No effect	May affect	No effect	May affect	No effect
Peregrine Falcon	No effect	No effect	No effect	No effect	No effect	No effect	No effect
Piping Plover	No effect	No effect	No effect	No effect	No effect	No effect	No effect
Fish							
Gulf Sturgeon	No effect	No effect	No effect	No effect	No effect	No effect	No effect
Pallid Sturgeon	No effect	No effect	No effect	No effect	No effect	No effect	No effect
Mammals							
Red Wolf	No effect	No effect	No effect	No effect	No effect	No effect	No effect
West Indian Manatee	No effect	No effect	No effect	No effect	No effect	No effect	No effect
Marine Mammals							
Atlantic Spotted Dolphin	No effect	No effect	No effect	No effect	No effect	No effect	No effect
West Indian Manatee	No effect	No effect	No effect	No effect	No effect	No effect	No effect
Reptiles							
Atlantic Hawksbill Sea Turtle	No effect	No effect	No effect	No effect	No effect	No effect	No effect
Green Sea Turtle	No effect	No effect	No effect	No effect	No effect	No effect	No effect
Kemps Ridley Sea Turtle	No effect	No effect	No effect	No effect	No effect	No effect	No effect
Leatherback Sea Turtle	No effect	No effect	No effect	No effect	No effect	No effect	No effect
Loggerhead Sea Turtle	No effect	No effect	No effect	No effect	No effect	No effect	No effect

Table F.4.5-2: Summary of Potential Operation and Maintenance Impacts on Threatened, Endangered, and Candidate Species from Development of Chacahoula Site

Species	Site	Power lines to Site	Chacahoula to St. James ROW	Chacahoula to Clovelly ROW	RWI and ROW to ICW	ROW to Gulf of Mexico	Offshore Brine Diffuser
Birds							
Bald Eagle	May affect	May affect	May affect	May affect	May affect	No effect	No effect
Brown Pelican	No effect	No effect	No effect	No effect	No effect	No effect	No effect
Peregrine Falcon	No effect	No effect	No effect	No effect	No effect	No effect	No effect
Piping Plover	No effect	No effect	No effect	No effect	No effect	No effect	No effect
Fish							
Gulf Sturgeon	No effect	No effect	No effect	No effect	No effect	No effect	No effect
Pallid Sturgeon	No effect	No effect	No effect	No effect	No effect	No effect	No effect
Mammals							
Red Wolf	No effect	No effect	No effect	No effect	No effect	No effect	No effect
West Indian Manatee	No effect	No effect	No effect	No effect	No effect	No effect	No effect
Marine Mammals							
Atlantic Spotted Dolphin	No effect	No effect	No effect	No effect	No effect	No effect	No effect
West Indian Manatee	No effect	No effect	No effect	No effect	No effect	No effect	No effect
Reptiles							
Atlantic Hawksbill Sea Turtle	No effect	No effect	No effect	No effect	No effect	No effect	No effect
Green Sea Turtle	No effect	No effect	No effect	No effect	No effect	No effect	No effect
Kemps Ridley Sea Turtle	No effect	No effect	No effect	No effect	No effect	No effect	No effect
Leatherback Sea Turtle	No effect	No effect	No effect	No effect	No effect	No effect	No effect
Loggerhead Sea Turtle	No effect	No effect	No effect	No effect	No effect	No effect	No effect

Table F.4.5-3: Summary of Potential Construction-Related Impacts to Threatened, Endangered, and Candidate Species from Clovelly Site Development

Species	Site (including connections to existing oil pipelines)
Birds	
Bald Eagle	No effect
Brown Pelican	No effect
Peregrine Falcon	No effect
Piping Plover	No effect
Fish	
Gulf Sturgeon	No effect
Marine Mammals	
Atlantic Spotted Dolphin	No effect
West Indian Manatee	No effect
Reptiles	
Atlantic Hawksbill Sea Turtle	No effect
Green Sea Turtle	No effect
Kemp's Ridley Sea Turtle	No effect
Leatherback Sea Turtle	No effect
Loggerhead Sea Turtle	No effect

