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FER/3:KPB

Mr. Robert P. Labelle
Chief, Environmental Division
Minerals Management Service
United States Department of Interior
Mail Stop 4040
381 Elden Street
Herndon, VA 20170-4817

Dear Mr. Labelle:

This constitutes the National Marine Fisheries Service (NOAA Fisheries) biological opinion (Opinion) based on our review of the Minerals Management Service's (MMS) proposed Gulf of Mexico Outer Continental Shelf Lease Sale 184 and its effects on the sperm whale *(Physeter macrocephalus*), leatherback (*Dermochelys coriacea*), green (*Chelonia mydas*), hawksbill (*Eretmochelys imbricata*), Kemp's ridley (*Lepidochelys kempii*), and loggerhead (*Caretta caretta*) sea turtles, and in accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended. Your request for formal consultation submitted on March 11, 2002, was received on March 15, 2002.

The Opinion concludes that Lease Sale 184 and the associated actions of the lease sale is not likely to jeopardize the continued existence of threatened or endangered species under the jurisdiction of NOAA Fisheries or destroy or adversely modify critical habitat that has been designated for those species. However, NOAA Fisheries anticipates incidental take of these species and has issued an Incidental Take Statement (ITS) pursuant to section 7 of the ESA. This ITS contains reasonable and prudent measures with implementing terms and conditions to help minimize this take. Please note that an ITS has not been included for sperm whales since a small take authorization has not been issued under the regulations and requirements of the Marine Mammal Protection Act.

This Opinion is based on information provided in a biological assessment from the MMS and received by NOAA Fisheries, Protected Resources Division, on March 7, 2002, published and unpublished scientific information on the biology and ecology of threatened and endangered marine species within the action area, and other sources of information. A complete administrative record of this consultation is on file at the Southeast Regional Office in St. Petersburg, Florida.

This concludes formal consultation on the MMS= Lease Sale 184. Consultation on this issue must be reinitiated if: (1) the amount or extent of the take specified in the ITS is exceeded for any of the identified actions; (2) new information reveals that the effects of the actions may affect listed species or critical habitat; (3) any of the identified actions are subsequently modified in a manner that causes an effect to the listed species that was not considered in the Opinion; and (4) a new species is listed or critical habitat is designated that may be affected by the identified actions.

The consultation number for this action is F/SER/2002/00145; if you have any questions about this consultation please refer to this number. I look forward to cooperating with the MMS on future section 7 consultations.

Sincerely,

Joseph E. Powers Ph.D.
Acting Regional Administrator

Enclosure

cc: F/PR3
O:\section7\formal\mms184.wpd
File: 1514-22.O.4a

Endangered Species Act - Section 7 Consultation
Biological Opinion

Action Agency: United States Department of the Interior
Minerals Management Service (MMS)

Activity: Gulf of Mexico Outer Continental Shelf Lease Sale 184
(F/SER/2002/00145)

Consultation Conducted By: National Marine Fisheries Service (NOAA Fisheries) Southeast Regional Office

Date Issued: ____

Approved By: ____
Joseph E. Powers, Ph.D., Acting Regional Administrator

Consultation History

March 11, 2002: A request for formal consultation was received by NOAA Fisheries from the MMS.

April 5-6, 2002: Informal consultation of the proposed action in Miami, Florida. The species affected by proposed action and possible affects of the actions to species were discussed.

April 26, 2002: NOAA Fisheries acknowledged that a complete application had been received and formal consultation had been initiated.

June 14, 2002: Some draft text of the biological opinion was sent to the MMS and a conference call was arranged to discuss the draft document.

June 19, 2002: A conference call between NOAA Fisheries and the MMS took place to discuss the draft biological opinion. Consultation on reasonable and prudent measures took place and the ability of the MMS to implement mitigation measures.

June 20, 2002: A conference call between NOAA Fisheries and MMS took place to discuss the reasonable and prudent measures associated with the lease sale.

July 3, 2002: The 1998 Final Environmental Impact Statement (EIS) for the Western Planning Area of the Gulf of Mexico was received by request of NOAA Fisheries for clarification of information in the Lease Sale 184 Environmental Assessment that did not appear in the 2002 Central and Western Planning Areas Draft EIS.

July 8, 2002: Conference discussions between NOAA Fisheries and MMS on the amount of vessel traffic near the proposed Gulf sturgeon critical habitat as a result of the proposed action.

Biological Opinion

I. Description Proposed Action

Western Sale 184 is the first lease sale scheduled in the Outer Continental Shelf Oil & Gas Leasing Program: 2002-2007 USDOI, MMS, 2001a. However, since the EIS is in the draft stages and will not become final until the summer of 2002, and since the associated Central and Western multisale EIS is still in the draft stages, the MMS submitted updated information regarding Lease Sale 184 in an Environmental Assessment (EA) (OCS EIS/EA, MMS 2002-008) received by NOAA Fisheries on March 11, 2002, that has been tiered off the existing Western multisale EIS (USDOI, MMS, 1998).

This consultation considers activities involved with the lease sale of all the remaining lease blocks in the Western Planning Area (WPA, Figure 1) in the Gulf of Mexico (GOM) Outer Continental Shelf (OCS). Associated impacts of the proposed action include the exploration (i.e., sea floor sampling, seismic surveys), development, production, and non-explosive removal of offshore structures resulting from the proposed sale, and the effect of these activities on species protected under the jurisdiction of NOAA Fisheries. The MMS is presently reinitiating consultation on the explosive removal of offshore structures and will be considered under a separate consultation. Lease Sale 184 is tentatively scheduled for August 2002 and will offer all remaining blocks in the WPA. The Western GOM is bounded on the west and north by the Federal-state boundary offshore Texas; the eastern boundary begins at the offshore boundary between Texas and Louisiana and proceeds southeasterly to approximately 28 degrees N. latitude, thence east to approximately 92 degrees W. longitude, thence south to the maritime boundary with Mexico as established by the ATreaty Between the Government of the United States of America and the Government of the United Mexican States on the Delimitation of the Continental Shelf in the Western Gulf of Mexico Beyond 200 Nautical Miles≅, which took effect in January 2001. The proposed lease area includes approximately 11.9 million hectares (28.4 million acres) located 12 to 310 nautical miles (22 to 574 km) offshore of Texas and Louisiana in water depths ranging from 8 to 3000 meters (26 to 9843 feet). The estimated amounts of resources projected to be developed as a result of this proposed sale range from 1.485 to 2.735 billion barrels of oil and 37.780 to 54.225 trillion cubic feet of natural gas.

On June 9, 2000, following extensive negotiations, the presidents of the United States and Mexico signed the Treaty Between the Government of the United States of America and the Government of the United Mexican States on the Delimitation of the Continental Shelf in the Western Gulf of Mexico Beyond 200 Nautical Miles, establishing the continental shelf boundary in the Western Gap described in the above paragraph. Also established is a 1.4-mile buffer zone on each side of the boundary in which the parties agreed to a 10-year moratorium on oil and gas exploitation commencing when the treaty entered into force. The U.S. Senate ratified the treaty on October 18, 2000, and the Mexican Senate gave its approval on November 28, 2000. The provisions of the treaty entered into force upon exchange of the instruments of ratification of the treaty on January 17, 2001. The MMS proposes to offer the blocks in the area formerly known as the Western Gap but presents an alternative to defer blocks in the Eastern Gap.

Excluded from the proposed action are Blocks A-375 (East Flower Garden Bank) and A-398 (West

Flower Garden Bank) in the High Island Area, East Addition, South Extension. The East and West Flower Garden Banks are designated as a national marine sanctuary. Also, in light of the President's June 1998 withdrawal of all national marine sanctuaries from oil and gas leasing, additional blocks or portions of these blocks (High Island, East Addition, South Extension, Block A-401; High Island, South Addition, Blocks A-366, A-383, A-399 and A-513; and Garden Banks 134 and 135), which lie partially within the Flower Garden Banks National Marine Sanctuary, are deferred from the proposed action. Mustang Island Area Blocks 793, 799, and 816 have been excluded from the proposed action for Navy personnel and equipment training. The MMS had deferred leasing of blocks beyond the U.S. Economic Exclusive Zone (EEZ) in each of the Gulf of Mexico sales since Central Gulf Sale 169. In Central Gulf Sale 178 Part 2 and Western Gulf Sale 180, MMS offered blocks beyond the EEZ in the area known as the Western Gap.

The MMS assumes a 35-year life of the leases resulting from the proposed action. Exploratory activity takes place over a 25-year period, beginning in the year of the sale. Development activity takes place over a 29-year period, beginning with the installation of the first production platform and ending with the drilling of the last development wells. Production of oil and gas begins by the second year after a proposed action and continues through the 34th year.

MMS regulations explicitly prohibit the disposal of equipment, cables, chains, containers, or other materials into offshore waters. Portable equipment and other loose items weighing 18 kg or more must be marked in a durable manner with the owner's name prior to use or transport on offshore waters. Smaller objects must be stored in a marked container when not in use.
Under MMS operating regulations and lease agreements, all lessees must remove objects and obstructions upon termination of a lease. Lessees must ensure all objects related to their activities were removed following termination of their lease.

MMS conducts onsite inspections to assure compliance with lease terms, Notice to Lessees and Operators (NTL's), and approved plans, and to ensure that safety and pollution-prevention requirements of regulations are met. These inspections involve items of safety and environmental concern. If an operator is found in violation of a safety or environmental requirement, a citation is issued requiring that it be fixed within 7 days.

II. Status of Listed Species and Critical Habitat

The following listed species under the jurisdiction of NOAA Fisheries are known to occur in the GOM and may be affected by the proposed action:

Endangered

Sperm Whale *Physeter macrocephalus*
Leatherback turtle *Dermochelys coriacea*
Green turtle *Chelonia mydas*

Hawksbill turtle	*Eretmochelys imbricata*
Kemp's ridley turtle	*Lepidochelys kempii*

Threatened

Loggerhead turtle	*Caretta caretta*
Gulf sturgeon	*Acipenser oxyrinchus destoii*

Endangered whales, including northern Atlantic right whales (*Eubalaena glacialis*) and humpback whales (*Megaptera novaeangliae*), have been observed occasionally in the GOM. The individuals observed have likely been inexperienced juveniles straying from the normal range of these stocks. Since NOAA Fisheries does not believe that there are resident stocks of these species in the GOM, the potential for interaction between any of the proposed project's activities and northern Atlantic right whales or humpback whales is extremely low. Based on the above, NOAA Fisheries has determined that these species are not likely to be adversely affected by the proposed action.

No critical habitat for listed species under the jurisdiction of NOAA Fisheries has been designated within the action area of Lease Sale 184 of the Exclusive Economic Zone (EEZ) of the Gulf of Mexico.

III. Status of the Species

A. Species/critical habitat description

Sperm Whale

Sperm whales are distributed in all of the world's oceans. The sperm whale was listed as endangered under the ESA in 1973. For the purposes of management, the IWC defines four stocks: the North Pacific, the North Atlantic, the Northern Indian Ocean, and Southern Hemisphere. However, Dufault's (1999) review of the current knowledge of sperm whales indicates no clear picture of the worldwide stock structure of sperm whales. In general, females and immature sperm whales appear to be restricted in range, whereas males are found over a wider range and appear to make occasional movements across and between ocean basins (Dufault 1999). Sperm whales are the most abundant large cetacean in the Gulf of Mexico, and represent the most important Gulf cetacean in terms of collective biomass. These whales were once hunted in Gulf waters.

There is no critical habitat designated for sperm whales.

Leatherback sea turtle

The leatherback sea turtle was listed as endangered on June 2, 1970 (35 FR 8491). Leatherbacks distribution and nesting grounds are found circumglobally, and are found in waters of the Atlantic, Pacific, and Indian Oceans; the Caribbean Sea; and the Gulf of Mexico (Ernst and Barbour 1972).

Adult leatherbacks forage in temperate and subpolar regions from 71°N to 47°S latitude in all oceans and undergo extensive migrations between 90°N and 20°S, to and from the tropical nesting beaches. In the Atlantic Ocean, leatherbacks have been recorded as far north as Newfoundland, Canada, and Norway, and as far south as Uruguay, Argentina, and South Africa (see NMFS SEFSC 2001). Female leatherbacks nest from the southeastern United States to southern Brazil in the western Atlantic and from Mauritania to Angola in the eastern Atlantic. The most significant nesting beaches in the Atlantic, and perhaps in the world, are in French Guiana and Suriname (see NMFS SEFSC 2001).

Critical habitat for the leatherback includes the waters adjacent to Sandy Point, St. Croix, U.S.V.I. There is no critical habitat designation for the leatherback in the Gulf of Mexico.

Green sea turtle

Federal listing of the green sea turtle occurred on July 28, 1978 (43 FR 32808), with all populations listed as threatened except for the Florida and Pacific coast of Mexico breeding populations which are endangered. The complete nesting range of the green turtle within the NOAA Fisheries, Southeast Region includes sandy beaches of mainland shores, barrier islands, coral islands, and volcanic islands between Texas and North Carolina and at the U.S. Virgin Islands (U.S.V.I.) and Puerto Rico (NMFS and USFWS 1991a). Principal U.S. nesting areas for green turtles are in eastern Florida, predominantly Brevard through Broward counties (Ehrhart and Witherington 1992). Regular green turtle nesting also occurs on St Croix, U.S.V.I., and on Vieques, Culebra, Mona, and the main island of Puerto Rico (Mackay and Rebholz 1996).

Critical habitat for the green sea turtle has been designated for the waters surrounding Isla Culebra, Puerto Rico and its associated keys.

Hawksbill sea turtle

The hawksbill turtle was listed as endangered on June 2, 1970, and is considered Critically Endangered by the International Union for the Conservation of Nature (IUCN) based on global population declines of over 80% during the last three generations (105 years) (Meylan and Donnelly 1999).

In the western Atlantic, the largest hawksbill nesting population occurs in the Yucatán Peninsula of Mexico (Garduño-Andrade et al. 1999) with other important but significantly smaller nesting aggregations found in Puerto Rico, the U.S. Virgin Islands, Antigua, Barbados, Costa Rica, Cuba, and Jamaica (Meylan 1999a). The species occurs in all ocean basins although it is relatively rare in the eastern Atlantic and eastern Pacific, and absent from the Mediterranean Sea. They have been observed on the coral reefs south of Florida, but are also found in other habitats including inlets, bays, and coastal lagoons. A surprisingly large number of small hawksbills have also been encountered in Texas. The diet is highly specialized and consists primarily of sponges (Meylan 1988), although other food items have been documented to be important in some areas of the Caribbean (van Dam and Diez 1997, Mayor et al. 1998, Leon and Diez 2000). The lack of sponge-covered reefs and the cold winters in the northern Gulf likely prevent hawksbills from establishing a strong population in this area.

Critical habitat for the hawksbill turtle includes Mona and Monito Islands, Puerto Rico, and the waters surrounding these islands, out to 3 nautical miles. Mona Island is designated Critical Habitat for the hawksbill and it receives protection as a Natural Reserve under the administration of the Puerto Rico Department of Natural Resources and Environment. The coral reef habitat and cliffs around Mona Island and nearby Monito Island are an important feeding ground for all sizes of post-pelagic hawksbills. Genetic research has shown that this feeding population is not primarily composed of hawksbills that nest on Mona, but instead includes animals from at least six different nesting aggregations, particularly the U.S. Virgin Islands and the Yucatán Peninsula (Mexico) (Bowen et al. 1996, Bass 1999). Genetic data indicate that some hawksbills hatched at Mona utilize feeding grounds in waters of other countries, including Cuba and Mexico. Hawksbills in Mona waters appear to have limited home ranges and may be resident for several years (van Dam and Diez 1998).

Kemp's Ridley sea turtle

The Kemp=s ridley was listed as endangered on December 2, 1970. Internationally, the Kemp=s ridley is considered the most endangered sea turtle. Kemp=s ridleys nest in daytime aggregations known as arribadas, primarily at Rancho Nuevo, a stretch of beach in Mexico, Tamaulipas State. The species occurs mainly in coastal areas of the Gulf of Mexico and the northwestern Atlantic Ocean. Occasional individuals reach European waters. Adults of this species are usually confined to the Gulf of Mexico, although adult-sized individuals sometimes are found on the Eastern Seaboard of the United States.

There is no designated critical habitat for the Kemp=s ridley sea turtle.

Loggerhead sea turtle

The loggerhead sea turtle was listed as a threatened species on July 28, 1978 (43 FR 32800). This species inhabits the continental shelves and estuarine environments along the margins of the Atlantic, Pacific, and Indian Oceans, and within the continental U.S. it nests from Louisiana to Virginia. The major nesting areas include coastal islands of Georgia, South Carolina, and North Carolina, and the Atlantic and Gulf coasts of Florida, with the bulk of the nesting occurring on the Atlantic coast of Florida. Developmental habitat for small juveniles are the pelagic waters of the North Atlantic and the Mediterranean Sea.

There is no critical habitat designated for the loggerhead sea turtle.

Gulf Sturgeon

NOAA Fisheries and the U.S. Fish and Wildlife Service listed the Gulf sturgeon, also known as the Gulf of Mexico sturgeon, as a threatened species on September 30, 9991 (56 CFR 49653). The Gulf Sturgeon is a subspecies of the Atlantic sturgeon *A. o. oxyrhynchus*. The Gulf sturgeon has a sub-cylindrical body embedded with bony plates (scutes), gretalt extended snout, ventral mouth with four chin barbels, and the upper lobe of the tail is longer than the lower (Valdykov 1955, Valdykov and Greeley 1963). Adults range from 1.8 to 2.4 m in length, with females attaining greater lengths and masses than males.

