File

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JUN 29 2007

F/SER32:KPB

Mr. Joseph Christopher
Regional Supervisor
Minerals Management Service
1201 Elmwood Park Boulevard
New Orleans, LA 70123-2394

Dear Mr. Christopher:

This constitutes the National Marine Fisheries Service's (NMFS) biological opinion (opinion) based on our review of the Minerals Management Service's (MMS) request for formal Endangered Species Act (ESA) section 7 consultation on the effects of the Five-Year Outer Continental Shelf Oil and Gas Leasing Program (2007-2012) in the Central and Western Planning Areas of the Gulf of Mexico. The biological opinion concludes that the five-year leasing program and its associated actions are not likely to jeopardize the continued existence of threatened or endangered species under the jurisdiction of NMFS or destroy or adversely modify designated critical habitat. However, NMFS anticipates incidental take of sea turtle 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.

We look forward to cooperation with you on a pile driving study and workshop, and our continued cooperation to ensure the conservation of our threatened and endangered marine species and designated critical habitat. We have enclosed other statutory requirements that may apply to this action, as well as additional information on NMFS' Public Consultation Tracking System to allow you to track the status of ESA consultations. If you have any questions, please contact Kyle Baker, fishery biologist, at (727) 824-5312, or by e-mail at kyle.baker@noaa.gov.

Sincerely,

Roy E. Crabtree, Ph.D.
Regional Administrator

Enclosures

cc: F - Lindow

File: 1514-22.O.1
Ref: F/SER/2006/02611

Additional Considerations for ESA Section 7 Consultations (Revised 12-6-2005)

Marine Mammal Protection Act (MMPA) Recommendations: The Endangered Species Act (ESA) section 7 process does not authorize incidental takes of listed or non-listed marine mammals. If such takes may occur, an incidental take authorization under MMPA section 101 (a)(5) is necessary. Contact Ken Hollingshead of our NMFS Headquarters' Protected Resources staff at (301) 713-2323 for more information on MMPA permitting procedures.

Essential Fish Habitat (EFH) Recommendations: In addition to its protected species/critical habitat consultation requirements with NMFS' Protected Resources Division (PRD) pursuant to section 7 of the ESA, prior to proceeding with the proposed action the action agency must also consult with NMFS' Habitat Conservation Division (HCD) pursuant to the Magnuson-Stevens Fishery Conservation and Management Act's (MSA) requirements for essential fish habitat (EFH) consultation (16 U.S.C. 1855 (b)(2) and 50 CFR 600.905-.930, subpart K). The action agency should also ensure that the applicant understands the ESA and EFH processes; that ESA and EFH consultations are separate, distinct, and guided by different statutes, goals, and time lines for responding to the action agency; and that the action agency will (and the applicant may) receive separate consultation correspondence on NMFS letterhead from HCD regarding their concerns and/or finalizing EFH consultation.

Public Consultation Tracking System (PCTS) Guidance: PCTS is an online query system allowing federal agencies and U.S. Army Corps of Engineers'(COE) permit applicants to track the status of NMFS consultations under ESA section 7 and under MSA sections 305(b)2 and 305(b)(4): Essential Fish Habitat. Access PCTS via: www.nmfs.noaa.gov/pcts. Federal agencies are required to enter an agency-specific username and password to query the Federal Agency Site. The Corps Permit Site allows COE permit applicants to check on the current status of Clean Water Act section 404 permit actions for which NMFS has conducted an ESA section 7 consultation with the COE since the beginning of the 2001 fiscal year (no password needed).

For COE-permitted projects, click on "Enter Corps Permit Site." From the "Choose Agency Subdivision (Required)" list, pick the appropriate COE district. At "Enter Agency Permit Number," type in the COE district identifier, hyphen, year, hyphen, number. The COE is in the process of converting its permit application database to PCTS-compatible "ORM." An example permit number is: SAJ-2005-000001234-IPS-1. For the Jacksonville District, which has already converted to ORM, permit application numbers should be entered as SAJ (hyphen), followed by 4-digit year (hyphen), followed by permit application numeric identifier with no preceding zeros. E.g., SAJ-2005-123, SAJ-2005-1234, SAJ-2005-12345.