Table F.4.5-4: Summary of Potential Operation and Maintenance Impacts to Threatened, Endangered, and Candidate Species from Clovelly Site Development

Species	Site (including connections to existing oil pipelines)
Birds	
Bald Eagle	No effect
Brown Pelican	No effect
Peregrine Falcon	No effect
Piping Plover	No effect
Fish	
Gulf Sturgeon	No effect
Marine Mammals	
Atlantic Spotted Dolphin	No effect
West Indian Manatee	No effect
Reptiles	
Atlantic Hawksbill Sea Turtle	No effect
Green Sea Turtle	No effect
Kemp's Ridley Sea Turtle	No effect
Leatherback Sea Turtle	No effect
Loggerhead Sea Turtle	No effect

Table F.4.5-5: Summary of Potential Construction-Related Impacts to Threatened, Endangered, and Candidate Species by Development of Bayou Choctaw Site

Species	Site	Brine Injection Wells
Birds		
Bald Eagle	No effect	No effect
Fish		
Gulf Sturgeon	No effect	No effect
Pallid Sturgeon	No effect	No effect
Mammals		
Louisiana Black Bear	No effect	No effect

Table F.4.5-6: Summary of Potential Operation and Maintenance Impacts to Threatened, Endangered, and Candidate Species by Development of the Bayou Choctaw Site

Species	Site	Brine Injection Wells
Birds		
Bald Eagle	No effect	No effect
Fish		
Gulf Sturgeon	No effect	No effect
Pallid Sturgeon	No effect	No effect
Mammals		
Louisiana Black Bear	No effect	No effect

Table F.4.5-7: Summary of Potential Construction-Related Impacts to Threatened, Endangered, and Candidate Species by Development of the West Hackberry Site

Species	Site
Birds	
Bald Eagle	No effect
Brown Pelican	No effect
Piping Plover	No effect
Red-Cockaded Woodpecker	No effect
Fish	
Gulf Sturgeon	No effect
Mammals	
Red Wolf	No effect
West Indian Manatee	No effect
Reptiles	
Atlantic Hawksbill Sea Turtle	No effect
Green Sea Turtle	No effect
Kemp's Ridley Sea Turtle	No effect
Leatherback Sea Turtle	No effect
Loggerhead Sea Turtle	No effect

Table F.4.5-8: Summary of Potential Operation and Maintenance Impacts to Threatened, Endangered, and Candidate Species Affected by Development of the West Hackberry Site

Species	Site
Birds	
Bald Eagle	No effect
Brown Pelican	No effect
Piping Plover	No effect
Red-Cockaded Woodpecker	No effect
Fish	
Gulf Sturgeon	No effect
Mammals	
Red Wolf	No effect
West Indian Manatee	No effect
Reptiles	
Atlantic Hawksbill Sea Turtle	No effect
Green Sea Turtle	No effect
Kemp's Ridley Sea Turtle	No effect
Leatherback Sea Turtle	No effect
Loggerhead Sea Turtle	No effect

Table F.4.5-9: Summary of the Number of Species Potentially Affected at the Chacahoula and Clovelly Sites

Potential for Effect	Number of Species			
	Chacahoula, Louisiana		Clovelly, Louisiana	
	Construction	Operation and Maintenance	Construction	Operation and Maintenance
No effect	12	13	12	12
May affect	2	1	0	0

Table F.4.5-10: Summary of the Number of Species Potentially Affected at the Bayou Choctaw and West Hackberry Sites

Potential for Effect	Number of Species			
	Bayou Choctaw, Louisiana		West Hackberry, Louisiana	
	Construction	Operation and Maintenance	Construction	Operation and Maintenance
No effect	4	4	12	12
May affect	0	0	0	0