Critical habitat was proposed on June 6, 2002, in the *Federal Register* (67 FR 39105). The Services are proposing portions of the following Gulf of Mexico rivers and tributaries as critical habitat for the Gulf sturgeon:

Pearl and Bogue Chitto rivers in Louisiana and Mississippi; Pascagoula, Leaf, Bowie (also referred to as Bouie), Big Black Creek, and Chickasawhay rivers in Mississippi; Escambia, Conecuh, and Sepulga rivers in Alabama and Florida; Yellow, Blackwater, and Shoal rivers in Alabama and Florida; Choctawhatchee and Pea rivers in Florida and Alabama; Apalachicola and Brothers rivers in Florida; and Suwannee and Withlacoochee rivers in Florida. The proposal also includes portions of the following estuarine and marine areas: Lake Pontchartrain (east of the Lake Pontchartrain Causeway), Lake Catherine, Little Lake, The Rigolets, Lake Borgne, Pascagoula Bay, and Mississippi Sound systems in Louisiana and Mississippi, and sections of the adjacent state waters within the Gulf of Mexico; Pensacola Bay system in Florida; Santa Rosa Sound in Florida; nearshore Gulf of Mexico in Florida; Choctawhatchee Bay system in Florida; Apalachicola Bay system in Florida; and Suwannee Sound and adjacent state waters within the Gulf of Mexico in Florida.

The proposed critical habitat is located in the action area of the Central and Eastern Planning Areas.

B. Life history

Sperm Whales

Females and juveniles form pods that are restricted mainly to tropical and temperate latitudes (between 50°N and 50°S) while the solitary adult males can be found at higher latitudes (between 75°N and 75°S) (Reeves and Whitehead 1997). In the western North Atlantic they range from Greenland to the Gulf of Mexico and the Caribbean.

Evidence suggests that the disproportionately large head of the sperm whale is an adaptation to produce these vocalizations (Norris and Harvey 1972, Cranford 1992). This suggests that the production of these loud low frequency clicks is extremely important to the survival of individual sperm whales. The function of these vocalizations is relatively well-studied (Weilgart and Whitehead 1997, Goold and Jones 1995). Long series of monotonous, regularly spaced clicks are associated with feeding and are thought to be produced for echolocation. Sperm whales also utilize unique stereotyped click sequence "codas" (Mullins et al. 1988, Watkins 1977, Adler-Fenchel 1980, Watkins et al. 1985b). According to

Weilgart and Whitehead (1988) to possibly convey information about the age, sex, and reproductive status of the sender. Groups of closely related females and their offspring have group-specific dialects (Weilgart and Whitehead 1997).

Female sperm whales attain sexual maturity at the mean age of 8 or 9 years and a length of about 9 m (Kasuya 1991, Würsig et al. 2000). The mature females ovulate April through August in the Northern Hemisphere. During this season one or more large mature bulls temporarily join each breeding school. A single calf is born at a length of about 4 meters, after a 15-16 month gestation period. Sperm whales exhibit alloparental guarding of young at the surface (Whitehead 1996), and alloparental nursing (Reeves and Whitehead 1997). Calves are nursed for 2-3 years (in some cases, up to 13 years); the calving interval is estimated to be about 4 to 7 years (Kasuya 1991, Würsig et al. 2000).

Males have a prolonged puberty and attain sexual maturity at between age 12 and 20, and a body length of 12 m, but may require another 10 years to become large enough to successfully compete for breeding rights (Kasuya 1991, Würsig et al. 2000). Bachelor schools consist of maturing males who leave the breeding school and aggregate in loose groups of about 40 animals. As the males grow older they separate from the bachelor schools and remain solitary most of the year (Best 1979).

The age distribution of the sperm whale population is unknown, but they are believed to live at least 60 years (Rice 1978). Estimated annual mortality rates of sperm whales are thought to vary by age, but previous estimates of mortality rate for juveniles and adults are now considered unreliable (IWC 1980, as cited in Perry et al. 1999). Potential sources of natural mortality in sperm whales include killer whales and the papilloma virus (Lambertsen et al. 1987).

Sperm whales generally occur in waters greater than 180 meters in depth. While they may be encountered almost anywhere on the high seas, their distribution shows a preference for continental margins, sea mounts, and areas of upwelling, where food is abundant (Leatherwood and Reeves 1983). Waring et al. (1993) suggests sperm whale distribution in the Atlantic is closely correlated with the Gulf Stream edge. Like swordfish, which feed on similar prey, sperm whales migrate to higher latitudes during summer months, when they are concentrated east and northeast of Cape Hatteras. Bull sperm whales migrate much farther poleward than the cows, calves, and young males. Because most of the breeding herds are confined almost exclusively to warmer waters, many of the larger mature males return in the winter to the lower latitudes to breed. It is not known whether Gulf sperm whales exhibit similar seasonal movement patterns. Their presence in the Gulf is year-round; however, due to the lack of males observed in the GOM and a lack of data on movements of the resident population, it is not known whether females leave the area to mate or whether males sporadically enter the area to mate with females.

Deepwater is their typical habitat, but sperm whales also occur in coastal waters at times (Scott and Sadove 1997). When found relatively close to shore, sperm whales are usually associated with sharp increases in bottom depth where upwelling occurs and biological production is high, implying the presence of a good food supply (Clarke 1956), and with the movement of cyclonic eddies in the northern Gulf (Davis et al. 2000).

Sperm whales feed primarily on medium to large-sized mesopelagic squids Architeuthis and Moroteuthis. They also take significant quantities of large demersal and mesopelagic sharks, skates, and bony fishes, especially mature males in higher latitudes (Clarke 1962, 1979). Postulated feeding/hunting methods include lying suspended and relatively motionless near the ocean floor and ambushing prey; attracting squid and other prey with bioluminescent mouths; or stunning prey with ultrasonic sounds (Würsig 2000). Sperm whales occasionally drown after becoming entangled in deep-sea cables that wrap around their lower jaw, and non-food objects have been found in their stomachs, suggesting these animals may at times cruise the ocean floor with open mouths (Würsig et al. 2000, Rice 1989). It has been speculated that sperm whales may ingest food with a sucking motion of the tongue, and may immobilize prey by using intensely focused and projected sound (Norris and Mohl 1983, and Berzin 1971, as cited in Norris and Mohl 1983, Würsig et al. 2000).

Leatherback sea turtle

The leatherback is the largest living turtle and it ranges farther than any other sea turtle species, exhibiting broad thermal tolerances (NMFS and USFWS 1995). Adult leatherbacks forage in temperate and subpolar regions from 71°N to 47°S latitude in all oceans and undergo extensive migrations to and from tropical nesting beaches between 90°N and 20°S. Female leatherbacks nest from the southeastern United States to southern Brazil in the western Atlantic and from Mauritania to Angola in the eastern Atlantic, with nesting occurring as early as late February or March. When they leave the nesting beaches, leatherbacks move offshore but eventually utilize both coastal and pelagic waters. Very little is known about the pelagic habits of the hatchlings and juveniles, and they have not been documented to be associated with the sargassum areas as are other species. Leatherbacks are deep divers, with estimated dives to depths in excess of 1000 m (Eckert et al. 1989), but they may come into shallow waters if there is an abundance of jellyfish nearshore.

Although leatherbacks are a long-lived species (> 30 years), they are somewhat faster to mature than loggerheads, with an estimated age at sexual maturity reported of about 13-14 years for females, and an estimated minimum age at sexual maturity of 3-6 years, with 9 years reported as a likely minimum (Zug 1996) and 19 years as a likely maximum (NMFS SEFSC 2001). They nest frequently (up to 7 nests per year) during a nesting season and nest about every 2-3 years. During each nesting, they produce 100 eggs or more in each clutch and, thus, can produce 700 eggs or more per nesting season (Schultz 1975).

Leatherback sea turtles feed primarily on jellyfish as well as cnidarians and tunicates. They are also the most pelagic of the turtles, but have been known to enter coastal waters on a seasonal basis to feed in areas where jellyfish are concentrated.

Green sea turtle

Green sea turtle mating occurs in the waters off the nesting beaches. Each female deposits 1-7 clutches (usually 2-3) during the breeding season at 12-14 day intervals. Mean clutch size is highly variable among populations, but averages 110-115. Females usually have 2-4 or more years between breeding seasons, while males may mate every year (Balazs 1983). After hatching, green sea turtles go through a post-hatchling pelagic stage where they are associated with drift lines of algae and other debris.

Green turtle foraging areas in the southeast United States include any neritic waters having macroalgae or sea grasses near mainland coastlines, islands, reefs, or shelves, and any open-ocean surface waters, especially where advection from wind and currents concentrates pelagic organisms (Hirth 1997, NMFS and USFWS 1991a). Principal benthic foraging areas in the region include Aransas Bay, Matagorda Bay, Laguna Madre, and the Gulf inlets of Texas (Doughty 1984, Hildebrand 1982, Shaver 1994), the Gulf of Mexico off Florida from Yankeetown to Tarpon Springs (Caldwell and Carr 1957, Carr 1984), Florida Bay and the Florida Keys (Schroeder and Foley 1995), the Indian River Lagoon System, Florida (Ehrhart 1983), and the Atlantic Ocean off Florida from Brevard through Broward counties (Wershoven and Wershoven 1992, Guseman and Ehrhart 1992). Adults of both sexes are presumed to migrate between nesting and foraging habitats along corridors adjacent to coastlines and reefs. Age at sexual maturity is estimated to be between 20 to 50 years (Balazs 1982, Frazer and Ehrhart 1985).

Green sea turtles are primarily herbivorous, feeding on algae and sea grasses, but also occasionally consume jellyfish and sponges. The post-hatchling, pelagic-stage individuals are assumed to be omnivorous, but little data are available.

Hawksbill sea turtle

The life history of hawksbills consists of a pelagic stage that lasts from the time they leave the nesting beach as hatchlings until they are approximately 22-25 cm in straight carapace length (Meylan 1988, Meylan in prep.), followed by residency in developmental habitats (foraging areas where immature individuals reside and grow) in coastal waters. Adult foraging habitat, which may or may not overlap with developmental habitat, is typically coral reefs, although other hard-bottom communities and occasionally mangrove-fringed bays may be occupied. Hawksbills show fidelity to their foraging areas over periods of time as great as several years (van Dam and Diez 1998).

Hawksbills may undertake developmental migrations (migrations as immature turtles) and reproductive migrations that involve travel over hundreds or thousands of kilometers (Meylan 1999b). Reproductive females undertake periodic (usually non-annual) migrations to their natal beach to nest. Movements of reproductive males are less well known, but are presumed to involve migrations to the nesting beach or to courtship stations along the migratory corridor. Females nest an average of 3-5 times per season. Clutch size is up to 250 eggs (Hirth 1980). Reproductive females may exhibit a high degree of fidelity to their nest sites.

Kemp's Ridley sea turtle

Remigration of females to the nesting beach varies from annually to every 4 years, with a mean of 2 years (TEWG 1998). Nesting occurs from April into July and is essentially limited to the beaches of the western Gulf of Mexico, near Rancho Nuevo in southern Tamaulipas, Mexico. The mean clutch size for Kemp's ridleys is 100 eggs/nest, with an average of 2.5 nests/female/season.

Juvenile/subadult Kemp's ridleys have been found along the Eastern Seaboard of the United States and in the Gulf of Mexico. Atlantic juveniles/subadults travel northward with vernal warming to feed in the productive, coastal waters of Georgia through New England, returning southward with the onset of winter to escape the cold (Lutcavage and Musick 1985, Henwood and Ogren 1987, Ogren 1989). In the Gulf, juvenile/subadult ridleys occupy shallow, coastal regions. Ogren (1989) suggested that in the northern Gulf they move offshore to deeper, warmer water during winter. Studies suggest that subadult Kemp's ridleys stay in shallow, warm, nearshore waters in the northern Gulf of Mexico until cooling waters force them offshore or south along the Florida coast (Renaud 1995). Little is known of the movements of the post-hatching, planktonic stage within the Gulf. Studies have shown the post-hatchling pelagic stage varies from 1-4 or more years, and the benthic immature stage lasts 7-9 years (Schmid and Witzell 1997). The TEWG (1998) estimates age at maturity to range from 7-15 years.

Stomach contents of Kemp's ridleys along the lower Texas coast consisted of a predominance of nearshore crabs and mollusks, as well as fish, shrimp and other foods considered to be shrimp fishery discards (Shaver 1991). Pelagic stage, neonatal Kemp's ridleys presumably feed on the available sargassum and associated infauna or other epipelagic species found in the Gulf of Mexico.

Loggerhead sea turtle

Mating takes place in late March-early June, and eggs are laid throughout the summer, with a mean clutch size of 100-126 eggs in the southeastern United States. Individual females nest multiple times during a nesting season, with a mean of 4.1 nests/nesting individual (Murphy and Hopkins 1984). Nesting migrations for an individual female loggerhead are usually on an interval of 2-3 years, but can vary from 1-7 years (Dodd 1988). Loggerhead sea turtles originating from the western Atlantic nesting aggregations are believed to lead a pelagic existence in the North Atlantic Gyre for as long as 7-12 years or more, but there is some variation in habitat use by individuals at all life stages. Turtles in this early life history stage are called pelagic immatures. Stranding records indicate that when pelagic immature loggerheads reach 40-60 cm straight-line carapace length they begin to recruit to coastal inshore and nearshore waters of the continental shelf throughout the U.S. Atlantic and Gulf of Mexico.

Benthic immature loggerheads, the life stage following the pelagic immature stage, have been found from Cape Cod, Massachusetts, to southern Texas, and occasionally strand on beaches in northeastern

Mexico. Large benthic immature loggerheads (70-91 cm) represent a larger proportion of the strandings and in-water captures (Schroeder et al. 1998) along the south and western coasts of Florida as compared with the rest of the coast, which could indicate that the larger animals are either more abundant in these areas or just more abundant within the area relative to the smaller turtles. Benthic immature loggerheads foraging in northeastern U.S. waters are known to migrate southward in the fall as water temperatures cool (Epperly et al. 1995b, Keinath 1993, Morreale and Standora 1999, Shoop and Kenney 1992), and migrate northward in spring. Past literature gave an estimated age at maturity of 21-35 years (Frazer and Ehrhart 1985, Frazer et al. 1994) and the benthic immature stage as lasting at least 10-25 years. However, NMFS SEFSC (2001) reviewed the literature and constructed growth curves from new data, estimating ages of maturity ranging from 20-38 years and benthic immature stage lengths from 14- 32 years.

Juveniles are omnivorous and forage on crabs, mollusks, jellyfish, and vegetation at or near the surface (Dodd 1988). Sub-adult and adult loggerheads are primarily coastal and typically prey on benthic invertebrates such as mollusks and decapod crustaceans in hard bottom habitats.

Gulf Sturgeon

The Gulf sturgeon is anadromous, migrating into freshwater 8 to 9 months of the year. They inhabit coastal rivers from Louisiana to Florida during the warmer months and overwinter in estuaries, bays, and the Gulf of Mexico. Sub-adults and adults spend about 6 years in fresh water, migrating upstream from estuaries as early as March and downstream as late as November (Carr 1983, Wooley and Crateau 1985, Odernkirk 1989, Clugston et al. 1995, Huff 1975). Adult fish tend to congregate in deeper waters of rivers with moderate currents and sand and rocky bottoms. Seagrass beds with mud and sand substrates appear to be important marine habitats (Mason and Clugston 1993). Individuals are long-lived, some reaching at least 42 years in age (Huff 1975). Age at sexual maturity for females range from 8 to 17 years, and for males from 7 to 21 years (Huff 1975).

Gulf sturgeon eggs are demersal (sink to the bottom) and adhesive (Vladykov 1963). Spawning occurs in freshwater over relatively hard and sediment-free substrates such as limestone outcrops and cut limestone banks, exposed limestone bedrock or other exposed rock, large gravel or cobble beds, soapstone or hard clay (Fox and Hightower 1998, Marchent and Shutters 1996, Sulak and Clugston 1999). Although fry and juveniles feed in the riverine environment, sub-adults and adults do not (Mason and Clugston 1993, Sulak and Klugston 1999). A full discussion of the life history of this subspecies, may be found in the September 30, 1991, final rule listing the Gulf sturgeon as a threatened species (56 FR 49653), and the Recovery/Management Plan approved by NOAA Fisheries and the U.S. Fish and Wildlife Service in September 1995.

C. Population dynamics

Sperm whales

There has been speculation, based on a year-round occurrence of strandings, opportunistic sightings and whaling catches, that sperm whales in the Gulf of Mexico may constitute a distinct stock (Schmidley 1981, Fritts 1983, Hansen et al. 1996 as cited in Perry et al. 1999), and indeed, they are treated as such in NOAA Fisheries Marine Mammal Stock Assessment Report (Waring et al. 2000). Seasonal aerial surveys have confirmed that sperm whales are present in the northern Gulf of Mexico in all seasons, but sightings are more common during summer (Mullin et al. 1991, Mullin et al. 1994, Mullin and Hoggard 2000).

According to Würsig et al. (2000), sperm whales south of the Mississippi River Delta apparently concentrate their movements to stay in or near variable areas of upwelling, or cold-core rings. Presumably this is due to the greater productivity inherent in such areas, which would provide concentrated sources of forage species for these great whales. The continental margin in the north-central Gulf is only 20 km wide at its narrowest point, and the ocean floor descends quickly along the continental slope, reaching a depth of 1,000 m within 40 km of the coast. This unique area of the Gulf of Mexico brings deepwater organisms within the influence of coastal fisheries, contaminants, and other human impacts on the entire northern Gulf. Low salinity, nutrient-rich water from the Mississippi River contributes to enhanced primary and secondary productivity in the north-central Gulf, and may explain the presence of sperm whales in the area (Davis et al. 2000). In fact, researchers with Texas A&M believe that the area should be considered as critical habitat for sperm whales (R. Davis, pers. comm.), as it is the only known breeding and calving area in the Gulf, for what is believed to be an endemic population.