For inquiries regarding applications processed by Corps districts that have not yet made the conversion to ORM (e.g., Mobile District), enter the 9-digit numeric identifier, or convert the existing COE-assigned application number to 9 numeric digits by deleting all letters, hyphens, and commas; converting the year to 4-digit format (e.g., -04 to 2004); and adding additional zeros in front of the numeric identifier to make a total of 9 numeric digits. E.g., AL05-982-F converts to 200500982; MS05-04401-A converts to 200504401. PCTS questions should be directed to Eric Hawk at Eric.Hawk@noaa.gov. Requests for username and password should be directed to April Wolstencroft (PCTSUsersupport@noaa.gov).

Endangered Species Act - Section 7 Consultation
Biological Opinion

Action Agency: Department of the Interior, Minerals Management Service

Activity: Gulf of Mexico Oil and Gas Activities: Five-Year Leasing Plan for Western and Central Planning Areas 2007-2012

Consulting Agency: National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southeast Regional Office, Protected Resources Division

Approved by:

Roy E. Crabtree, Ph.D., Regional Administrator
National Marine Fisheries Service, Southeast Regional Office
St. Petersburg, Florida

Date Issued: 6/29/07

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1 INTRODUCTION

The Outer Continental Shelf Lands Act (OCSLA) is the primary Act giving MMS its regulatory authority to establish policies and procedures for managing the oil and natural gas resources of the Outer Continental Shelf (OCS). The Energy Policy Act of 2005 expanded and further defined the MMS role in energy development. Enacted on August 8, 2005, the Energy Policy Act amended Section 8 of the OCSLA to authorize the Department of the Interior (DOI) to grant leases, easements, or rights-of-way on the OCS for the development and support of energy resources from sources other than oil and gas and to allow for alternate uses of existing facilities on the OCS. The Energy Policy Act grants MMS new responsibilities over Federal offshore renewable energy and related uses of the OCS. Although no projects are planned at this time, MMS is evaluating the potential of renewable energy resources on the OCS.

The OCSLA requires DOI to prepare a five-year program that specifies the size, timing and location of areas to be assessed for Federal offshore natural gas and oil leasing. It is the role of DOI to ensure that the U.S. government receives fair market value for acreage made available for leasing and that any oil and gas activities conserve resources, operate safely, and take maximum steps to protect the environment. The last five-year program expires on June 30, 2007. MMS has formulated the next five-year program for 2007-2012, including all leaseable U.S. Federal waters in the Central Planning Area (CPA) and the Western Planning Area (WPA). The Gulf of Mexico (GOM) Region of MMS has developed one EIS and a biological assessment for the eleven lease sales scheduled in the GOM under the 2007-2012 five-year program.

Recent Lease Sale Consultation History
The MMS has consulted with NMFS on five-year GOM oil and gas activities in the past. The most recent 5-year (2003-2007) consultation was formally requested by MMS in April 2002. A draft biological opinion was sent from NMFS to MMS in September 2002, and the final biological opinion was issued to MMS in November 2002.

The MMS has petitioned NMFS for programmatic rulemaking under the Marine Mammal Protection Act (MMPA) for Explosive Removal of Structures (EROS). This rulemaking also includes a programmatic section 7 consultation with NMFS under the ESA on these activities. The NMFS Proposed Rule for Explosive Removal of Structures operations was published in the Federal Register on April 7, 2006, and the ESA biological opinion was issued on August 28, 2006. Thus, EROS activities are not included in this consultation as part of the proposed action, but as part of the environmental baseline.