F.5.1 Chacahoula, Louisiana

Following are the recommendations of the types of measures that could lessen the potential effects from developing the Chacahoula site:

- Conduct a preconstruction survey to identify bald eagle nests near the proposed site and on all pipeline ROWs. If any nests are found, DOE would coordinate with the USFWS and LDWF to avoid adverse impacts. Construction activities along ROWs would be scheduled to avoid nesting periods and pipeline ROWs routed around nesting trees, if possible. If ROWs cannot be rerouted, nesting trees and other large trees nearby would be left undisturbed if possible. Construction activities should be timed to avoid the nesting season and all activity should be restricted within 1,500 feet (450 meters) of active nests.

- Conduct a preconstruction survey to identify brown pelican roosts on or near the proposed brine disposal ROW in Terrebonne Parish or the crude oil pipeline ROW to Clovelly. If evidence of this species is found in or near a pipeline ROW, construction would be scheduled to occur during periods when the potentially affected species are not present, if possible. In all cases, bird nests and roosts should be left undisturbed, and all activity should be restricted within 1,320 feet (402 meters) of any sensitive species.

- Notify USFWS and the appropriate state wildlife officials if any protected species are observed either during preconstruction field surveys or during construction.

- Use directional drilling to construct the pipeline crossing, if feasible, at a proposed pipeline ROW that intersects a surface water body where there is confirmation of one or more endangered, threatened, or candidate species.

- Install and maintain sediment basins, silt fences, and hay bale barriers before or concurrent with soil disturbing activities when directional drilling is not used to construct a pipeline crossing a surface water body where an endangered, threatened, or candidate species may be present; silt curtains or other instream sediment barriers should be used to mitigate water quality impacts and downstream siltation.

- Schedule activities, to the extent practicable, to avoid sensitive life-cycle stages (e.g., spawning, nesting) identified in section F.2 when construction, operation, or maintenance activities would occur in areas identified as habitat for a threatened, endangered, or candidate species.

F.5.2 Clovelly, Louisiana

Following are the recommendations of the types of measures that could lessen the potential effects from developing the Clovelly site:

- Conduct a preconstruction survey to identify brown pelican roosts or rookeries within 2,300 feet (700 meters) of proposed development. If evidence of these species is found nearby, construction activities should be scheduled to avoid nesting season (spring and summer).

- Notify USFWS and the appropriate state wildlife officials if any protected species are observed either during preconstruction field surveys or construction.

- Schedule activities, to the extent practicable, to avoid sensitive life-cycle stages (e.g., spawning, nesting) identified in section F.2 when construction, operation, or maintenance activities would occur in areas identified as habitat for a threatened or endangered species.

F.5.3 Bayou Choctaw, Louisiana

Following is the recommendation of a measure that could lessen the potential effects from developing the Bayou Choctaw site and brine injection wells:

- Notify USFWS and the appropriate state wildlife officials if any protected species are observed either during preconstruction field surveys or construction.

F.5.4 West Hackberry, Louisiana

Following is the recommendation of a measure that could lessen the potential effects from developing the West Hackberry site:

- Notify USFWS and the appropriate state wildlife officials if any protected species are observed either during preconstruction field surveys or construction.

REFERENCES

Anderson, D.W. and J.J. Hickey. 1970. "Oological data on egg and breeding characteristics of brown pelicans." *Wilson Bull. 82*(1):14–28. (As cited in NatureServe 2005).

Aycock, R.C. December 5, 2005. RE: *Reopening the scoping period for the preparation of an Environmental Impact Statement (EIS) for the Proposed Expansion of the Strategic Petroleum Reserve (SPR)*. Communication to D. Silawsky, U.S. Department of Energy.

Berg, R.K. 1981. "Fish populations of the wild and scenic Missouri River, Montana." Montana Department of Fish, Wildlife and Parks. (As cited at USFWS 1993).