Sperm whales are noted for their ability to make prolonged, deep dives, and are likely the deepest and longest diving mammal. Typical foraging dives last 40 minutes and descend to about 400 m, followed by approximately 8 minutes of resting at the surface (Gordon 1987, Papastavrou et al. 1989). However, dives of over 2 hours and deeper than 3.3 km have been recorded (Clarke 1976, Watkins et al. 1985, Watkins et al. 1993) and individuals may spend extended periods of time at the surface. Descent rates recorded from echo-sounders were approximately 1.7m/sec and nearly vertical (Goold and Jones 1995). There are no data on diurnal differences in dive depths in sperm whales. However, like most diving vertebrates for which there are data (e.g., rorqual whales, fur seals, chinstrap penguins), sperm whales probably make relatively shallow dives at night when deep scattering layer organisms move towards the surface.

Leatherback sea turtle

Leatherbacks are widely distributed throughout the oceans of the world, and are found in waters of the Atlantic, Pacific, Caribbean, and the Gulf of Mexico (Ernst and Barbour 1972). An estimate of 34,500 females (26,200-42,900) was made by Spotila et al. (1996), along with a claim that the species as a whole was declining and local populations were in danger of extinction (NMFS SEFSC 2001). Genetic analyses of leatherbacks to date indicate that within the Atlantic basin significant genetic differences occur among St. Croix (U.S. Virgin Islands), and mainland Caribbean populations (Florida, Costa Rica, Suriname/French Guiana) and between Trinidad and the mainland Caribbean populations (Dutton et al. 1999) leading to the conclusion that there are at least three separate subpopulations of leatherbacks in the Atlantic.

The primary leatherback nesting beaches occur in French Guiana, Suriname, and Costa Rica in the western Atlantic, and in Mexico in the eastern Pacific. Recent declines have been seen in the number of leatherbacks nesting worldwide (NMFS and USFWS 1995). A population estimate of 34,500 females (26,200-42,900) was made by Spotila et al. (1996), who stated that the species as a whole was declining and local populations were in danger of extinction. Adult mortality has increased significantly from interactions with fishery gear (Spotila et al. 1996). The Pacific population is in a critical state of decline, now estimated to number less than 3,000 total adult and subadult animals (Spotila et al. 2000). The status of the Atlantic population is less clear. In 1996, it was reported to be stable, at best (Spotila et al. 1996), but numbers in the western Atlantic at that time were reported to be on the order of 18,800 nesting females. According to Spotila (pers. comm.), the western Atlantic population currently numbers about 15,000 nesting females, whereas current estimates for the Caribbean (4,000) and the eastern Atlantic, off Africa, (numbering ca. 4,700) have remained consistent with numbers reported by Spotila et al. in 1996.

The nesting aggregation in French Guiana has been declining at about 15% per year since 1987. From 1979-1986, the number of nests was increasing at about 15% annually. The number of nests in Florida and the U.S. Caribbean has been increasing at about 10.3% and 7.5%, respectively, per year since the early 1980s but the magnitude of nesting is much smaller than that along the French Guiana coast (see NMFS SEFSC 2001). In summary, the conflicting information regarding the status of Atlantic leatherbacks makes it difficult to conclude whether or not the population is currently in decline. Numbers at some nesting sites are up, while at others they are down.

Green sea turtle

The vast majority of green turtle nesting within the southeast United States occurs in Florida. In Florida from 1989-1999, green turtle abundance from nest counts ranges 109-1,389 nesting females per year (Meylan et al. 1995 and Florida Marine Research Institute Statewide Nesting 2001 Database, unpublished data; estimates assume 4 nests per female per year, Johnson and Ehrhart 1994). High biennial variation and a predominant 2-year remigration interval (Witherington and Ehrhart 1989, Johnson and Ehrhart 1994) warrant combining even and odd years into 2-year cohorts. This gives an estimate of total nesting females that ranges 705-1,509 during the period 1990-1999. It is important to note that because methodological limitations make the clutch frequency number (4 nests/female/year) an underestimate (by as great as 50%), a more conservative estimate is 470-1,509 nesting females in Florida between 1990 and 1999. In Florida during the period 1989-1999, numbers of green turtle nests by year show no trend. However, odd-even year cohorts of nests do show a significant increase during the period 1990-1999 (Florida Marine Research Institute, 2001 Index Nesting Beach Survey Database).

It is unclear how greatly green turtle nesting in the whole of Florida has been reduced from historical levels (Dodd 1981), although one account indicates that nesting in Florida's Dry Tortugas may now be only a small fraction of what it once was (Audubon 1926). Total nest counts and trends at index beach sites during the past decade suggest that green turtles that nest within the southeast United States are recovering and have only recently reached a level of approximately 1,000 nesting females. There are no reliable estimates of the number of green turtles inhabiting foraging areas within the southeast United States, and it is likely that green turtles foraging in the region come from multiple genetic stocks. These trends are also uncertain because of a lack of data. However, there is one sampling area in the region with a large time series of constant turtle-capture effort that may represent trends for a limited area within the region. This sampling area is at an intake canal for a power plant on the Atlantic coast of Florida where 2,578 green turtles have been captured during the period 1977-1999 (FPL 2000). At the power plant, the annual number of immature green turtle captures (minimum straight-line carapace length < 85 cm) has increased significantly during the 23-year period.

Status of immature green turtles foraging in the southeast United States might also be assessed from trends at nesting beaches where many of the turtles originated, principally, Florida, Yucatán, and Tortuguero. Trends at Florida beaches are presented above. Trends in nesting at Yucatán beaches cannot be assessed because of irregularity in beach survey methods over time. Trends at Tortuguero (ca. 20,000-50,000 nests/year) show a significant increase in nesting during the period 1971-1996 (Bjorndal et al. 1999).

Hawksbill sea turtle

Mona Island (Puerto Rico, 181 05' N, 67157 W) has 7.2 km of sandy beach that host the largest known hawksbill nesting aggregation in the Caribbean Basin, with over 500 nests recorded annually from 1998B2000 (Diez and van Dam in press, Carlos Diez pers. comm.). The island has been surveyed for marine turtle nesting activity for more than 20 years; surveys since 1994 show an increasing trend. Increases are attributed to nest protection efforts in Mona and fishing reduction in the Caribbean. The U.S. Virgin Islands are also an important hawksbill nesting location. Buck Island Reef National Monument off St. Croix has been surveyed for nesting activity since 1987. Between 1987 and 1999, between 73 and 135 hawksbill nests had been recorded annually (Meylan and Donnelly 1999). The population, although small, is considered to be stationary. Nesting beaches on Buck Island experience large-scale beach erosion and accretion as a result of hurricanes, and nests may be lost to erosion or burial. Predation of nests by mongoose is a serious problem and requires intensive trapping. Hawksbill nesting also occurs elsewhere on St. Croix, St. John and St. Thomas. Juvenile and adult hawksbills are common in the waters of the U.S. Virgin Islands. Immature hawksbills tagged at St. Thomas during long-term, in-water studies appeared to be resident for extended periods (Boulon 1994). Tag returns were recorded from St. Lucia, the British Virgin Islands, Puerto Rico, St. Martin, and the Dominican Republic (Boulon 1989, Meylan 1999b).

The Atlantic coast of Florida is the only area in the United States where hawksbills nest on a regular basis, but four is the maximum number of nests documented in any year during 1979-2000 (Florida Statewide Nesting Beach Survey database). Nesting occurs as far north as Volusia County, Florida, and south to the Florida Keys, including Boca Grande and the Marquesas. Soldier Key in Miami-Dade County has had more nests than any other location, and it is one of the few places in Florida mentioned in the historical literature as having been a nesting site for hawksbills DeSola 1935). There is also a report of a nest in the late 1970s at nearby Cape Florida. It is likely that some hawksbill nesting in Florida goes undocumented due to the great similarity of the tracks of hawksbills and loggerheads. All documented records of hawksbill nesting from 1979 to 2000 took place between May and December except for one April nest in the Marquesas (Florida Statewide Nesting Survey database).

Twenty-four hawksbills have been removed from the intake canal at the Florida Power and Light St. Lucie Plant in Juno Beach (St. Lucie County) during 1978-2000 (M. Bresette pers. comm.). The animals ranged in size from 34.0B83.4 cm straight carapace length and were captured in most months of the year. Immature hawksbills have been recorded on rare occasions in both the Indian River Lagoon (Indian River County) and Mosquito Lagoon (Brevard County). A 24.8 cm hawksbill was captured on the worm reefs 200 meters off the coast in Indian River County (L. Ehrhart pers. comm.).

Records of hawksbills north of Florida are relatively rare, although several occurrences have been documented (Parker 1996, Ruckdeschel et al. 2000, S. Epperly pers. comm., Schwartz 1976, Keinath and Musick 1991, Sea Turtle Stranding and Salvage Network database).

Kemp's ridley sea turtle

Kemp=s ridleys have a very restricted distribution relative to the other sea turtle species. Data suggests that adult Kemp's ridley turtles are restricted somewhat to the Gulf of Mexico in shallow near shore waters, and benthic immature turtles of 20-60 cm straight line carapace length are found in nearshore coastal waters including estuaries of the Gulf of Mexico and the Atlantic, although adult-sized individuals sometimes are found on the Eastern Seaboard of the United States. The post-pelagic stages are commonly found dwelling over crab-rich sandy or muddy bottoms. Juveniles frequent bays, coastal lagoons, and river mouths.

Of the seven extant species of sea turtles in the world, the Kemp's ridley has declined to the lowest population level. Most of the population of adult females nest on the Rancho Nuevo beaches (Pritchard 1969). When nesting aggregations at Rancho Nuevo were discovered in 1947, adult female populations were estimated to be in excess of 40,000 individuals (Hildebrand 1963). By the early 1970s, the world population estimate of mature female Kemp's ridleys had been reduced to 2,500-5,000 individuals. The population declined further through the mid-1980s. Recent observations of increased nesting suggest that the decline in the ridley population has stopped and the population is now increasing. Nesting at Tamaulipas and Veracruz increased from a low of 702 nests in 1985, to

1,930 nests in 1995, to 6,277 nests in 2000 (USFWS 2000). The population model used by the TEWG (1998) projected that Kemp's ridleys could reach the intermediate recovery goal identified in the Recovery Plan, of 10,000 nesters by the year 2020 if the assumptions of age to sexual maturity and age specific survivorship rates used in their model are correct.

Loggerhead sea turtle

Loggerhead sea turtles occur throughout the temperate and tropical regions of the Atlantic, Pacific, and Indian Oceans and are the most abundant species of sea turtle occurring in U.S. waters. Loggerhead sea turtles concentrate their nesting in the north and south temperate zones and subtropics, but generally avoid nesting in tropical areas of Central America, northern South America, and the Old World (Magnuson et al. 1990).

In the western Atlantic, most loggerhead sea turtles nest from North Carolina to Florida and along the Gulf coast of Florida. There are five western Atlantic subpopulations, divided geographically as follows: (1) a northern nesting subpopulation, occurring from North Carolina to northeast Florida at about 29^{o} N (approximately 7,500 nests in 1998); (2) a south Florida nesting subpopulation, occurring from 29^{o} N on the east coast to Sarasota on the west coast (approximately 83,400 nests in 1998); (3) a Florida Panhandle nesting subpopulation, occurring at Eglin Air Force Base and the beaches near Panama City, Florida (approximately 1,200 nests in 1998); (4) a Yucatán nesting subpopulation, occurring on the eastern Yucatán Peninsula, Mexico (Márquez 1990) (approximately 1,000 nests in 1998) (TEWG 2000); and (5) a Dry Tortugas nesting subpopulation, occurring in the islands of the Dry Tortugas, near Key West, Florida (approximately 200 nests per year) (NMFS SEFSC 2001). Natal homing of females to the nesting beach provides the barrier between these subpopulations, preventing recolonization with turtles from other nesting beaches.

Based on the data available, it is difficult to estimate the size of the loggerhead sea turtle population in the United States or its territorial waters. There is, however, general agreement that the number of nesting females provides a useful index of the species= population size and stability at this life stage. Nesting data collected on index nesting beaches in the United States from 1989-1998 represent the best data set available to index the population size of loggerhead sea turtles. However, an important caveat for population trends analysis based on nesting beach data is that this may reflect trends in adult nesting females but not reflect overall population growth rates. Given this caveat, between 1989 and 1998, the total number of nests laid along the U.S. Atlantic and Gulf coasts ranged from 53,014 to 92,182 annually, with a mean of 73,751. On average, 90.7% of these nests were from the south Florida subpopulation, 8.5% were from the northern subpopulation, and 0.8% were from the Florida Panhandle nest sites. There is limited nesting throughout the Gulf of Mexico west of Florida, but it is not known to which subpopulation these nesting females belong.

The number of nests in the northern subpopulation from 1989 to 1998 was 4,370 to 7,887, with a 10-year mean of 6,247 nests. With each female producing an average of 4.1 nests in a nesting season, the average number of nesting females per year in the northern subpopulation was 1,524. The total nesting and non-nesting adult female population is estimated as 3,810 adult females in the northern subpopulation (TEWG 1998, 2000). The northern population, based on number of nests, has been classified as stable or declining (TEWG 2000). Another consideration adding to the vulnerability of the northern subpopulation is that NOAA Fisheries scientists estimate that the northern subpopulation produces 65% males, while the south Florida subpopulation is estimated to produce 80% females (NMFS SEFSC 2001).

The southeastern U.S. nesting aggregation is of great importance on a global scale and is second in size only to the nesting aggregation on islands in the Arabian Sea off Oman (Ross 1979, Ehrhart 1989, NMFS and USFWS 1991b). The global importance of the southeast U.S. nesting aggregation is especially important because the status of the Oman colony has not been evaluated recently, but it is located in an area of the world where it is highly vulnerable to disruptive events such as political upheavals, wars, catastrophic oil spills, and lack of strong protections (Meylan et al. 1995).

Gulf Sturgeon

While little is known about the abundance of Gulf sturgeon throughout most of its range, population estimates have been calculated for the Apalachicola, Choctawhatchee, and Suwannee rivers. The FWS calculated an average (from 1984-1993) 115 individuals (> 45 cm TL) over-summering in the Apalachicola River below Jim Woodruff Lock and Dam (FWS & GSMFC 1995). Preliminary estimates of the size of the Gulf sturgeon subpopulation in the Choctawhatchee River system are 2,000 to 3,000 fish over 61 cm TL (F. Parauka pers. comm. 2001). The Suwannee River Gulf sturgeon population (i.e., fish > 60 cm TL and older than age 2) has recently been calculated at ca 7,650 individuals (Sulak and Clugston 1999). Although the size of the Suwannee River sturgeon population is considered stable, the population structure is highly dynamic and unstable as indicated by length frequency histograms (Sulak and Clugston 1999). Strong and weak year classes coupled with the regular removal of larger fish limits the growth of the Suwannee River population but stabilizes the average population size (Sulak and Clugston 1999).

D. Status and distribution

Sperm whales

Sperm whales are found throughout the world's oceans in deep waters from between about 60^o N and 60^o S latitudes (Leatherwood and Reeves 1983, Rice 1989). The primary factor for the population decline that precipitated ESA listing was commercial whaling in the 18th, 19th, and 20th centuries for ambergris and spermaceti. The International Whaling Commission (IWC) estimates that nearly a quarter-million sperm whales were killed worldwide in whaling activities between 1800 and 1900 (IWC 1969). A commercial fishery for sperm whales operated in the Gulf of Mexico during the late 1700s to the early1900s, but the exact number of whales taken is not known (Townsend 1935). The over harvest of sperm whales resulted in their alarming decline in the last century. From 1910 to 1982, there were nearly 700,000 sperm whales killed worldwide from whaling activities (IWC Statistics 1959-1983). Since the ban on nearly all hunting of sperm whales, there has been little evidence that direct effects of anthropogenic causes of mortality or injury are significantly affecting the recovery of sperm whale stocks (Perry et al. 1999, Waring et al. 1997, Blaylock et al. 1995). Sperm whales have been protected from commercial harvest by the International Whaling Commission (IWC) since 1981, although the Japanese continued to harvest sperm whales in the North Pacific until 1988 (Reeves and Whitehead 1997). They are also protected by the Convention on International Trade in Endangered Species of wild flora and fauna and the Marine Mammal Protection Act of 1972.

New threats: The concern for the effects of anthropogenic noise on the physiology and behavior of marine mammals has received much attention recently. Sperm whale vocalization and audition are important for echolocation and feeding, social behavior and intragroup interactions, and to maintain social cohesion within the group. Anthropogenic noise due to vessel noise, noise associated with oil production, seismic surveys, and other sources have the potential to interfere with audition (e.g., threshold shift or acoustic trauma), communication, feeding ability, behavior, disruption of breeding behaviors, and result in avoidance of areas emitting these types of sounds. Andrew et al. (2002) reported that over a 33-year period, increases in shipping sound levels in the ocean may account for 10 dB increase in ambient noise between 20-80 Hz and between 200-300 Hz, and a 3 dB increase in noise at 100 Hz on the continental slope off Point Sur, California. Although comparable data are not available for shelf waters in the Gulf of Mexico, the amount of vessel traffic and industrial noise in the Gulf may contribute to similar increases in ambient noise in the hearing range of sperm whales that alters their behavior and may increase the risk of vessel collisions with sperm whales in the Gulf.