Consultation History
MMS submitted a biological assessment (BA) and request for section 7 consultation under the ESA on the OCS Leasing Program for 2007-2012 on June 5, 2006. In a letter dated July 28, 2006, NMFS requested additional information regarding the effects of pipelines and accidental oil spills on Gulf sturgeon critical habitat, the time of year of construction activities, pile driving, and other noise associated with the proposed action.

On December 21, 2006, MMS resubmitted a BA. Subsequent discussions through e-mail exchanges and teleconferences were held to gather additional information and discuss potential impacts resulting from vessel strikes, oil spills, and construction activities on the OCS. NMFS initiated consultation with MMS on May 1, 2007.

2 DESCRIPTION OF THE PROPOSED ACTION

MMS is the administrative agency responsible for the mineral leasing of submerged OCS lands and for the supervision of offshore operations after lease issuance. The Western and Central GOM are currently major oil- and gas-producing areas. The proposed action is for the exploration, development and production, and associated activities as a result of MMS lease sales of available OCS blocks in the WPA and CPA. Eleven area wide oil and gas lease sales in the WPA and CPA of the GOM OCS are scheduled during the five-year period. Under the proposed five-year program, two sales would be held each year, one in the WPA and one in the CPA (Table 1). The purpose of the lease sale portion of the proposed action is to offer for lease those areas currently available for lease that may contain economically recoverable oil and natural gas resources. The proposed lease sales will provide qualified bidders the opportunity to bid upon and lease acreage in the GOM OCS for the exploration, development, and production of oil and natural gas.

Table 1. Proposed WPA and CPA GOM OCS Lease Sales for 2007-2012.

Lease Sale Number	GOM Planning Area	Year of Lease Sale
204	WPA	2007
205	CPA	2007
206	CPA	2008
207	WPA	2008
208	CPA	2009
210	WPA	2009
213	CPA	2010
215	WPA	2010
216	CPA	2011
218	WPA	2011
222	CPA	2012

2.1 Action Area

The action area of the project includes all areas to be affected directly or indirectly by the action, and not merely the immediate area involved in the action (50 CFR 402.02). The action area is considered to include the Federal OCS waters in the WPA and CPA and all activities associated with the exploration, development, and production of those areas. The Federal OCS waters in the GOM begin 10 mi offshore of Florida; 3 mi offshore of Louisiana, Mississippi, and Alabama; and 10 mi offshore of Texas; and extend to the limits of the Exclusive Economic Zone (EEZ). The action area includes these waters as well as the coastal areas, ports, airspace, and waterways used by transport vessels related to the proposed action.

The northern boundary of the CPA is defined by the Federal-State boundary offshore Louisiana, Mississippi, and Alabama (Figure 1). The eastern boundary of the CPA is defined by the offshore boundary between Alabama and Florida, proceeding southeasterly to 26.19°N. latitude, thence southwesterly to 25.6°N. latitude. The western boundary of the CPA is defined by the offshore boundary between Texas and Louisiana, proceeding southeasterly to 28.43°N. latitude, thence south southwesterly to 27.49°N. latitude, thence south southeasterly to 25.80°N. latitude. The southern boundary of the CPA is defined by the continental shelf boundary with Mexico as established by 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 GOM Beyond 200 Nautical Miles," which took effect in January 2001, and by the limit of the U.S. EEZ in the area east of the continental shelf boundary with Mexico. The CPA consists of approximately 66.3 million acres (ac), of which approximately 34.8 million ac are not currently leased. The CPA is located from 4.8 to 354 kilometers (km) offshore in water depths ranging from 4 to 3,400 meters (m). A typical lease sale in the CPA is projected to yield 0.776-1.292 billion barrels of oil (BBO) and 3.236-5.229 trillion cubic feet (tcf) of gas. The entire CPA will be considered for possible leasing except:

- blocks that were formerly included within the Eastern Planning Area (EPA) and are within 100 mi of the Florida coast;
- blocks that were formerly included within the EPA and are under an existing Presidential withdrawal through the year 2012 as well as subject to annual congressional moratoria;
- blocks that are beyond the U.S. EEZ in the area known as the northern portion of the Eastern Gap; and
- whole and partial blocks that lie within the 1.4-nmi buffer zone north of the continental shelf boundary between the United States and Mexico.