Bowker, B. and T. Jacobson. 1995. "Louisiana Black Bear, *Ursus americanus luteolus*, Recovery Plan." U.S. Fish and Wildlife Service, Southeast Region, Atlanta, GA. Accessed September 27, 1995, at http://ecos.fws.gov/docs/recovery_plans/1995/950927.pdf

Buehler, D.A. 2000. "Bald Eagle (*Haliaeetus leucocephalus*)." In: *The Birds of North America No. 506.* The Birds of North America, Inc. A. Poole and F. Gill (editors). Philadelphia, PA. Accessed at http://ecos.fws.gov/docs/life_histories/B008.html

Cade, T.J. 1982. *The falcons of the world*. Ithaca, NY. Cornell University Press. (As cited in NatureServe 2005).

Campbell, R.W., N.K. Dawe, I. McTaggart-Cowan, J.M. Cooper, G.W. Kaiser, and M.C.E. McNall. 1990. *The birds of British Columbia. Volume 2: Nonpasserines, diurnal birds of pretty through woodpeckers*. Vancouver, B.C., Canada. Royal B.C. Museum and Environment Canada.

Carley, C. J. 1979. "Status summary: the red wolf (CANIS RUFUS)." *Endangered Species Report No. 7*. U.S. Fish Wildlife Service. Albuquerque, NM. (As cited in NatureServe 2005).

Carloss, M., Biologist Program Manager, LA DWF. October 3, 2005. Communication to Donald Silawsky, U.S. Department of Energy.

Carlson, D.M., W.L. Pflieger, L. Trial, and P.S. Haverland. 1985. "Distribution, biology, and hybridization of Scaphirhynchus albus and S. platorynchus in the Missouri and Mississippi Rivers." *Environmental Biology of Fishes. 14*(1):51–59. (As cited in USFWS 1993).

Christiansen, C.C. 1975. "Organochlorine pesticide and polychlorinated biphenyl contamination of the channel catfish (Ictalurus punctatus) of the Missouri River." Nebraska Department of Environmental Control. Lincoln, NE. (As cited at USFWS 1993).

Committee on Sea Turtle Conservation (CSTC), National Research Council (U.S.). 1990. "Decline of the Sea Turtles: Causes and Prevention." National Academy Press. Washington, D.C. (As cited in NatureServe 2005).

Conant, R. and J.T. Collins. 1991. *A field guide to reptiles and amphibians: eastern and central North America*. Third edition. Houghton Mifflin Co. Boston, MA. (As cited in NatureServe 2005).

Conte, F.S., S.I. Doroshoy, P.B. Lutes, and E.M. Strange. 1988. "Hatchery manual for the white sturgeon with applications to the North American Acipenseridae." Publication 3322. University of California at Davis. Davis, CA. (As cited in USFWS 1993).

Cross, D. H. 1992. "The Suwannee River is home to a rare and unusual fish." *Fish and Wildlife News.* Winter Volume pp 17 and 23. (As cited in NatureServe 2005).

Davis, W.B. and D.J. Schmidly. 1997. *The Mammals of Texas, Online Edition.* Copyrighted 1997 by Texas Tech University. Accessed at http://www.nsrl.ttu.edu/tmot1/canirufu.htm

Dodd, C. K., Jr. 1988. "Synopsis of the biological data on the loggerhead sea turtle *CARETTA CARETTA* (Linnaeus 1758)." *U.S. Fish and Wildlife Service, Biol. Rep. 88*(14). (As cited in NatureServe 2005).

Dodd, C.K., Jr. 1992. "Loggerhead sea turtle *CARETTA CARETTA* (Linnaeus)." In: *Rare and endangered biota of Florida. Vol. III. Amphibians and reptiles*. P.E. Moler (editor). University Press of Florida. (As cited in NatureServe 2005).

Dryer, M. Undated. Personal communication with USFWS. (As cited in USFWS, 1993).

Eckert, S.A. March1992. "Bound for deep water." *Natural History*. pp 28–35. (As cited in NatureServe 2005).