Sperm whales have been observed to frequently stop echolocating in the presence of underwater pulses made by echosounders and submarine sonar (Watkins and Schevill 1975, Watkins et al. 1985). Andre et al. (1997) reported that 10 kHz pulses (180 db re 1 ΦPa at the source) induced startle reactions in sperm whales, and Goold (1999) reported six sperm whales that were driven through a narrow channel using ship noise and echosounder/fishfinder emissions from a flotilla of 10 vessels. Bowles et al. (1991) have reported that low frequency sounds (209-220 db re 1 Pa at 57 Hz) from the Heard Island Feasibility Test may have caused sperm whales to fall silent and/or to leave the test area. Watkins and Scheville (1975) showed that sperm whales interrupted click production in response to pinger (6 to 13 kHz) sounds. Watkins et al. (1985, 1993) also reported that sperm whales in the eastern Caribbean became silent, interrupted their activities and moved away from strong pulses from submarine sonar. Watkins et al. (1993) reported interruption of vocal activity and immediate submergence by two sperm whales exposed to high level submarine sonar pulses. They also stop vocalizing for brief periods when codas are being produced by other individuals, perhaps because they can hear better when not vocalizing themselves (Goold and Jones 1995). One contradictory observation reports no alteration in sperm whale vocal activity when exposed to levels of 173 dB re 1 ΦPa rms from 1 g TNT detonators (Madsen and Mohl 2000), but it was surmised that the detonations resembled the distant sounds of sperm clicks and may account for the apparent lack of response by the sperm whales. Richardson et al. (1995) cite a personal communication with J. Gordon (1994) indicating that sperm whales in the Mediterranean continued calling when exposed to frequent and strong military sonar signals, but also report that whalers rarely used sonar to follow these whales due to their tendency to scatter upon hearing the sound.

Finneran et al. (in press) have reported that in response to water guns, the odontocete, Delphinapterus leucas (white whale), exhibited masked temporary threshold shifts (MTTS) of 7 and 6 dB at 0.4 and 30 kHz respectively, approximately 2 minutes following exposure to single impulses with peak pressures of 160 kPa, peak-to-peak pressures off 226 dB re 1 Pa, and total energy fluxes of 186 db re 1 Pa·s. Thesholds returned to within 2 dB of the pre-exposure value within 4 minutes of exposure. The number of sperm whales has been reported to decrease when airguns were used in the Gulf of Mexico (Mate et al. 1992) and to have moved out of areas after the start of air-gun seismic testing (Davis et al. 1995) indicating the potential of acoustic harassment and disturbance from the dB levels and/or frequency ranges produced from seismic surveys. The United Kingdom presently implements guidelines for minimizing acoustic disturbance of marine mammals from seismic surveys (JNCC 1998). From observer reports on seismic surveys, it has been reported that there is a tendency for cetaceans to increase swimming speed, breach, and jump. Nearly all species were found to be farther from the air guns when they were firing than when they were not, and sperm whales have been observed to dive more frequently during periods of air gun use (Stone 2000, 2001).

Sperm whales produce loud broad-band clicks from about 0.1 to 20 kHz (Weilgart and Whitehead 1997, Goold and Jones 1995). Clicks recorded off the coast of Norway in 1997 and 1998, an area thought to be utilized by adult foraging males, were measured for directionality and sound levels. The recorded sound levels for sperm whale clicks exceeded 220 dB. The results of these studies are 40 to 50 dB higher than the sound levels previously recognized for this species (Møhl et al. 2000). Clicks are repeated at rates of 1-90 per second (Backus and Schevill 1966, Watkins and Schevill 1977, Watkins et al. 1985).

Recent vocalizations measured from a sperm whale calf (Ridgway and Carder 2001) resulted in two types of clicks: (a) 1 to 2 ms high-frequency, low amplitude clicks with peak frequencies at 5 kHz to 12 kH (amplitude under 140 dB re 1 Pa), and (b) 7 to 20 ms low-frequency, high amplitude clicks with peak frequencies at 500 Hz to 3 kHz (148 to 165 dB re 1 Pa). Low-frequency grunts were also recorded at frequencies below 3 kHz. Based on inner ear anatomy, Ketten (1994) noted that the predicted functional lower limit of hearing for sperm whale should be near 100 Hz. Electro-physiological audiograms of the sperm whale calf's hearing resulted in a most sensitive auditory range between 2.5 to 60 kHz.

Adverse reactions by whales to vessel activity have been recorded (e.g., Gaskin 1972, Gambell 1968, Lockyer 1977, Whitehead 1990, Reeves 1992, Gordon et al. 1992). Sperm whales are also vulnerable to collisions with vessels. The USS ROSS, en route to gunnery exercises and while located in the Outer Range approximately 35 miles southwest of Vieques and about 8 miles south of Puerto Rico, collided with and killed a sperm whale on June 18, 2001. The reported vessel speed at the time of the collision was 27 knots (J. Wallmeyer pers. comm., 2001) in daylight and unrestricted visibility. After the impact, a pod of whales was seen nearby. In the Gulf of Mexico, the USS BULKLEY reported striking a whale at night on June 25, 2001, while undergoing sea trials out of Pascagoula, Mississippi. Due to the offshore distribution of this species, interactions that do occur are less likely to be reported than those involving right, humpback, and fin whales occurring in nearshore areas. Although ship strikes with sperm whales does not appear to be a major threat in the Gulf of Mexico at this time, the increase in vessel traffic throughout known sperm whale habitat warrants concern.

Documented takes primarily involve offshore fisheries such as the offshore lobster pot fishery and pelagic driftnet and longline fisheries. Sperm whales have learned to depredate sablefish from longline gear in the Gulf of Alaska and toothfish from longline operations in the south Atlantic Ocean. No direct injury or mortality has been recorded during hauling operations, but lines have had to be cut when whales were caught on them (Ashford et al. 1996). Because of their generally more offshore distribution and their benthic feeding habits, sperm whales are less subject to entanglement than are right or humpback whales. Sperm whales have been taken in the pelagic drift gillnet fishery for swordfish, and could likewise be taken in the shark drift gillnet fishery on occasions when they may occur more nearshore, although this likely does not occur often. Although no interaction between sperm whales and longlines have been recorded in the U.S. Atlantic, as noted above, such interactions have been documented elsewhere. The Southeast U.S. Marine Mammal Stranding Network received reports of 16 sperm whales that stranded along the Gulf of Mexico coastline from 1987 to 2001 in areas ranging from Pinellas County, Florida to Matagorda County, Texas. One of these whales had deep, parallel cuts posterior to the dorsal ridge that were believed to be caused by the propeller of a large vessel. This trauma was assumed to be the proximate cause of the stranding.

Sea turtles

Historically, intense harvest of eggs, loss of suitable nesting beaches and fishery related mortality have led to the rapid decline of sea turtle populations. The four species of sea turtles that occur in the action area are all highly migratory. NOAA Fisheries believes that all sea turtle species are highly migratory throughout the action area. Individual animals will make migrations into nearshore waters as well as other areas of the Gulf, Atlantic, and the Caribbean Sea. Therefore, the range-wide status of the four species of sea turtles described above, most accurately reflects each species= status within the action area.

Threats to sea turtles

Ingestion of ocean debris and entanglement in nondegradable debris such as trash and discarded fishing gear continue to pose threats and lead to turtle deaths each year. Young turtles in their pelagic phase are dependent on ocean driftlines for food. Contact with oil and the ingestion of plastics and tar are known to kill young sea turtles (Carr 1987). Ingestion of plastics, styrofoam, balloons and tar, and mortalities have been attributed to mortalities of young turtles (Carr 1987, Witham 1978).

Sea turtles entangled in fishing gear generally have a reduced ability to feed, dive, surface to breathe or perform any other behavior essential to survival (Balazs 1985). They may be more susceptible to boat strikes if forced to remain at the surface, and entangling lines can constrict blood flow resulting in necrosis (Ibid.). Greater numbers of sea turtles are killed in collisions with boats or are injured due to increased numbers of high-speed, high-powered boats. Coastal development and artificial lighting continue to threaten nesting beaches worldwide.

Leatherback sea turtle

Leatherback sea turtles are susceptible to ingestion of marine debris (Balazs 1985, Fritts 1982, Lutcavage et al. 1997, Mrosovsky 1981, Shoop and Kenney 1992). NMFS SEFSC (2001) notes that poaching of eggs and animals still occurs. In the U.S. Virgin Islands, four of five strandings in St. Croix were the result of poaching (Boulon 2000).

Of the Atlantic turtle species, leatherback turtles seem to be the most susceptible to entanglement in fishing gear with lines, such as lobster gear lines and longline gear rather than swallowing hooks. They are also just as susceptible to trawl capture as the other species. This susceptibility may be the result of attraction to gelatinous organisms and algae that collect on buoys and buoy lines at or near the surface, and perhaps to the lightsticks used to attract target species in the longline fishery. It has been reported that 358 leatherbacks were incidentally caught by permitted activities, 2-45 observed takes occurred, and estimated 918 takes have occurred in the Atlantic pelagic longline fishery (NMFS 2001).

Leatherbacks may become entangled in longline gear (NMFS SEFSC 2001, Part III, Chapter 7), buoy lines (D. Fletcher pers. comm.), lobster pot lines (Prescott 1988, R. Prescott pers. comm.), and trawl fisheries (Anon 1985, Marcano and Alio 2000). During the period 1977-1987, 89% of the 57 stranded adult leatherbacks were the result of entanglement (Prescott 1988), and during the period 1990-1996, 58% of the 59 stranded adult leatherbacks showed signs of entanglement (R. Prescott, pers. comm.). Leatherback sea turtles also are vulnerable to capture in gillnets (Goff and Lien 1988, Goff et al. 1994, Anon. 1996, Castroviejo et al. 1994, Chevalier et al. 1999, Lagueux et al. 1998, Eckert and Lien 1999).

According to observer records, an estimated 6,363 leatherback sea turtles were caught by the U.S. Atlantic tuna and swordfish longline fisheries between 1992-1999, of which 88 were discarded dead (NMFS SEFSC 2001). However, the U.S. fleet accounts for a small portion (5%-8%) of the hooks fished in the Atlantic Ocean compared to other nations, including Taipei, Brazil, Trinidad, Morocco, Cyprus, Venezuela, Korea, Mexico, Cuba, U.K., Bermuda, People's Republic of China, Grenada, Canada, Belize, France, and Ireland (Carocci and Majkowski 1998). Reports of incidental takes of turtles are incomplete for many of these nations (see NMFS SEFSC 2001, Part II, Chapter 5, p. 162 for a complete description of take records). Adding up the under-represented observed takes per country per year of 23 actively fishing countries would likely result in estimates of thousands of sea turtles annually over different life stages.

Green sea turtle

The principal cause of past declines and extirpations of green turtle assemblages has been the over-exploitation of green turtles for food and other products. Adult green turtles and immatures are still exploited heavily on foraging grounds off Nicaragua and to a lesser extent off Colombia, Mexico, Panama, Venezuela, and the Tortuguero nesting beach (Carr et al. 1978, Nietschmann 1982, Bass et al. 1998, Lagueux 1998).

Significant threats on green turtle nesting beaches in the region include beach armoring, erosion control, artificial lighting, and disturbance. Armoring of beaches (seawalls, revetments, rip-rap, sandbags, sand fences) in Florida, meant to protect developed property, is increasing and has been shown to discourage nesting even when armoring structures do not completely block access to nesting habitat (Mosier 1998). Hatchling sea turtles on land and in the water that are attracted to artificial light sources may suffer increased predation proportional to the increased time spent on the beach and in the predator-rich nearshore zone (Witherington and Martin 2000).

Green turtles depend on shallow foraging grounds with sufficient benthic vegetation. Direct destruction of foraging areas due to dredging, boat anchorage, deposition of spoil, and siltation (Coston-Clements and Hoss 1983, Williams 1988) may have considerable effects on the distribution of foraging green turtles. Eutrophication, heavy metals, radioactive elements, and hydrocarbons all may reduce the extent, quality, and productivity of foraging grounds (Frazier 1980).

Pollution also threatens the pelagic habitat of young green turtles. Older juvenile green turtles have also been found dead after ingesting seaborne plastics (Balazs 1985). A major threat from manmade debris is the entanglement of turtles in discarded monofilament fishing line and abandoned netting (Balazs 1985).

The occurrence of green turtle fibropapillomatosis disease was originally reported in the 1930s, when it was thought to be rare (Smith and Coates 1938). Presently, this disease is cosmopolitan and has been found to affect large numbers of animals in some areas, including Hawaii and Florida (Herbst 1994, Jacobson 1990, Jacobson et al. 1991). The growths are commonly found in the eyes, occluding sight, are often entangled in debris, and are frequently infected secondarily.

Natural disturbances such as hurricanes can cause significant destruction of nests and topography of nesting beaches (Pritchard 1980, Ross and Barwani 1982, Witherington 1986). Predation on sea turtles by animals other than humans occurs principally during the egg and hatchling stage of development (Stancyk 1982). Mortality due to predation of early stages appears to be relatively high naturally, and the reproductive strategy of the animal is structured to compensate for this loss (Bjorndal 1980).

Green turtles are often captured and drowned in nets set to catch fishes. Gillnets, trawl nets, pound nets (Crouse 1982, Hillestad et al. 1982, National Research Council 1990) and abandoned nets of many types (Balazs 1985, Ehrhart et al. 1990) are known to catch and kill sea turtles. Green turtles also are taken by hook and line fishing. Collisions with power boats and encounters with suction dredges have killed green turtles along the U.S. coast and may be common elsewhere where boating and dredging activities are frequent (Florida Marine Research Institute, Sea Turtle Stranding and Salvage Network Database).

Hawksbill sea turtle

Hawksbills are threatened by all the factors that threaten other marine turtles, including exploitation for meat, eggs, and the curio trade, loss or degradation of nesting and foraging habitats, increased human presence, nest depredation, oil pollution, incidental capture in fishing gear, ingestion of and entanglement in marine debris, and boat collisions (Lutcavage et al. 1997, Meylan and Ehrenfeld 2000). The primary cause of hawksbill decline has been attributed to centuries of exploitation for tortoiseshell, the beautifully patterned scales that cover the turtle's shell (Parsons 1972). International trade in tortoiseshell is now prohibited among all signatories of the Convention on International Trade in Endangered Species, but some illegal trade continues, as does trade between non-signatories.

Kemp=s Ridley

The largest contributor to the decline of the ridley in the past was commercial and local exploitation, especially poaching of nests at the Rancho Nuevo site, as well as the Gulf of Mexico trawl fisheries. The advent of the Turtle Excluder Device (TED) regulations for trawlers and protections for the nesting beaches have allowed the species to begin to rebound. Many threats to the future of the species remain, including interactions with fishery gear, marine pollution, foraging habitat destruction, illegal poaching of nests, and the potential threats to nesting beaches from such sources as global climate change, development, and tourism pressures.

Sea turtles are adversely impacted domestically and internationally by many factors including: trawl fisheries, gillnet fisheries, hook and line fisheries, pelagic longline fisheries, pound nets, fish traps, lobster pots, whelk pots, long haul seines and channel nets. Presently, NOAA Fisheries continues to modify TED design to reduce sea turtle mortality in trawl fisheries. Non-fishery impacts such as power plants, marine pollution, ingestion of marine debris, and direct harvest of eggs and adults in foreign countries, oil and gas exploration, development, and transportation, underwater explosions, dredging, offshore artificial lighting, marina and dock construction and operation; boat collisions, and poaching contribute to declines in sea turtle populations. On nesting beaches sea turtles are threatened with beach erosion; armoring; renourishment; artificial lighting; beach cleaning; increased human presence; recreational beach equipment and furniture; exotic dune and beach vegetation; predation by species such as fire ants, raccoons (Procyon lotor), armadillos (Dasypus novemcinctus), opossums (Didelphus virginiana); and poaching.

Loggerhead sea turtle

Ongoing threats to the western Atlantic populations include incidental takes from dredging, commercial trawling, longline fisheries, and gillnet fisheries; loss or degradation of nesting habitat from coastal development and beach armoring; disorientation of hatchlings by beachfront lighting; nest predation by native and non-native predators; degradation of foraging habitat; marine pollution and debris; watercraft strikes; and disease.

Loggerhead sea turtles face numerous threats from natural causes. The five known subpop-ulations of loggerhead sea turtles in the northwest Atlantic that nest in the southeastern United States are subject to fluctuations in the number of young produced annually because of natural phenomena, such as hurricanes, as well as human-related activities. There is a significant overlap between hurricane seasons in the Caribbean Sea and northwest Atlantic Ocean (June to November) and the loggerhead sea turtle nesting season (March to November). Hurricanes can have potentially disastrous effects on the survival of eggs in sea turtle nests. In 1992, Hurricane Andrew affected turtle nests over a 90-mile length of coastal Florida. All of the eggs were destroyed by storm surges on beaches that were closest to the eye of this hurricane (Milton et al. 1994). On Fisher Island near Miami, Florida, 69% of the eggs did not hatch after Hurricane Andrew, likely due to an inhibition of gas exchange between the eggshell and the submerged nest environment resulting from the storm surge. Nests from the northern subpopulation were destroyed by hurricanes which made landfall in North Carolina in the mid-to-late 1990s. Sand accretion and rainfall that result from these storms can appreciably reduce hatchling success. These natural phenomena probably have significant, adverse effects on the size of specific year classes, particularly given the increasing frequency and intensity of hurricanes in the Caribbean Sea and northwest Atlantic Ocean.

Status and distribution of Gulf sturgeon

Gulf Sturgeon

Historically, the Gulf sturgeon occurred from the Mississippi River to Tampa Bay. Its present range extends from Lake Pontchartrain and the Pearl River system in Louisiana and Mississippi east to the Suwannee River in Florida. Sporadic occurrences have been recorded as far west as the Rio Grande River between Texas and Mexico, and as far east and south as Florida Bay (Wooley and Crateau 1985, Reynolds 1993).