Ehrhart, L.M., and B.E. Witherington. 1992. "Green turtle CHELONIA MYDAS (Linnaeus)." In: *Rare and endangered biota of Florida. Vol. III. Amphibians and reptiles*. P.E. Moler (editor). University Press of Florida. (As cited at NatureServe 2005).

Elser, A.A., R.C. McFarland, and D. Schwehr. 1977. "The effect of altered stream flow on fish of the Yellowstone and Tongue Rivers, MT. Tech. Report No. 8." *Yellowstone Impact Study*. Water Resources Division, Montana Department of Natural Resources and Conservation, Helena. (As cited at USFWS 1993).

Ettel, T. Undated. Personal Communication. (As cited in NatureServe, 2005).

Gilbraith, D.M., M.J. Schwalbach, and C.R. Berry. 1988. "Preliminary report on the status of the pallid sturgeon, Scaphirhynchus albus, a candidate endangered species." Department of Wildlife and Fisheries Sciences, South Dakota State University, Brookings. (As cited in USFWS 1993).

Hall, E.R. 1981. *The Mammals of North America, Vol. 11*. New York. John Wiley and Sons. (As cited in USFWS 1992).

Helms, D. 1974. "Shovelnose sturgeon, Scaphirhynchus platorynchus, in the navigational impoundments of the upper Mississippi River." *Tech. Series*. Iowa State Conservation Commission 74-3. (As cited at USFWS, 1993).

Hooper, R.G., A.F. Robinson, and J.A. Jackson. 1980. "The red-cockaded woodpecker: notes on life history and management." U.S. Forest Service, Southeastern Area, State and Private Forestry, Gen. Rep. SA-GR 9.

James, F.C. 1995. "Status of the Red-cockaded Woodpecker in 1990 and prospect for recovery." In: *Red-cockaded Woodpecker: recovery, ecology, and management*. D. Kulhavy, R. G. Hooper, and R. Costa (editors). Stephen F. Austin State University. Nacogdoches, TX. pp 439–451.

James, C., Assistant Field Supervisor, U.S. Fish and Wildlife Service, Mississippi Field Office, Jackson, MS. October 20, 2005. Communication to D. Silawsky, U.S. Department of Energy.

Kallemeyn, L. 1981. "A status report on the pallid sturgeon, SCAPHIRHYNCHUS ALBUS. Draft." (As cited in NatureServe 2005).

Lefebvre, L.W., et al. 1989. "Distribution, status, and biogeography of the West Indian manatee." In: *Biogeography of the West Indies*. C. A. Woods (editor). Sandhill Crane Press. Gainesville, FL. pp 567–610. (As cited in NatureServe 2005).

Lester, G., Natural Heritage Program Coordinator, Louisiana Department of Wildlife and Fisheries. March 8, 2006. *Department of Energy: Proposed Oil Reserve Expansion and Pipeline Installation.* Letter to ICF Consulting.

Louisiana Natural Heritage Program (LNHP). 2004. "Species Listed as Threatened, Endangered, and Candidate in Louisiana." Department of Wildlife and Fisheries, Baton Rouge, LA. Accessed at http://www.wlf.state.la.us/apps/netgear/index.asp?cn=lawlf&pid=693

Lund, P.F. 1985. "Hawksbill turtle (ERETMOCHELYS IMBRICATA) nesting on the east coast of FL. *J. Herpetology. 19*:164–166. (As cited in NatureServe 2005).

Matthews, J. R. and C. J. Moseley (editors). 1990. "The Official World Wildlife Fund Guide to Endangered Species of North America. Volume 1. Plants, Mammals and Volume 2. Birds, Reptiles, Amphibians, Fishes, Mussels, Crustaceans, Snails, Insects, and Arachnids." Beacham Publications, Inc. Washington, D.C. (As cited in NatureServe 2005).