In the late 19th century and early 20th century, the Gulf sturgeon supported an important commercial fishery, providing eggs for caviar, flesh for smoked fish, and swim bladders for isinglass, a gelatin used in food products and glues (Carr 1983). Dams and sill construction after 1950 restricted access to historic spawning areas (Boschung 1976, Wooley and Crateau 1985, McDowell 1988), and overfishing resulted in the decline of the Gulf sturgeon throughout most of the 20th century. The decline was exacerbated by habitat loss associated with the construction of water control structures, such as dams and sills, mostly after 1950. In several rivers throughout its range, dams have severely restricted sturgeon access to historic migration routes and spawning areas. Dredging and other navigation maintenance, possibly including lowering of river elevations and elimination of deep holes and altered rock substrates, may have adversely affected Gulf sturgeon habitats (Wooley and Crateau 1985). Contaminants, both agricultural and industrial, may also be a factor in their decline. Organochlorines have been documented in Gulf sturgeon at levels that may cause reproductive failure, reduced survival of young, or physiological alterations in other fish (White et al. 1983). To compound these anthropogenic impacts, the life history of the Gulf sturgeon complicates recovery efforts. Breeding populations take years to establish because of their advanced age at sexual maturity. In addition, Gulf sturgeon appear to be homestream spawners with little, if any, natural repopulation from migrants from other rivers.

New threats: Today, poor water quality due to pesticide runoff, heavy metals, and industrial contamination may be affecting sturgeon populations. Habitat loss continues to pose major threats to the recovery of the species.

E. Analysis of the species/critical habitat likely to be affected

NOAA Fisheries believes that the sperm whale, leatherback, green, hawksbill, Kemp=s ridley, and loggerhead sea turtles are present in the action area and are likely to be adversely affected by the proposed action, but no critical habitat for any species will be impacted. These species are known to occur in the action area and the likelihood of them being impacted by the activities in the action area is not discountable. The effects of petroleum industry-associated noise on sea turtles are little understood, but it may cause disturbance if not physical harm. NOAA Fisheries believes sperm whales may be vulnerable to adverse effects of acoustic harassment from seismic activities, construction and operation noise, or pollution resulting from activities associated with the proposed action. Injury or death from accidental vessel strikes or ingestion of debris are potential concerns as well.

IV. Environmental Baseline

This section contains an analysis of the effects of past and ongoing human and natural factors leading to the current status of the species, its habitat, and ecosystem, within the action area. The environmental baseline is a snapshot of a species= health at a specified point in time and includes state, tribal, local, and private actions already affecting the species, or that will occur contemporaneously with the consultation in progress. Unrelated Federal actions affecting the same species or critical habitat that have completed formal or informal consultation are also part of the environmental baseline, as are Federal and other actions within the action area that may benefit listed species or critical habitat.

The environmental baseline for this Opinion includes the effects of several activities that affect the survival and recovery of threatened and endangered species in the action area. The activities that shape the environmental baseline in the action area of this consultation are primarily fisheries and recovery activities associated with reducing fisheries impacts. Other environmental impacts include effects of discharges, dredging, military activities, and industrial cooling water intake.

A. Status of the species within the action area

Sperm whale

Sperm whales groups have been observed throughout the Gulf of Mexico from the upper continental slope near the 100 m isobath to the seaward extent of the U.S. Exclusive Economic Zone and beyond from sightings data collected from NOAA cruises from 1991 to 2000 (Roden and Mullin 2000, Baumgartner et al. 2001, Burks et al. 2001). NOAA Fisheries believes there are insufficient data to determine population trends for this species (Waring et al. 1999). There has been speculation, based on year-round occurrence of strandings, opportunistic sightings, and whaling catches, that sperm whales in the Gulf of Mexico may constitute a distinct stock (Schmidly 1981). Seasonal aerial surveys confirm that sperm whales are present in the northern Gulf of Mexico in all seasons, but sightings are more common during the summer months (Mullin et al. 1991, Davis et al. 2000).

The Gulf of Mexico sperm whale stock is estimated at 530 sperm whales, calculated from an average of estimates from 1991-1994 surveys (Waring et al. 2000). The minimum population estimate (Nmin), is 411 sperm whales (Waring et al. 2000). The estimate of N_{min} is calculated as the lower limit of the two-tailed 60% confidence interval of the log-normal distributed abundance estimate (or the equivalent of the 20th percentile of the log-normal distributed abundance estimate (Anon. 1994). N_{min} is a required component of the Potential Biological Removal level (PBR) calculation as required under the MMPA. The estimated PBR for the Gulf sperm whale stock is 0.8 sperm whales. PBR is an estimate of the number of animals which can be removed (in addition to natural mortality) annually from a marine mammal population or stock while maintaining that stock at the Optimum Sustainable Population level (OSP) or without causing the population or stock to slow its recovery to OSP by more than 10%. Stock size is considered to be low relative to OSP; there is no trend in population size discernable from estimates of abundance over time (Waring et al. 2000).

Sea Turtles

The five species of sea turtles that occur in the action area are all highly migratory. NOAA Fisheries believes that no individual members of any of the species are likely to be year-round residents of the action area. Individual animals will make migrations into nearshore waters as well as other areas of the North Atlantic Ocean, Gulf of Mexico, and the Caribbean Sea. Therefore, the range-wide status of the five species of sea turtles, given in Section II above, most accurately reflects the species= status within the action area. More detailed descriptions of the species in the action area are given below.

Leatherback sea turtle

The leatherback is the most abundant sea turtle in waters over the northern Gulf of Mexico continental slope (Mullin and Hoggard 2000). Leatherbacks appear to to spatially use both continental shelf and slope habitats in the Gulf (Fritts et al. 1983, Collard 1990, Davis and Fargion 1996). GulfCet I and Gu8lfCet II surveys suggest that the region from the Mississippi Canyon to DeSoto Canyon, especially near the shelf edge, appears to be an important habitat for leatherbacks (Mullin and Hoggard 2000). Temporal variability and abundance suggest that specific areas may be important to this species, either seasonally or for short periods of time. Leatherbacks have been sighted frequently during both summer and winter (Muliin and Hoggard 2000).

Green Sea Turtle

The florida breeding population of green sea turtle is listed an endangered. Green sea turtles are found throughout the Gulf of Mexico. They occur in small numbers over seagrass beds along the south of Texas and the Florida Gulf coast. Reports of green turtles nesting along the Gulf coast are infrequent.

Hawksbill sea turtle

Long-term trends in hawksbill nesting in Florida are unknown, although there are a few historical reports of nesting in south Florida and the Keys (True 1884, Audubon 1926, DeSola 1935). No trend in nesting in Florida is evident from 1979 to 2000; between 0 and 4 nests are recorded annually. The hawksbill has been recorded in all of the Gulf states. Nesting is extremely rare and one nest was documented at Padre Island in 1998 (Mays and Shaver 1998). Pelagic-size individuals and small juveniles are not uncommon and are believed to be animals dispersing from nesting beaches in the Yucatán Peninsula of Mexico and farther south in the Caribbean (Amos 1989). The majority of hawksbill sighting come from stranded animals. Strandings from 1972B1989 were concentrated at Port Aransas, Mustang Island, and near the headquarters of the Padre Island National Seashore (Amos 1989). Live hawksbills are sometimes seen along the jetties at Aransas Pass Inlet. Other live sightings include a 24.7-cm juvenile captured in a net at Mansfield Channel in May 1991 (Shaver 1994), and periodic sightings of immature animals in the Flower Gardens National Marine Sanctuary, particularly at Stetson Bank (E. Hickerson pers. comm.).

Kemp=s Ridley

The nearshore waters of the Gulf of Mexico are believed to provide important developmental habitat for juvenile Kemp's ridley and loggerhead sea turtles. Ogren (1988) suggests that the Gulf coast, from Port Aransas, Texas, through Cedar Key, Florida, represents the primary habitat for subadult ridleys in the northern Gulf of Mexico. Stomach contents of Kemp's ridleys along the lower Texas coast consisted of a predominance of nearshore crabs and mollusks, as well as fish, shrimp, and other foods considered to be shrimp fishery discards (Shaver 1991). Analyses of stomach contents from sea turtles stranded on upper Texas beaches apparently suggest similar nearshore foraging behavior (Plotkin pers. comm.).

Loggerhead sea turtle

Loggerhead nesting along the Gulf coast occurs primarily along the Florida Panhandle, although some nesting has been reported from Texas through Alabama as well (NMFS and USFWS 1991b). Loggerhead turtles have been primarily sighted in waters over the continental shelf, although many surface sightings of this species have also been made over the outer slope, beyond the 1,000 m isobath. Sightings of loggerheads in waters over the continental slope suggest that they may be in transit through these waters to distant foraging sites or while seeking warmer waters during the winter. Although loggerhead are widely distributed during both summer and winter, their abundance in surface waters over the slope was greater during winter than in summer (Mullin and Hoggard 2000).

Gulf Sturgeon

The historic range of the Gulf sturgeon included nine major rivers and several smaller rivers from the Mississippi River, Louisiana, to the Suwannee River, Florida, and in marine waters of the Central and Eastern Gulf of Mexico, south to Tampa Bay (Wooley and Crateau 1985, FWS et al. 1995). Five genetically-based stocks have been identified: (1) Lake Pontchartrain and Pearl River, (2) Pascagoula River, (3) Escambia and Yellow rivers, (4) Chactawhatchee River, and (5) Apalachicola, Ochlockonee, and Suwannee rivers (Wirgin et al., 1997). Mitochondrial DNA analyses of populations show that Gulf sturgeon return to natal river areas for feeding as well as spawning (Stabile et al. 1996), and genetic analysis of tissue samples concluded that Gulf sturgeon exhibit a strong natal river fidelity, with stocks exchanging less than one mature female per generation on the average (Waldman and Wirgin 1997).

Subadult and adult Gulf sturgeon spend cool months (October or November through March or April) in estuarine areas, bays, or in the Gulf of Mexico (Odenkirk 1989, Foster 1993, Clugston et al. 1995). Adult Gulf sturgeon are more likely to overwinter in the Gulf of Mexico. Habitats used by Gulf sturgeon in the vicinity of the Mississippi Sound barrier islands tend to have a sand substrate and an average depth of 1.9 to 5.9 m (6.2 to 19.4 ft). Estuary and bay unvegetated Amud≅ habitats having a preponderance of natural silts and clays supporting Gulf sturgeon prey and the Gulf sturgeon found in these areas are assumed to be utilizing these habitats for foraging.

Sulak and Clugston (1999) describe two hypotheses regarding where adult Gulf sturgeon may overwinter in the Gulf of Mexico to find abundant prey. The first hypothesis is that Gulf sturgeon spread along the coast in nearshore waters in depths less than 10 m (33 ft). The alternative hypothesis is that they migrate far offshore to the broad sedimentary plateau in deep water (40 to 100 m (131 to 328 ft)) west of the Florida Middle Grounds, where over twenty species of bottom-feeding fish congregate in the winter (Darnell and Kleypas 1987). Available data support the first hypothesis. Evaluation of tagging data has identified several nearshore Gulf of Mexico feeding migrations, but no offshore Gulf of Mexico feeding migrations. Telemetry data document
Gulf sturgeon from the Pearl River and Pascagoula River subpopulations migrate from their natal bay systems to Mississippi Sound and move along the barrier islands on both the barrier island passes (Ross et al. 2001a, Rogillio et al. in prep.). Gulf sturgeon from the Choctawhatchee River, Yellow River, and Apalachicola River have been documented migrating in the nearshore Gulf of Mexico waters between Pensacola and Apalachicola bay units (Fox et al. in press, F. Paruka pers. comm. 2002). Telemetry data from the Gulf of Mexico mainly show sturgeon in depths of 6 m (19.8 ft) or less (Ross et al. 2001a, Rogillio et al. in prep., Fox et al. in press, F. Paruka pers. comm. 2002).

The release of chemicals and other biological pollutants have been identified as Federal actions that, when carried out, funded, or authorized by a Federal agency, may destroy or adversely modify critical habitat for the Gulf sturgeon. The release of chemical or biological pollutants may alter water quality and sediment quality by affecting the following factors: temperature, salinity, pH, hardness, turbidity, oxygen content, and other chemical characteristics, such that it is appreciably impaired for normal Gulf sturgeon behavior, reproduction, growth, or viability.

B. Factors affecting species environment within the action area.

Federal Actions

In recent years, NOAA Fisheries has undertaken several ESA section 7 consultations to address the effects of federally-permitted fisheries and other Federal actions on threatened and endangered species. Each of those consultations sought to develop ways of reducing the probability of adverse effects of the action on sea turtles. Similarly, recovery actions undertaken under the ESA are addressing the problem of take of sea turtles in the fishing and shipping industries. The following summary of anticipated sources of incidental take of turtles includes only those Federal actions which have undergone formal section 7 consultation.
Potential adverse effects from Federal vessel operations in the action area and throughout the range of sea turtles include operations of the Navy (USN) and Coast Guard (USCG), the Environmental Protection Agency, the National Oceanic and Atmospheric Administration (NOAA), and the Army Corps of Engineers (COE). NOAA Fisheries has conducted formal consultations with the USCG, the USN, and NOAA on their vessel operations. Through the section 7 process, where applicable, NOAA Fisheries has and will continue to establish conservation measures for all these agency vessel

operations to avoid or minimize adverse effects to listed species. At the present time, however, they represent potential for some level of interaction.

In addition to vessel operations, other military activities including training exercises and ordnance detonation also affect sea turtles. Consultations on individual activities have been completed, but no formal consultation on overall USCG or USN activities in any region has been completed at this time.

The construction and maintenance of Federal navigation channels has also been identified as a source of turtle mortality. Hopper dredges move relatively rapidly (compared to sea turtle swimming speeds) and can entrain and kill sea turtles, presumably as the drag arm of the moving dredge overtakes the slower moving turtle. A regional biological opinion (RBO) with the COE has been completed for the southeast Atlantic waters and the Gulf of Mexico. Consultation on a new RBO for the COE=s Gulf of Mexico hopper dredging operations is currently underway.

The COE and MMS (the latter is non-military) oil and gas exploration, well development, production, and abandonment/rig removal activities also adversely affect sea turtles. Both of these agencies have consulted with NOAA Fisheries on these types of activities.

Adverse effects on threatened and endangered species from several types of fishing gear occur in the action area. Efforts to reduce the adverse effects of commercial fisheries are addressed through the ESA section 7 process. Gillnet, longline, trawl gear, and pot fisheries have all been documented as interacting with sea turtles. For all fisheries for which there is a Federal fishery management plan (FMP) or for which any Federal action is taken to manage that fishery, impacts have been evaluated under section 7. Several formal consultations have been conducted on the following fisheries that NOAA Fisheries has determined are likely to adversely affect threatened and endangered species: American lobster, monkfish, dogfish, southeastern shrimp trawl fishery, northeast multispecies, Atlantic pelagic swordfish/tuna/shark, and summer flounder/scup/black sea bass fisheries.

On June 14, 2001, NOAA Fisheries issued a jeopardy opinion for the Highly Migratory Species (HMS) fisheries off the eastern United States. The HMS Opinion found that the continued prosecution of the pelagic longline fishery in the manner described in the HMS FMP was likely to jeopardize the continued existence of loggerhead and leatherback sea turtles. This determination was made by analyzing the effects of the fishery on sea turtles in conjunction with the environmental baseline and cumulative effects. The environmental baseline section of the HMS opinion is incorporated herein by reference (and can be found at the following website:

http://www.nmfs.noaa.gov/prot_res/readingrm/ESAsec7/HMS060801final.pdf

The environmental baseline for the June 14, 2001, HMS Opinion also considered the impacts from the North Carolina offshore spring monkfish gillnet fishery and the inshore fall southern flounder gillnet fishery, both of which were responsible for large numbers of sea turtle mortalities in 1999 and 2000, especially loggerhead sea turtles. However, during the 2001 season NOAA Fisheries implemented an observer program that observed 100% of the effort in the monkfish fishery, and then in 2002 a rule was enacted creating a seasonal monkfish gillnet closure along the Atlantic coast based upon sea surface temperature data and turtle migration patterns. In 2001 NOAA Fisheries also issued an ESA section 10 permit with mitigative measures for the southern flounder fishery. Subsequently, the sea turtle mortalities in these fisheries were drastically reduced. The reduction of turtle mortalities in these fisheries reduces the negative effects these fisheries have on the environmental baseline.

NOAA Fisheries has implemented a reasonable and prudent alternative (RPA) in the HMS fishery which would allow the continuation of the pelagic longline fishery without jeopardizing the continued existence of loggerhead and leatherback sea turtles. The provisions of this RPA include the closure of the Grand Banks region off the northeast United States and gear restrictions that are expected to reduce the bycatch of loggerheads by as much as 76% and leatherbacks by as much as 65%. Further, NOAA Fisheries is implementing a major research project to develop measures aimed at further reducing longline bycatch. The implementation of this RPA reduces the negative effects that the HMS fishery has on the environmental baseline. The conclusions of the June 14, 2001, HMS Opinion and the subsequent implementation of the RPA are hereby incorporated into the environmental baseline section of this Opinion.

Another action with Federal oversight which has impacts on sea turtles is the operation of electrical generating plants. Sea turtles entering coastal or inshore areas have been affected by entrainment in the cooling-water systems of electrical generating plants. Biological opinions have already been written for a number of electrical generating plants, and others are currently undergoing section 7 consultation.

Many section 7 consultations for Federal actions affecting the Gulf sturgeon and its habitat have been undertaken with the COE, other Department of Defense (DOD) agencies, the U.S.C.G., the National Park Service, the Federal Highway Administration, the MMS, the Federal Energy Regulatory Commission, and others. Since listing, NOAA Fisheries has conducted 70 informal and four formal consultations involving Gulf sturgeon. The informal consultations, all of which concluded with a finding that the Federal action would not affect or would not likely adversely affect the Gulf sturgeon, addressed a wide range of actions including navigation, beach nourishment, Gulf of Mexico fishery management planning, oil and gas leases, power plants, bridges, pipelines, breakwaters, rip-rap, levees and other flood-protection structures, piers, bulkheads, jetties, military actions, and in-stream gravel mining. The formal consultations, which followed a finding that the Federal action may affect Gulf sturgeon, have dealt exclusively with navigation projects, oil and gas leases, pipelines, review of water quality standards, and disaster recovery activities, and have resulted in biological opinions. Also, the Gulf sturgeon was addressed in several biological opinions that were triggered by may-affect determinations for other listed species. To date, none of the Services' opinions has concluded that a proposed Federal action would jeopardize the continued existence of the Gulf sturgeon.

Previous biological opinions for the Gulf sturgeon have included discretionary conservation recommendations to the action agency. Previous biological opinions for the Gulf sturgeon also have included non-discretionary reasonable and prudent measures, with implementing terms and conditions, which are designed to minimize the proposed action's incidental take of Gulf sturgeon. The conservation recommendations and reasonable and prudent measures provided in previous Gulf sturgeon biological opinions have included enforcement of marine debris and trash regulations; avoidance of dredging and disposal in deeper portions of the channel; monitoring and reporting of Atake≅ events during project construction; operation of equipment so as to avoid or minimize take; monitoring of post-project habitat conditions; monitoring of project-area Gulf sturgeon subpopulations; limiting of dredging to the minimum dimensions necessary; limiting of the depth of dredged material placed in disposal areas; arrangement of the sequence of areas for dredging to minimize potential harm; screening of intake structures; avoidance of riverine dredging during spawning months; limiting of tow times of trawl nets for hurricane debris cleanup; addition of specific measures for species protection to oil spill contingency plans; and funding of research useful for Gulf sturgeon conservation. All formal consultations concluded Ano jeopardy≅ for the Gulf sturgeon.

State or Private Actions

Commercial traffic and recreational pursuits can have an adverse effect on sea turtles through propeller and boat strike damage. Private vessels participate in high speed marine events concentrated in the southeastern United States and are a particular threat to sea turtles, and occasionally to marine mammals as well. The magnitude of these marine events is not currently known. NOAA Fisheries and the USCG are in early consultation on these events, but a thorough analysis has not been completed.

Various fishing methods used in state fisheries, including trawling, pot fisheries, fly nets, and gillnets are known to cause interactions with sea turtles. Georgia and South Carolina prohibit gillnets for all but the shad fishery. Florida has banned all but very small nets in state waters, as has Texas. Louisiana, Mississippi, and Alabama have also placed restrictions on gillnet fisheries within state waters such that very little commercial gillnetting takes place in southeast waters, with the exception of North Carolina. Most pot fisheries in the Southeast are prosecuted in areas frequented by sea turtles.

Strandings in the North Carolina area represent, at best, 7%-13% of the actual nearshore mortality (EWG et al. 1996). Studies by Bass et al. (1998), Norrgard (1995), and Rankin-Baransky (1997) indicate that the percentage of northern loggerheads in this area is highly over-represented in the strandings when compared to the approximately 9% representation from this subpopulation in the overall U.S. sea turtle nesting populations. Specifically, the genetic composition of sea turtles in this area is 25%-54% from the northern subpopulation, 46%-64% from the South Florida subpopulation, and 3%-16% from the Yucatán subpopulation. The cumulative removal of these turtles on an annual basis would severely impact the recovery of this species.

Other Potential Sources of Impacts in the Environmental Baseline

A number of activities that may indirectly affect listed species include discharges from wastewater systems, dredging, ocean dumping and disposal, and aquaculture. The impacts from these activities are difficult to measure. Where possible, however, conservation actions are being implemented to monitor or study impacts from these elusive sources.

NOAA Fisheries and the USN have been working cooperatively to establish a policy for monitoring and managing acoustic impacts from anthropogenic sound sources in the marine environment. Acoustic impacts can include temporary or permanent injury, habitat exclusion, habituation, and disruption of other normal behavior patterns.

Conservation and Recovery Actions Shaping the Environmental Baseline

NOAA Fisheries implemented a series of regulations aimed at reducing potential for incidental mortality of sea turtles in commercial fisheries. In particular, NOAA Fisheries has required the use of TEDs in southeast U.S. shrimp trawls since 1989 and in summer flounder trawls in the mid-Atlantic area (south of Cape Charles, Virginia) since 1992. It has been estimated that TEDs exclude 97% of the turtles caught in such trawls. These regulations have been refined over the years to ensure that TED effectiveness is maximized through proper placement and installation, configuration (e.g., width of bar spacing), floatation, and more widespread use. Recent analyses by Epperly and Teas (1999) indicate that the minimum requirements for the escape opening dimensions are too small, and that as many as 47% of the loggerheads stranding annually along the Atlantic seaboard and Gulf of Mexico were too large to fit through existing openings. On October 2, 2001, NOAA Fisheries published a proposed rule to require larger escape openings in TEDs and is planning to publish a final rule in 2002.

In 1993 (with a final rule implemented 1995), NOAA Fisheries established a Leatherback Conservation Zone to restrict shrimp trawl activities from the coast of Cape Canaveral, Florida, to the North Carolina/Virginia border. This provides for short-term closures when high concentrations of normally pelagic-distributed leatherbacks are recorded in more coastal waters where the shrimp fleet operates. This measure is necessary because, due to their size, adult leatherbacks are larger than the escape openings of most NOAA Fisheries-approved TEDs.
NOAA Fisheries is also working to develop a TED which can be effectively used in a type of trawl known as a fly net, which is sometimes used in the mid-Atlantic and northeast fisheries to target sciaenids and bluefish. Limited observer data indicate that takes can be quite high in this fishery. A prototype design has been developed, but testing under commercial conditions is still necessary.

In addition, NOAA Fisheries has been active in public outreach efforts to educate fishermen regarding sea turtle handling and resuscitation techniques. As well as making this information widely available to all fishermen, NOAA Fisheries recently conducted a number of workshops with longline fishermen to discuss bycatch issues including protected species, and to educate them regarding handling and release guidelines. NOAA Fisheries intends to continue these outreach efforts and hopes to reach all fishermen participating in the pelagic longline fishery over the next one to two years. There is also an extensive network of Sea Turtle Stranding and Salvage Network participants along the Atlantic and Gulf of Mexico which not only collects data on dead sea turtles, but also rescues and rehabilitates any live stranded turtles.

V. Effects of the Action

Despite the many regulations implemented to reduce the likelihood of environmental impacts of OCS oil and gas development activities, these activities may have numerous direct and indirect effects on listed and protected species in the Gulf of Mexico. These effects are described in detail in the draft environmental impact statements prepared by MMS for this proposed action.

The projects or results of actions undertaken as part of the proposed action that may have adverse impacts on listed species are:

- noise from exploration, construction, and production activities;
- well, pipeline, and platform construction;
- vessel traffic;
- brightly-lit platforms;
- OCS-related trash and debris; and
- contaminants.

Noise

Oil and gas exploration, development and production activities contribute numerous sources of additional noise into Gulf of Mexico waters. These increases in noise are expected to affect sea turtles and sperm whales.

Seismic surveys

Based on the best scientific information currently available, sperm whales are clearly aware of their acoustical environment and can exhibit behavioral reactions including cessation of vocalizations and locomotive avoidance. Because they spend large amounts of time at depth and use low frequency sound, sperm whales are likely to be vulnerable to the effects of low frequency sound in the ocean (Croll et al. 1999). Even though sperm whales are abundant on a world-wide scale (Reeves and Whitehead 1997), because their potential rate of reproduction is so low and because those found in the Gulf of Mexico are believed to be a small (Nmin= 411) resident stock, even small negative impacts of noise resulting from activities associated with the proposed action could cause population declines. NOAA Fisheries believes that with the available data, any behavioral responses causing adverse effects to sperm whales due to noise associated with development and operation will be short-term and unlikely to result in non-lethal biological effects. However, sperm whales in the vicinity of seismic surveys are likely to be harassed by the frequency and intensity levels associated with these activities that would result in disruption of their natural behaviors including vocalization and avoidance of the sound source.

During GulfCet I and II surveys seismic exploration signals were detected 10% and 21% of the time respectively. There has been a sharp increase in seismic exploration in the last several years. The OCS Deep Water Royalty Relief Act (DWRRA*)* provides economic incentives for operators to develop fields in water depths greater than 200 m. Leases resulting from a sale held after year 2000 may be issued with an automatic royalty suspension volume on a "lease" basis. Immediately after the DWRRA was enacted, deepwater leasing activity exploded. There are about 3,500 active leases in water depths less than 1,000 ft, about 160 active leases in 1,000-1,499 ft water depth, about 1,620 active leases in 1,500-4,999 ft water depth, about 1,320 active leases in 5,000-7,499 ft water depth, and about 820 active leases in water depths of 7,500 ft and greater.

The effects of seismic surveys on cetaceans are well documented and appear to show the second most dramatic response of all types of noise pollution for any species considered, after military sonar (Roussel 2002). Airguns are towed 5-10 m below the surface of the water and release the compressed air regularly every several seconds followed by 5-15 second silent periods. Twelve to 70 airguns may be towed to study deep water structures. The peak levels of sound pulses produced by the airgun arrays are well above ambient and vessel sound levels, but short pulses limit the total energy released. The sound from the seismic sources is directed downward; however, some horizontal propagation that can be detected many kilometers away will occur (Malme et al. 1983). Depending on the type of seismic survey operation and type of air guns used, survey operations produce between 225 to 240 dB re 1 ΦPa at 1 m. McCauley (1994) reported that, dependent on the sound propagation characteristics if the area, intensity only decreases to 180 dB at 1 km and to approximately 150 dB within 10 km of the source.

Sperm whales spend a large amount of time below the surface while feeding. The sperm whale dive takes then down to a depth where they could be passed over by operating seismic vessels without visual detection. As airgun arrays are generally configured to produce a maximum, low frequency energy lobe directly downwards toward the seabed, sperm whales may enter a region of increased ensonification relative to more near-surface species. Richardson et al. (1995) hypothesized that marine mammals would have to be well within 100 m of an airgun array to be susceptible to immediate hearing damage, but may be exposed to levels of 180 dB from air guns at distances of 1000 m (1 km)(McCauley 1994). Presently, NOAA Fisheries recommends a precautionary 180 dB safety zone for protecting marine mammals. The spherical spreading model proposed by Richardson et al. (1995) predicts a 1 km radius surrounding an air gun array typically operating at an intensity of 240 dB re 1 ΦPa. Although auditory damage is not expected to occur during seismic surveys, the possibility of temporary or permanent threshold impairment exists. Adverse effects to behavior may also theoretically occur at these dB levels.

Seismic exploration signals were encountered frequently during GulfCet cruises to determine marine mammal distribution and abundance in the Gulf. Most signals were of a relatively standard form, with the main energy of the pulse between 100-900 Hz, with one or two echoes, typically below 100 Hz. On a number of occasions, signals broadcast from seismic survey vessels were received. This included a loud seismic shock centered at 2.5 kHz, with little energy below 1 kHz. This first pulse has the same frequency content of a sperm whale. Reportedly, higher frequency systems centered between 25-45 kHz are now in use.

During surveys conducted to locate and tag sperm whales in the Gulf of Mexico, sperm whales sighted over a few days in a particular area began to leave when seismic activities occurred (Mate 1994), suggesting that sperm whales may be harassed by seismic surveys, but would possibly remove themselves from harmful exposure to airgun pulses. NOAA Fisheries agrees that the best available information suggests that, while the effects of the noise produced by seismic surveys is believed to be sublethal, sea turtles and marine mammals, including listed sperm whales, may have short-term startle or avoidance responses. Additionally, if exposure to such noise is prolonged, sperm whales could be temporarily displaced from areas of biological importance to them. Sperm whales have been observed in the action area, although concentrations have been observed off the Mississippi delta region in the Gulf. Recent studies sponsored by MMS and conducted jointly by researchers from NOAA Fisheries, and academic institutions, have indicated that this area should be considered as critical habitat for sperm whales (R. Davis pers. comm.), as it is the only known breeding and calving area in the Gulf, for what is believed to be an endemic population.

Auditory masking

Significant auditory interference, or masking, only occurs for frequencies similar to those of the masking noise. The maximum radius of influence of an introduced sound on marine mammals is the distance from the source at which the noise can barely be heard. This range is determined by either the hearing sensitivity of the animal, and/or the background noise level (Richardson et al. 1995). For example, communication signals in beluga are subject to masking by low frequency noises of icebreakers (Erbe 2000).

Masking for sperm whales could affect communication between individuals, ability to receive information from their environment, or echolocation effectiveness. Sperm whale clicks can range to below 100 Hz, but most of the energy is concentrated at 2-4 kHz and 10-16 kHz, within the range of seismic activities recorded in the Gulf.
As with other marine mammals, odontocetes exhibit disturbance reactions such as cessation of resting, feeding, or social interactions and/or changes in surfacing, respiration, or diving cycles, and avoidance behavior in response to certain frequencies in the hearing range of the animal and to sound intensity. Sperm whales, however, may react to sounds at low frequencies because they can hear at low frequencies, and have been known to react to received levels of 100 dB at 3.5 kHz generated by submarine sonar (Watkins et al. 1993).

Seismic effects on prey

Squid have showed a strong startle response to a nearby air-gun starting up by firing their ink sacs and/or jetting directly away from the air-gun source at a received level of 174 dB re 1 mPa mean squared pressure (McCauley et al. 2000). Throughout this study the squid (*Sepioteuthis australis*) showed avoidance of the air-gun by keeping close to the water surface in an experimental cage at a location furthest from the air-gun. During two trials with squid and using a ramped approach air-gun signal (rather than a sudden nearby startup), a startle response was not seen but a noticeable increase in alarm responses were seen once the air-gun level exceeded 156- 161 dB re 1 mPa mean squared pressure. Although startle response were not as consistent during the ramp-up trials, there was a general trend for the squid to increase their swimming speed on approach of the air-gun but then to slow at the closest approach and for them to remain close to the water surface during the air-gun operations. Squid appeared to make use of the sound shadow measured near the water surface. Persistent alarm responses in the form of squid jetting away from the air-gun source and corresponding with an air-gun shot were observed. It was demonstrated that as the air-gun threshold increased, so did the relative proportion of startle responses recorded, and that this type of response was consistent between trials.

The response of squid to air-gun signals has not been reported in the literature before. They are a major main prey item of sperm whales in the Gulf of Mexico. McCauley et al. (2000) showed that it is probable that seismic operations will impact squid at thresholds at 161-166 dB re 1 mPa mean squared pressure and may affect behavior at lower levels. Seismic activities in the Gulf operate at dB levels much greater than those shown to alarm squid in the McCauley study and are likely to reduce the numbers and distribution of squid in the vicinity of seismic operations within the 161dB isopleth surrounding an air-gun array.

Sea turtles

Bone-conducted hearing appears to be a reception mechanism for at least some sea turtle species, with the skull and shell acting as receiving structures (Lenhardt et al. 1983). Captive loggerhead and Kemp's ridley turtles exposed to brief, audio-frequency vibrations initially showed startle responses of slight head retraction and limb extension (Lenhardt et al. 1983). Sound-induced swimming has been observed for captive loggerheads (O'Hara and Wilcox 1990, Moein et al. 1993, Lenhardt 1994); some loggerheads exposed to low-frequency sounds responded by swimming towards the surface at the onset of the sound, presumably to lessen the effects of the transmissions (Lenhardt 1994). McCauley et al. (2000) reported that sea turtles show avoidance to 3D air-gun arrays at 2 km and avoidance at 1 km (165 dB re 1 ΦPa and 175 db re 1 Φpa respectively). The authors cautioned that these observations are variable and thus far, are based on few observations. An anecdotal observation of a free-ranging leatherback's response to the sound of a boat motor suggests that leatherbacks may be sensitive to low-frequency sounds, but the response could have been to mid- or high-frequency components of the sound (Advanced Research Projects Agency 1995). Based on the above, NOAA Fisheries believes it is reasonable to assume that sea turtles will detect noise associated with these activities and experience some temporary, adverse effects. NOAA Fisheries also believes that of any these biological effects will be minor, and not likely to appreciably reduce the reproduction, numbers, or distribution of sea turtles in the wild.

Gulf sturgeon

McCauley et al. (2000) reported that a general response to fishes exposed to air gun levels greater than 156-161 dB re 1 Φpa was to swim to the bottom, but that no physiological stress could be attributed to the air gun startle responses. There have not been any studies to date on the affects of noise of Gulf sturgeon, known Gulf sturgeon habitat is not located in the WPA, and it is unlikely that any sturgeon will be exposed to seismic activity associated with mineral exploration in the WPA of the Gulf of Mexico.

Habituation and sensitization

In addition to disturbance, habituation and sensitization also are important when discussing the potential reactions of whales to a noise stimulus. Habituation refers to the condition in which repeated experiences with a stimulus that has no important consequence for the animal leads to a gradual decrease in response. Sensitization refers to the situation in which the animal shows an increased behavioral response over time, to a stimulus associated with something that has an important consequence for the animal. Richardson et al. (1990) provided an example of bowheads becoming habituated to the noises from dredging and drilling operations. Conversely, Richardson et al. (1995) cited Walker (1949) as reporting that the responses of gray whale mother and calf pairs to a hovering helicopter seemed to increase the more the helicopter herded the mother and calf pairs into shallow water.

There have been relatively few studies of habituation in marine mammals. In toothed whales, one apparent example of habituation is the tolerance by white whales of the many boats that occur in certain estuaries versus the extreme sensitivity of this species to the first icebreaker approach of the year in a remote area of the high Arctic. Also, in certain areas, wild dolphins have become unusually tolerant of humans, and may even actively approach them (Lockyer 1978, Conner and Smolker 1985, Shane et al. 1986).