Meylan, A. 1992. "Hawksbill turtle ERETMOCHELYS IMBRICATA (Linnaeus)." In: *Rare and endangered biota of Florida. Vol. III. Amphibians and reptiles*. P.E. Moler (editor). University Press of Florida. pp 95–99. (As cited in NatureServe 2005).

Meylan, A., B. Schroeder, and A. Mosier. 1995. "Sea turtle nesting activity in the state of Florida." *Florida Marine Research Publications. 52*:1–51. (As cited in NatureServe 2005).

Moos, R.E. 1978. *Movement and reproduction of shovelnose sturgeon, Scaphirynchus platorynchus, in the Missouri River, South Dakota*. Ph.D. Dissertation. University of South Dakota. Vermillion, SD. 2l6 pp. (As cited at USFWS 1993).

Mrosovsky, N. and J. Provancha. 1992. "Sex ratio of hatchling loggerhead sea turtles: data and estimates from a 5-year study." *Can. J. Zool. 70*:530–538. (As cited in NatureServe 2005).

National Geographic Society (NGS). 1983. "Field guide to the birds of North America." Washington, DC. National Geographic Society. (As cited in NatureServe 2005).

NatureServe. 2005. "NatureServe Explorer: An online encyclopedia of life [web application]." Version 4.6. Arlington, Virginia. Accessed at http://www.natureserve.org/explorer

Nowak, R.M. 1986. "Status of the Louisiana bear." U.S. Fish and Wildlife Service special report. (As cited in USFWS 1992).

Nowak, R.M. 1991. *Walker's mammals of the world.* Fifth edition. Vols. I and II. Johns Hopkins University Press. Baltimore, MD. (As cited in NatureServe 2005).

O'Shea, T.J. and M.E. Ludlow. 1992. "Florida manatee TRICHECHUS MANATUS LATIROSTRIS." In: *Rare and Endangered Biota of Florida. Volume I. Mammals*. S. R. Humphrey (editor). University Press of Florida. Gainesville, FL. pp 190–200. (As cited in NatureServe 2005).

Page, L.M., and B.M. Burr. 1991. "A field guide to freshwater fishes: North America north of Mexico." Houghton Mifflin Company. Boston, MA. (As cited in NatureServe 2005).

Palmer, R.S. (editor). 1962. *Handbook of North American birds. Vol. 1. Loons through flamingos.* Yale University Press. New Haven, CT. (As cited in NatureServe 2005).

Palmer, R.S. (editor). 1988. *Handbook of North American birds. Vol. 5.* Yale University Press. New Haven, CT. (As cited in NatureServe 2005).

Reid, J.P. 1996. "Chessie the manatee: From Florida to Rhode Island." *Argos Newsletter. 51*:13. (As cited in USFWS 2001b).

Riley, G.A. and R.T. McBride. 1975. "A survey of the red wolf (CANIS RUFUS)." In: *The wild canids: their systematics, behavioral ecology, and evolution.* M.W. Fox (editor). Van Nostrand Reinhold. New York. pp 263–277. (As cited in NatureServe 2005).

Taylor, B.L. 1992. "Population viability analysis for the Little Cumberland Island population of loggerhead turtles (CARETTA CARETTA)." Abstract, 6th Annual Meeting of the Society for Conservation Biology. (As cited in NatureServe 2005).

United States Department of Energy (DOE). 2002. "Federally Protected Animal and Plant Species Observed on U.S. Department of Energy Properties." Office of Environmental Policy and Guidance. October.

United States Fish and Wildlife Service (USFWS). 1983. "Northern States Bald Eagle Recovery Plan." In cooperation with the Bald Eagle Recovery Team. Washington, D.C.

United States Fish and Wildlife Service (USFWS). August 30, 1989. "Proposed rule to determine the pallid sturgeon to be an endangered species." *Federal Register*. *54:*35901–35904. (As cited in NatureServe 2005).