In general, there is a tendency for the level of response to human-made noises to scale with the level of variability and unpredictability in the sound source. Animals may show little to no response to a noise source with a relatively constant intensity level and constant frequency spectrum (e.g., a humming generator or operational drilling platform) but will react to a noise source that is rapidly changing in intensity or in frequency content (e.g., an exploration drilling platform, ice breaking activity). Of course, when whales are presented with very loud noises they will likely react regardless of whether they are intermittent or continuous.

Drilling and oil platform activities

The noises from operating platforms and drillships could produce sounds at intensities and frequencies that could be heard by turtles and sperm whales. Bowhead whales (*Balaena mysticetus*) avoid drillship noise with broad-band (20-1,000 Hz) received levels around 115 dB. Studies have also shown that bowhead whales (Schick and Urban 2000) and Gray whales (Malme et al. 1983) may temporarily lose habitat from the presence of drill ship noise. There is some evidence suggesting that turtles may be able to hear low-frequency sounds, which is where most industrial noise energy is concentrated. Sea turtle hearing sensitivity is not well studied. A few preliminary investigations using adult green, loggerhead, and Kemp's ridley turtles suggest that they are most sensitive to low-frequency sounds (Ridgway et al. 1969, Lenhardt et al. 1983). It has been suggested that sea turtles use acoustic signals from their environment as guideposts during migration and as a cue to identify their natal beaches (Lenhardt et al. 1983). Based on conclusions of Lenhardt et al. (1983) and O'Hara and Wilcox (1990), low-frequency sound transmissions could potentially cause increased surfacing behavior and deterrence from the area near the sound source. The potential for increased surfacing behavior could place turtles at greater risk of vessel collisions and potentially greater vulnerability to natural predators.

The potential direct and indirect impacts of sound on sperm whales includes physical auditory effects (temporary threshold shift), behavioral disruption, displacement from important habitat, and adverse impacts on the food chain. Based on the above information, NMFS believes that the low frequency noise created by drilling activities may also be detected by sperm whales and some harassment resulting in biological effects is possible. Because of the biological importance of the action area to Gulf sperm whales, any short- or long-term effects which appreciably reduce their reproduction, numbers, or distribution in the action area would be biologically significant to this apparently resident population.

Noise and disturbance associated with vessel and helicopter traffic

MMS reported that transportation corridors for sea going vessels would be through areas where loggerhead turtles have been sighted (these vessels would transit at a speed from about 8-12 knots or less during actual construction on-site). Helicopter activity will also increase as a result of the proposed action. Since noise from service-vessel traffic and helicopter overflights may elicit a startle reaction from sea turtles and sperm whales there is the possibility of short-term disruption of movement patterns and behavior. Sounds from approaching aircraft are detected in air far longer than in water. For example, an approaching Bell 214ST helicopter became audible in air over four minutes before passing overhead, while it was detected underwater for only 38 seconds at 3 m depth and 11 seconds at 18 m (Greene 1985). Gulf sturgeon are not expected to be impacted by noise associated with aircraft and vessel traffic associated with oil and gas activities in the WPA (see vessel traffic below).

Construction activities

Structure installation and pipeline placement can cause localized water quality degradation because of disturbed sediments which can impact wetlands, seagrass beds and live-bottom sea turtle habitats; however, these impacts are expected to be temporary. The temporary loss of seagrass and high-salinity marsh would affect sea turtles indirectly by temporarily reducing the availability of forage species that rely on these sensitive habitats. Because of the temporary nature of these disturbances, little or no long-term damage is expected to the physical integrity, species diversity, or biological productivity of live-bottom sea turtle and Gulf sturgeon habitat, sea grasses, and wetlands as a result of the proposed action. Noises associated with structure installation and pipeline placement activities are likely to be detected by all listed species, and they may temporarily avoid swimming through noisy areas, especially if the noises are highly variable and unpredictable. Since these disturbances would be temporary and the biological effects likely to be minor, NOAA Fisheries believes that it is reasonable to assume that any behavioral responses which may result from the detection of noises associated with structure installation and pipeline placement activities are not likely to result in a biological effect which would adversely affect any listed species. Pipeline placement for the WPA will make landfall on the Texas shoreline and these construction activities associated with the WPA will not affect Gulf sturgeon habitat.

Vessel traffic

Increased ship traffic could increase the probability of collisions between ships and sperm whales or turtles, resulting in injury or death to some animals. During 1996, there were 76,241 vessel trips recorded for the Panama City to New Orleans portion of the Gulf Intercoastal Waterway (GIWW), and 60,543 vessel trips originating or ending in the harbors of Pensacola, Mobile, and Pascagoula (U.S. Dept. of the Army, COE 1996). Although sperm whales are only rarely known to be struck by vessels, and their large size should make them easily detectable by an onboard observer, other large whales such as humpback and right whales (which generally are not present in the Gulf) have been struck by non-OCS vessels outside the proposed action area. Given the existing level of OCS-related vessel traffic in the Gulf, the absence of any reported collisions with sperm whales in the Gulf, the rapid and powerful swimming capabilities of this species, their habit of spending little time at the surface, and the expectation that an onboard observer would spot a sperm whale and avoid a collision, it is not probable that sperm whales will be struck by an OCS-related vessel.

As stated above, increased ship traffic could increase the probability of collisions between ships and sea turtles. Although there have been thousands of vessel trips that have been made in support of offshore operations during the past 40 years of OCS oil and gas operations, there have been no observations or reports of OCS-related vessels having struck sea turtles. However, collisions with small and/or submerging turtles may go undetected, even with an observer onboard is probably highly variable, and especially in adverse weather. An unquantifiable number of sea turtles could be killed or injured by collisions with oil and gas service vessels (Lease Sale 184 Environmental Assessment).

Experience and observations during marine research on boats and ships that travel much faster than those that will support the proposed action show that floating turtles do successfully dive and avoid injury on approach by motorized vessels (Gitschlag pers. comm. 2000). However, vessel-related injuries do occur and were noted in 13% of stranded turtles examined from strandings in the GOM and on the Atlantic coast during 1993 (Teas 1994), but this figure includes those that may have been struck by boats post-mortem. In Florida, where coastal boating is popular, the frequency of boat injuries between 1991 and 1993 was 18% of strandings (Lutcavage et al. 1997). Based on the above, NOAA Fisheries believes that the proposed increase in ship traffic is not likely to result in a ship strike of a sperm whale; however, due to their smaller size, it is reasonable to assume that one turtle may be accidentally injured or killed by collision with a project related vessel over the projected 30-years of operations resulting from the proposed lease sale.

Vessel traffic associated with service and transport, and the risk of oil and chemical spills associated with oil and gas activities have the potential to effect Gulf sturgeon and the habitat of this species. Approximately 40-150 vessel trips per month would occur as a result of a WPA proposed action. Because of the location of the deepwater portion of the WPA, service bases usage may be split between the deepwater ports of Texas (Freeport, Galveston, and Sabine Pass) and Louisiana (Lake Charles, Berwick, Port Fourchon, and Venice). This would result in 5-20 vessel trips/month going to Louisiana's deepwater ports and 5-20 vessel trips/month going to Texas's deepwater ports as a result of a proposed action (WPA 180 EIS, 1998). A vessel trip is defined as a round trip between service bases, including all transport between these destinations. About three quarters of the service vessel trips are projected for shallow water (< 200 m) and one quarter of the service vessel trips are projected for deepwater 200 m (Childs pers. comm. 2002).

The following service bases were identified most frequently in plans submitted for activities in the Western Planning Area:

-Cameron, Louisiana
-Freeport, Texas (deepwater)
-Galveston, Texas (deepwater)
-Port O'Conner, Texas
-Sabine Pass, Texas (deepwater)

It is projected that the majority of service vessel trips as a result of a proposed action will be to the service bases listed above. The WPA EIS (1998) identified the following service bases in Louisiana, Mississippi, and Alabama that could service the deepwater portions of the WPA:

-Lake Charles, Louisiana
-Berwick, Louisiana
-Port Fourchon, Louisiana
-Venice, Louisiana
-Pascagoula, Mississippi
-Theodore and Mobile, Alabama

However Venice is the easternmost service base identified in any WPA exploration or development plans received so far. It is unlikely that a proposed action will result in any trips east of the Mississippi River that would affect any proposed critical habitat of the Gulf sturgeon.

Brightly-lit platforms

Brightly-lit, offshore drilling platforms present a potential danger to sea turtle hatchlings (Owens 1983). Hatchlings are known to be attracted to light (Raymond 1984, Witherington and Martin 1996, Witherington 1997) and could be expected to orient toward lighted offshore platforms if they are close to shore (Chan and Liew 1988). If this occurs, hatchling predation would increase dramatically since large birds and predacious fish also congregate around the platforms (Owens 1983, Witherington and Martin 1996). Hatchlings may rely less on light cues offshore (Salmon and Wyneken, 1990); however, it is not known whether lights on platforms located further offshore attract them. Furthermore, attraction to offshore locations would be less problematic than attraction to landside locations, as the issue is to ensure that hatchlings head to sea rather than remaining onshore where they are subject to a variety of mortality sources including auto traffic and starvation. While some adverse effects may occur, NOAA Fisheries believes it is unlikely that they will appreciably reduce the reproduction, numbers, or distribution of sea turtles in the wild.

OCS-related trash and debris

Debris ingestion is an ongoing threat to sea turtles and marine mammals. Oil and gas operations on the OCS generate waste materials made of paper, plastic, wood, glass, and metal. Some personal items, such as hard hats and personal flotation devices, are accidentally lost overboard from time to time. The oil and gas industry is subject to regulations prohibiting the disposal of trash into the marine environment, although it is expected that items may go overboard accidentally.

Sperm whales are known to ingest foreign objects, and it has been speculated that they may at times feed near the ocean bottom with open mouth, ingesting many of the items they encounter (Würsig et al. 2000). Sperm whales may encounter pipelines associated with oil and gas production. A sperm whale was found entangled in a deep sea cable (Rice 1989). Laist (1996) summarized literature citing incidents of marine debris in cetaceans, and lists various types of fisheries gear, ropes, mylar balloons, cups, and newspapers as having been found in digestive tracts of stranded sperm whales. The NOAA Fisheries Southeast Region=s stranding records include a juvenile sperm whale which stranded off Hatteras, North Carolina in 1999. Its esophagus and stomach chambers were blocked with unidentified plastic, rope, plastic bags, and a small inflatable raft.

NOAA Fisheries believes that the amount of marine debris generated as a result of the proposed action is likely to be insignificant and is not likely to result in injury or death of sperm whales, or sea turtles, and Gulf sturgeon, and no documented cases of sperm whales becoming entangled in pipelines have been documented.

Sea turtle ingestion of marine debris is discussed in the Athreats to sea turtles≅ subheading in section IV. There have not been any documented cases of Gulf sturgeon entangled in marine debris, or ingestion of flotsam associated with the proposed action.

Petroleum and chemical effects

The discharge of oil is not authorized for exploration and production of oil resources; however, natural seeps from the ocean floor and accidental spills do routinely occur. Produced waters, drill muds, and drill cuttings are routinely discharged into offshore marine waters and are regulated by the U.S. Environmental Protection Agency=s and National Pollutant and Discharge Elimination System=s permits. Most of the routinely discharged chemicals are diluted and dispersed when released in offshore areas and are not expected to directly effect any listed species, but may indirectly affect species through bioaccumulation of trace metals. Accidental or intentional discharges of oil or chemicals have the potential to be released in large volumes that may have deleterious short-term affects (hours to days) within the immediate marine environment. The severity of the effects of an oil spill on listed species is obviously related to the location of the spill, the type of oil, the level of contact with the oil that the whales, turtles or fish have, and the life stage of the animal encountering the oil. Chemical spills may accidentally occur from a wide variety of exploration and production activities (see Boehm et al. 2001 for a detailed description of chemicals used in deepwater oil and gas operations) and may have adverse effects on habitats and species. There is a medium risk of probability (on a scale of low to high) that an oil or chemical spill will deleteriously effect a protected species (Boesch et al. 1987, Boehm et al. 2001).

There has not been a clear pattern of increases or decreases in the occurrence of oil spills or solid chemical spills over the past decade. However, there has been a steady increase in the number of liquid chemical spills occurring between 1990-1998. A total of 32 accidental spills (65,577 gal) occurred in 1998 accounting for 26.7% of the total number of spill incidents in U.S. waters for that year. Boehm et al. (2001) suggested that the increase in liquid chemical spills may not be directly correlated to an increase in operations, but rather, in part reflected an improvement in reporting practices by offshore operators and chemical supply companies suggesting that many spill events may still remain unreported. Oil spills can happen from a large variety of sources, including drilling rigs, drillships, tankers, barges, other vessels, pipelines, storage tanks and facilities, production wells, trucks, railcars, and other sources. A total of 500-1,600 bbl of oil is estimated to occur from spills <1,000 bbl as a result of the proposed action in the WPA. The chance of one spill occurring in the WPA between 500 and 1,000 bbl is 6%-12% and it is estimated that 1 spill >1000 bbl will occur in the WPA as part of the proposed action.

Direct contact with oil can result in irritation and damage to skin and soft tissues of whales and dolphins, and similar effects to sea turtles. Dolphins exposed to petroleum products exhibited reduced food intake, modifications in respiration and gas metabolism, and depressed nervous functions (Lukina et al.

1996 as cited in MMS 1997). Inhalation of toxic vapors released by fresh crude oil spills and other volatile distillates may irritate respiratory membranes, congest lungs and cause pneumonia. Hydrocarbons absorbed in the blood stream may accumulate in the brain and liver and result in neurological disorders. Trained dolphins could detect, and appeared to avoid, dark oil slicks. However, bottlenose dolphins did not consistently avoid entering slick oil during the Mega Borg oil spill (Smultea and Würsig 1991, 1995).

The DEIS prepared for the proposed action (MMS 2000) recounts numerous studies of the effects of oil on sea turtles. Eggs, hatchlings and juvenile turtles are the most vulnerable to mortalities associated with oil spills. Fresh oil was found to be toxic to sea turtle nests, particularly during the last quarter of the incubation period (Fritts and McGehee 1982 in MMS 2000). Based on direct observations, all of the major systems in sea turtles are adversely affected by short exposure to weathered oil (Vargo et al. 1986, Lutz and Lutcavage 1989). The long-term effects and the effects of chronic exposure are unknown. Oil adheres to the body surface of sea turtles, and has been observed on eyes, nares, mouth, and upper esophagus. Feeding along convergence lines could prolong sea turtles' contact with oil (Witherington 1994). Chronically ingested oil may accumulate in organs. Entrapment in tar and oil slicks may occur. Blood chemistry studies on sea turtles after oiling revealed decreases in hematocrit and hemoglobin concentrations (Lutcavage et al. 1995). This reduction in critical components of the oxygen transport system and associated high white blood cell counts suggests that sea turtles are significantly stressed by exposure to oil. A loggerhead sea turtle was sighted surfacing repeatedly in an oil slick in the Gulf of Mexico for over an hour. In 1993, eggs, hatchlings, and juvenile sea turtle mortalities occurred after a freighter hit two barges transporting fuel from Mississippi and Louisiana to Tampa, Florida. Strandings of oiled turtles or turtles associated with tar are reported regularly to the Sea Turtle Stranding and Salvage Network database, particularly from south Florida and along Padre Island, Texas.

Although the known range of the Gulf sturgeon margins the vicinity of the action area, they may be affected by actions associated with oil spills. Hydrocarbons may enter the Gulf sturgeon=s system by ingestion of contaminated prey or entry through the gills. Internal or external contact with oil may interfere with gill epithelium function, disrupt liver function, or result in mortality of Gulf sturgeon. Fish eggs and larvae are killed when contacted by oil (Longwell 1977). However, it has been estimated that there is less than a 0.5% probability of an oil spill > 1,000 bbl occurring in the western planning area and coming into contact with known Gulf sturgeon habitat within 10 days (Draft EIS, MMS 2002-015), and the potential for an oil spill to adversely impact Gulf Sturgeon is very low.

Chronic exposure of listed and protected whales, marine mammals, and sea turtles to the components of oil spills may result in contamination or reduction of prey. Additionally, physiological stress on these animals might result in reduced fitness and vulnerability to disease and parasites. However, annually, few deaths are likely due to the low likelihood that many listed or protected species may occur in the small areas contacted by oil spills, and dispersion and loss of oil is likely to be rapid if a spill occurs. Coastal oil-spill contingency plans should reduce the impact of spills, although some spill clean-up activities may affect sea turtles. (Note: Oil spill response and clean-up is federally managed by multi-agency Regional Response Teams, not MMS; therefore, oil spill response is not considered part of MMS' proposed action). Protection efforts generally attempt to prevent contact of oil on sensitive areas such as nesting beaches where turtles are particularly vulnerable.

Based on the above information, NOAA Fisheries believes that oil spills as a consequence of the proposed action will have adverse impacts on sperm whales, and sea turtles. The effects on sperm whales are expected to be sublethal as are the majority of effects on sea turtles. Because of the probability of releases and some large spills, however, NOAA Fisheries does believe that the degree of oiling experienced by a few individual turtles may rarely be acute and significant. NOAA Fisheries therefore believes that, over the projected 35-year lifetime of the proposed action, up to two sea turtles (in any combination of the five species found in the GOM) may be killed as a result of an oil spill resulting from activities associated with the proposed action. Although populations of some of these species are small, the loss of this small number of individuals is not likely to appreciably reduce the species' ability to survive and recover in the wild through reduction in their numbers. NOAA Fisheries is unable to estimate the number of individuals that may experience sublethal effects. For adult, female sea turtles, the reproductive periodicity and the number of eggs produced during a breeding season are thought to be influenced by the animals' nutritional condition and general fitness, so impacts to an individual adult female's overall reproductive success are theoretically possible. Although there is great uncertainty about the nature and extent of sublethal effects from contact with spilled oil, NOAA Fisheries does not expect those effects to rise to the level where there would be a detectable effect on any population's reproduction. Sublethal effects are also likely as a result of bioaccumulation of oil-based toxins up the food chain; however, such effects are currently not quantifiable.

The routine discharges of drilling fluids may indirectly affect the prey of sperm whales, sea turtles, and these discharges contain heavy metals that affect water quality in the nearfield of platforms. As platforms move into deeper waters, multiple wells will be associated with each structure and the resultant cumulative amount of contaminants allowed in discharges will be larger. However, the resulting introduction of contaminants into the Gulf of Mexico may affect sea turtles, and marine mammals, including listed sperm whales, through biomagnification in the food chain or a reduction in available prey. Chronic sublethal effects could cause declines in the health of listed species, or lowered reproductive fitness. In the WPA a total of 111-247 exploratory wells and 178-352 development wells will be drilled over the course of the lease that will discharge an estimated 1,000,000-2,300,000 of water-based drilling fluids and between 160,000-330,000 bbl of associated cuttings. These routine discharges of drilling fluids contain mostly barium and trace amounts of chromium, copper, cadmium, mercury, lead, and zinc. Chronic levels of these metals are localized to within 150 m of drilling structures (Kennicutt 1995), significant levels of all these metals except chromium have been measured within 500 m of Gulf of Mexico drilling sites (Boothe and Presley 1989), and dilution to background levels occurs within 1,000 m of the discharge point.

Marine mammals and sea turtles are unlikely to be directly effected by chemicals discharged in produced waters, drill muds, and drill cuttings, but are likely to accumulate heavy metals that will biomagnify through the food web. Heavy metals have been found in the tissues of both cetaceans and sea turtles; however, there is not sufficient data to determine the amount of accumulation or the effects of those concentrations on cetacean health, and no known deaths as a result of heavy metal toxicity have been documented.

Because of the location of the deepwater portion of the WPA, service bases usage may be split between the deepwater ports of Texas (Freeport, Galveston, and Sabine Pass) and Louisiana (Lake Charles, Berwick, Port Fourchon, and Venice). This would result in 5-20 vessel trips/month going to Louisiana's deepwater ports and 5-20 vessel trips/month going to Texas's deepwater ports as a result of a proposed action. However, Venice is the easternmost service base identified in any WPA exploration or development plans received so far. It is unlikely that any adverse affects as a result of vessel traffic west of the Mississippi River would affect any proposed Gulf sturgeon critical habitat. The range of the Gulf sturgeon is not within the vicinity of drilling operations in the WPA. Since the benthic prey of Gulf sturgeon are not migratory and do not exhibit large scale movements throughout the Gulf, the background levels of trace metals are not likely to affect the prey of Gulf sturgeon.

VI. Cumulative Effects

Cumulative effects are the effects of future state, local, or private activities that are reasonably certain to occur within the action area considered in this biological opinion. Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA. Within the action area, major future changes are not anticipated in ongoing human activities described in the environmental baseline. The present, major human uses of the action area such as commercial fishing, recreational boating and fishing, and the transport of petroleum and other chemical products throughout the action area are expected to continue at the present levels of intensity in the near future as are their associated risks of injury or mortality to sea turtles posed by incidental capture by fishermen, accidental oil spills, vessel collisions, marine debris, chemical discharges, and man-made noises. However, listed species of turtles migrate throughout the Gulf of Mexico and Atlantic and may be affected during their life cycles by non-Federal activities outside the action area.

Coastal runoff and river discharges carry large volumes of petrochemical and other contaminants from agricultural activities, cities, and industries into the Gulf of Mexico. The coastal waters of the Gulf of Mexico have more sites with high contaminant concentrations than other areas of the coastal United States, due to the large number of waste discharge point sources. The species of turtles analyzed in this Opinion may be exposed to and accumulate these contaminants during their life cycles.

Beachfront development, lighting, and beach erosion control are all ongoing activities along the southeastern coast of the United States. These activities potentially reduce or degrade sea turtle nesting habitats or interfere with hatchling movement to sea. Nocturnal human activities along nesting beaches may also discourage sea turtles from nesting sites. The extent to which these activities reduce sea turtle nesting and hatchling production is unknown. However, more and more coastal counties have or are adopting more stringent protective measures to protect hatchling sea turtles from the disorienting effects of beach lighting. Some of these measures were drafted in response to law suits brought against the counties by concerned citizens who charged the counties with failing to uphold the ESA by allowing unregulated beach lighting which results in takes of hatchlings.

State-regulated commercial and recreational boating and fishing activities in Pamlico Sound waters currently result in the incidental take of threatened and endangered species. It is expected that states will continue to license/permit large vessel and thrill-craft operations which do not fall under the purview of a Federal agency and will issue regulations that will affect fishery activities. Any increase in recreational vessel activity in inshore and offshore waters of the Atlantic Ocean will likely increase the risk of turtles taken by injury or mortality in vessel collisions. Recreational hook-and-line fisheries have been known to lethally take sea turtles, including Kemp=s ridleys. Future cooperation between NOAA Fisheries and the states on these issues should help decrease take of sea turtles caused by recreational activities. NOAA Fisheries will continue to work with states to develop ESA section 6 agreements and section 10 permits to enhance programs to quantify and mitigate these takes.

VII. Conclusion

After reviewing the current status of endangered sperm whale, the green, leatherback, hawksbill, and Kemp's ridley sea turtles, and the threatened loggerhead sea turtle and Gulf sturgeon in the GOM, the environmental baseline, the effects of the proposed action, and the cumulative effects, it is the biological opinion of NOAA Fisheries that the implementation of the proposed action, as described in the Proposed Action section of this Opinion, is not likely to jeopardize the continued existence of endangered sperm whale, the green, leatherback, hawksbill, and Kemp's ridley sea turtles, or the threatened loggerhead sea turtle and Gulf sturgeon. No critical habitat has been designated for these species in the GOM; therefore, none will be affected.

VIII. Incidental Take Statement

Incidental Take Statement

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or to attempt to engage in any such conduct. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary and must be undertaken by the MMS for the exemption in section 7(o)(2) to apply. MMS has a continuing duty to regulate the activity covered by this incidental take statement. If MMS fails to assume and implement the terms and conditions, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, MMS must report the progress of the action and its impact on the species to NOAA Fisheries as specified in the incidental take statement.

Amount or Extent of Anticipated Take

NOAA Fisheries has determined that there is a quantifiable expected impact to sperm whales and sea turtles in the action area as a result of OCS oil and gas activities. Based on stranding records, incidental captures during recreational and commercial fishing vessels, scientific surveys, and historical data, sperm whales, and five species of sea turtles are known to occur in GOM waters in and around the action area. Current available information on the relationship between these species and OCS oil and gas activities indicates that sea turtles may be killed or injured by vessel strikes that may happen as a result of the proposed action. Therefore, pursuant to section 7(b)(4) of the ESA, NOAA Fisheries anticipates an incidental take as follows:

> 1 take (injury or mortality) per year of any sea turtle species by vessel impact over the 30-year life of the proposed action.

If the actual incidental take meets or exceeds any of these levels, MMS must immediately reinitiate formal consultation.

NOAA Fisheries believes an unspecified number of sperm whales within the action area will be adversely affected by noise from construction and drilling activities and increased vessel traffic. These effects are expected to be sublethal. The extent to which sperm whales will detect and exhibit a behavioral response will be determined by a variety of factors. However, NOAA Fisheries is not including an incidental take statement for the incidental take of whale species due to acoustic harassment at this time because the take of marine mammals has not been authorized under section 101(a)(5) of the Marine Mammal Protection Act (MMPA) and/or its 1994 amendments. Following issuance of such regulations or authorizations, NOAA Fisheries may amend this Opinion to include incidental take of sperm whales.

Pursuant to section 7(b)(4) of the ESA, NOAA Fisheries anticipates an incidental take (by injury or mortality) of up to one documented sea turtle, either a loggerhead, Kemp's ridley, green, leatherback, or hawksbill turtle as a result of a vessel strike. This level of take is anticipated for the exploration and production of oil and gas that may result from the GOM OCS oil and gas lease sale 184. If the actual incidental take meets or exceeds this level, MMS must immediately request reinitiation of formal consultation. NOAA Fisheries, Southeast Regional Office, will cooperate with MMS in the review of the incident.

NOAA Fisheries believes that an unspecified number of sea turtles will experience sublethal effects as the result of exposure to spilled oil, resulting from the proposed action. NOAA Fisheries believes that up to two sea turtles of any of the five species present in the action area will be killed as a result of exposure to spilled oil. However, NOAA Fisheries is not including an incidental take statement for the incidental take of listed species due to oil exposure. Incidental take, as defined at 50 CFR 402.02, refers only to takings that result from an otherwise lawful activity. The Clean Water Act (33 USC 1251 *et seq*.) as amended by the Oil Pollution Act of 1990 (33 USC 2701 *et seq*.) prohibits discharges of harmful quantities of oil, as defined at 40 CFR 110.3, into waters of the United States. Therefore, even though this biological opinion has considered the effects on listed species by oil spills that may result from the proposed action, those takings that would result from an unlawful activity (i.e., oil spills) are not specified in this incidental take statement and have no protective coverage under section 7(o)(2) of the ESA.

Effect of the Take

In the accompanying biological opinion, NOAA Fisheries determined that the aforementioned level of anticipated take (lethal, or non-lethal) is not likely to appreciably reduce either the survival or recovery of sperm whales, leatherback, green, hawksbill, Kemp=s ridley, loggerhead sea turtles, or Gulf sturgeon in the wild by reducing their reproduction, numbers, or distribution. The activity, therefore, is not likely to result in jeopardy to any of the above mentioned species. The project area has no designated critical habitat for any of the listed species under NOAA Fisheries= jurisdiction, and therefore will not cause an adverse modification of critical habitat.

Reasonable and Prudent Measures

NOAA Fisheries believes the following reasonable and prudent measures are necessary and appropriate to minimize the potential for incidental take of sperm whales, or Kemp's ridley, green, loggerhead, leatherback, and hawksbill sea turtles:

1) MMS shall minimize the amount of flotsam and jetsam discharged into waters of the Gulf of Mexico as a result of the proposed action to the greatest extent practicable.

2) MMS shall observe the effects of vessel traffic on listed species.

3) MMS shall minimize adverse effects to sperm whales activity in an impact zone around the vicinity of all seismic operations in Gulf water equal to or greater than 200 m.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the ESA, MMS must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting and monitoring requirements. These terms and conditions are non-discretionary.

1. The MMS shall work with offshore oil and gas industry to:

a. Prepare a training video that educates offshore industry-related personnel on marine debris that may be generated by industry activities, their vectors of introduction into the marine environment, and measures that personnel are to undertake to eliminate jetsam and flotsam of industry-related trash in the Gulf. The MMS shall condition permits issued to oil companies to require offshore oil and gas industry-related personnel, including support services-related personnel (e.g., helicopter pilots, vessel captains and crews, and various contractors), to view the training video once each year. Lessees and operators will be responsible for certifying that personnel utilized offshore for their respective projects have viewed the training video on an annual basis.

b. Review existing practices, regulations, guidelines, and waste management plans to identify gaps that may result in the release of objects that might become flotsam and jetsam in the sea. Based upon that review, MMS shall update guidelines, in the form of a Notice to Lessees and Operators, to eliminate sources of flotsam and jetsam from offshore oil and gas activities. MMS shall provide the NOAA Fisheries, Southeast Regional Administrator with a copy of these guidelines.

c. MMS shall condition permits issued to oil companies requiring them to post signs in prominent places on all offshore oil and gas industry-related vessels and surface facilities (e.g., fixed and floating platforms used as a result of the proposed action detailing the reasons (legal and ecological) why release of debris must be eliminated.

2. MMS shall develop, in conjunction with NOAA Fisheries, a program to train observers to be used during vessel operations supporting the proposed action to minimize vessel strikes to protected species.

3. All seismic surveys will use approved ramp-up procedures to allow sea turtles and sperm whales to depart the impact zone before seismic surveying begins. Ramp-up procedures and seismic surveys may be initiated only during daylight hours. Ramp-up procedures shall begin no earlier than 20 minutes prior to the use of seismic equipment. Ramp-up should begin with a single air-gun firing singly followed by other air-guns in the array. The array will then increase firing at a rate of 6 dB re 1 ΦPa per minute until the full intensity of the array is achieved.

4. Observers who have successfully completed a NOAA Fisheries approved training program will be used on seismic vessels in the Western Planning area of the Gulf of Mexico. A 180 dB impact zone will be established in water depths equal to or greater than 200 m. NOAA Fisheries approved observers will monitor waters for sperm whales within a calculated 180 dB impact zone before and during seismic operations, based upon the appropriate water depth. Seismic operations will immediately cease when a sperm whale is detected within the 180 dB impact zone. Air-guns may begin ramp-up once it has been determined that all sperm whales have left the impact zone. Ramp-up procedures and seismic surveys may be initiated only during daylight hours. Impact zone calculations shall be made by seismic personnel. Based on the results of recent scientific studies, a new equation is in development that will be used to calculate the impact zone from seismic surveys. While this equation is in development, an established equation to predict spherical spreading will be used to determine the distance (L_r) at which 180 dB level or greater would be received within the range of a sound source. Richardson et al. (1995) present an equation for spherical spreading to determine the distance (L_r) at which 180 dB levels or greater would be received within the range of a sound source. The impact zone may be calculated by the logarithmic spherical spreading equation:

$$L_r = L_s - 20 \log R$$

L_r = the received level in dB re 1 ΦPa underwater

L_s = the source level at 1 m in the same units, and

R = the range in m

NOAA Fisheries will inform MMS when the new model for seismic operations is completed, at which point the MMS is required to replace the existing equation to calculate the 180 dB impact zone.

5. When sperm whales are sighted during seismic exploration in the Western Planning Area of the Gulf of Mexico, MMS must report to NOAA Fisheries within 14 days of the sighting. Reports shall include the location of the sighting, number of animals sighted, whether or not an animal entered the impact zone warranting a shut-down, how long the shut-down occurred (i.e., how long the sperm whale was in the impact zone), and the name and contact information for the person who wrote the report. A compilation of these data shall be submitted in the annual report.

6. MMS shall complete an annual report to be submitted to the NOAA Fisheries, Southeast Regional Office, Assistant Regional Administrator for Protected Resources, by January 30 of each year. This report will enumerate the number, amount, location, and types of toxic spills resulting from the proposed action for the previous year, and takes of protected species (Section 9 and Federal regulations pursuant to section 4(d) of the ESA) resulting from the proposed action for the previous year. Any takes shall be reported within no more than 48 hours of the take. The report shall include the species or detailed

description of the animal if positive identification is not possible, vessel identification, cause and/or circumstances surrounding the take date, time, location, and name of the person filling out the report.

7. The MMS shall require lessees and operators to instruct offshore personnel to immediately report all sightings and locations of injured or dead endangered and threatened species (e.g., sea turtles and whales) to the MMS. The MMS-GOMR Protected Species Biologist shall coordinate with the appropriate salvage and stranding network coordinators to determine if recovery of the impacted animal is necessary, using qualified staff and the appropriate equipment. If oil and gas industry activity is responsible for the injured or dead animals (e.g., because of a vessel strike), the MMS shall require the responsible parties to assist the respective salvage and stranding network as appropriate.

IX. Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authority to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

In order for NOAA Fisheries to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, NOAA Fisheries requests notification of the implementation of any conservation recommendations.

1. MMS should sponsor programs to conserve the ecology of the Gulf of Mexico marine environment.

2. MMS should sponsor research on juvenile sea turtle habitat in the GOM, which may include the effects of oil and gas exploration, development, and production.

3. MMS should continue to conduct surveys of the GOM to determine the seasonal distribution and relative abundance of sea turtles and cetaceans to ascertain the extent of impacts relative to OCS oil and gas activities.

4.4. On June 15-16, 1999, MMS hosted a Marine Protected Species Workshop in New Orleans, LA. MMS, in concert with appropriate agencies and with assistance in funding by industry where possible, should continue efforts in supporting work to carry out the recommendations of the panel. MMS should continue its support of research to determine effects of OCS related noise on sperm whales and sea turtles.

5. MMS should require that permit holders maintain helicopter traffic over the proposed action area at altitudes above 1,000 feet as practicable, to avoid disturbance to whales and sea turtles.

6. MMS should encourage the OCS oil and gas industry to research, develop, and deploy passive acoustic monitoring technologies, night vision equipment, and other technologies to detect and monitor cetaceans. The fact that sperm whales are vocal means that passive acoustic equipment and methods may offer an effective means of detecting and tracking sperm whales (Whitehead and Gordon 1986, Gordon 1987, Leaper et al. 1992). Passive monitoring systems and procedures approved by NOAA Fisheries may be used in lieu of visual observers; however, visual observers will be required when sperm whales are detected within the area of seismic activities. Approved monitoring and procedures can be utilized for nighttime seismic surveys. All passive monitoring systems and procedures must receive prior approval from NOAA Fisheries.

In order for NOAA Fisheries to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, NOAA Fisheries requests notification of the implementation of any conservation recommendations.

X. Reinitiation of Consultation

This concludes formal consultation on the actions outlined in MMS' letter dated October 19, 2000. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if (1) the amount or extent of taking specified in the incidental take statement is met or exceeded, (2) new information reveals effects of the action that may affect listed species or critical habitat (when designated) in a manner or to an extent not previously considered, (3) the identified action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in the biological opinion, or (4) a new species is listed or critical habitat designated that may be affected by the identified action. In instances where the amount or extent of incidental take is exceeded, MMS must immediately request reinitiation of formal consultation.

MMS is presently consulting with NOAA Fisheries on lease sales in the western and central Gulf of Mexico. The biological opinion will incorporate new information provided by the MMS on geologic and geophysical exploration in the Gulf of Mexico. The above-mentioned biological opinion will supercede all previous biological opinions pertaining to the Central and Western Planning areas of the Gulf of Mexico.

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