United States Fish and Wildlife Service (USFWS). 1992. "Endangered and Threatened Species of the Southeastern United States (The Red Book)." U.S. Fish and Wildlife Service, Region 4. As of November 1992. Excerpted at http://www.fws.gov/endangered/i/a/saa9e.html

United States Fish and Wildlife Service (USFWS). 1993. "Pallid sturgeon recovery plan." U.S. Fish and Wildlife Service, Bismarck, ND.

United States Fish and Wildlife Service (USFWS). 1995. "Fact Sheet for Bald Eagle (*Haliaeetus leucocephalus*)." Accessed at http://www.fws.gov/species/species_accounts/bio_eagl.html

United States Fish and Wildlife Service (USFWS). July 6, 2000. "Endangered and Threatened Wildlife and Plants; Proposed Determination of Critical Habitat for Wintering Piping Plovers." *Federal Register 65*(130): 36038.

United States Fish and Wildlife Service (USFWS). July 10, 2001a. "Endangered and Threatened Wildlife and Plants; Final Determination of Critical Habitat for Wintering Piping Plovers." *Federal Register 66*: 36038.

United States Fish and Wildlife Service (USFWS). 2001b. "Florida Manatee Recovery Plan, Third Revision. Original approved April 15, 1980." First revision approved July 24, 1989. Second revision approved January 29, 1996. Atlanta, GA. Accessed at http://www.fws.gov/northflorida/Manatee/manatees.htm#ManateeRecoveryPlan

United States Fish and Wildlife Service (USFWS). March 19, 2003a. "Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Gulf Sturgeon." *Federal Register*. *68:*13370.

United States Fish and Wildlife Service (USFWS). 2003b. "Lists of Endangered, Threatened, Proposed and Candidate Species for the Southeast Region – Louisiana." Accessed at http://www.fws.gov/southeast/es/county%20lists.htm

United States Fish and Wildlife Service (USFWS). 2003c. "Recovery Plan for the Red-cockaded Woodpecker (Picoides borealis), Second Revision." Original approved August 24, 1979. First revision approved April 11, 1985. Second revision approved March 20, 2003. U.S. Fish and Wildlife Service, Southeast Region. Atlanta, GA.

United States Fish and Wildlife Service (USFWS). 2005. "Threatened and Endangered Species System (TESS)." Accessed at http://www.fws.gov/endangered/wildlife.html

United States Fish and Wildlife Service (USFWS). Undated. "Piping Plover Life History." Accessed at http://ecos.fws.gov/docs/life_histories/B079.html

United States Fish and Wildlife Service and National Marine Fisheries Service (USFWS and NMFS). March 1998. Endangered Species Consultation Handbook. Accessed at http://www.fws.gov/endangered/consultations/s7hndbk/s7hndbk.htm

Watson, R., Supervisor, U.S. Fish and Wildlife Service, Louisiana Field Office, Lafayette, LA. October 3, 2005. Communication to D. Silawsky, U.S. Department of Energy.

Werner, F.T., Assistant Field Supervisor, U.S. Fish and Wildlife Service, Clear Lake ES Field Office, Houston, TX. 2005. Communication to D. Silawsky, U.S. Department of Energy.

Wibbels, T., et al. 1991. "Female-biased sex ratio of immature loggerhead sea turtles inhabiting the Atlantic coastal waters of Florida." *Can. J. Zool. 69*:2973–2977. (As cited in NatureServe 2005).

Wooding, J.B., M.R. Pelton, and J.R. Cox. 1993. *GIS generated map of occupied and potential black bear habitat on public and private lands in the Southeast Coastal Plains.* Tallahassee, FL. Florida Game and Fresh Water Fish Commission. (As cited in Bowker and Jacobson 1995).

Wynne, K. et al., 1999. "Guide to Marine Mammals and Turtles of the U.S. Atlantic and Gulf of Mexico." Rhode Island Seagrant, University of Rhode Island. Narragansett, RI.