The Central GOM Sale 205 area is the portion of the above-described CPA that was contained in the original Eastern GOM Sale 181 area, excluding blocks within 100 mi from the Florida coast. The Central GOM Sale 205 area consists of approximately 3.5 million ac, of which approximately 2.7 million ac are not currently leased. This is the only sale currently scheduled in the Five-Year Program that is not area-wide. Central GOM Sale 205 is projected to yield 0.115-0.149 BBO and 0.430-0.557 tcf of gas.

The western and northern boundaries of the WPA are defined by the Federal-State boundary offshore of Texas (Figure 1). The eastern boundary begins at the offshore boundary between Texas and Louisiana and proceeds southeasterly to 28.43°N latitude, thence south-southwesterly to 27.49°N latitude, thence south southeasterly to 25.80°N latitude. The southern boundary of the WPA is defined by the maritime boundary with Mexico that was established by 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 GOM Beyond 200 Nautical Miles," which took effect in January 2001. The WPA available consists of approximately 28.7 million ac, of which approximately 17.8 million ac are currently unleased. The WPA is located from

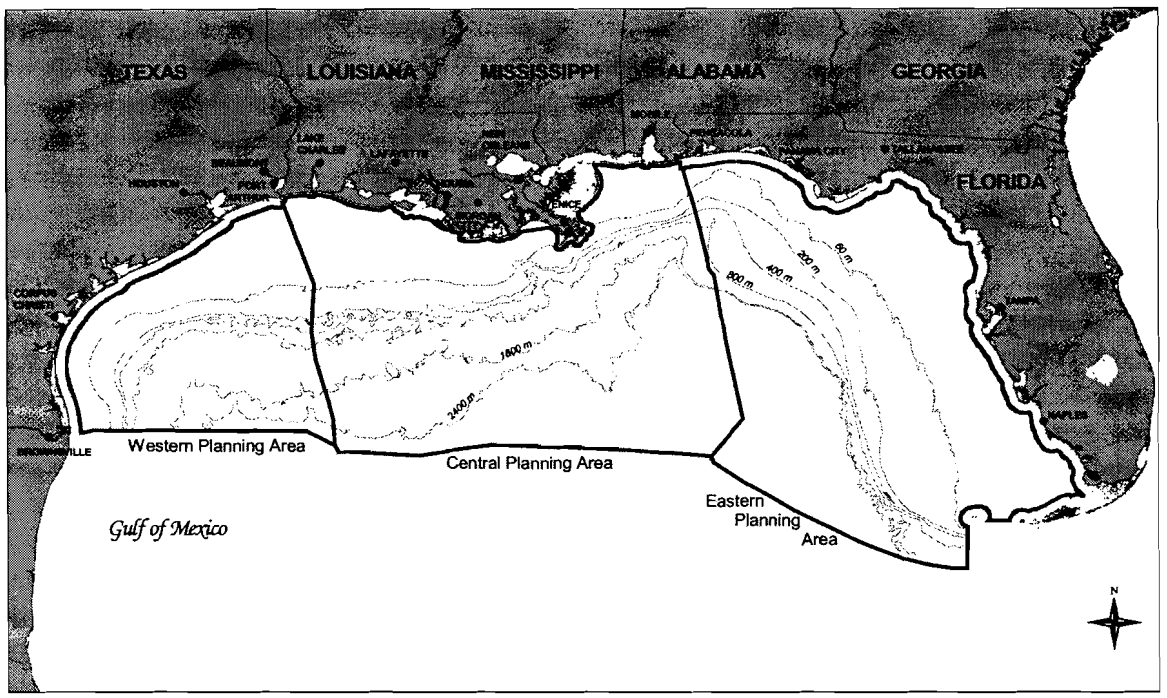

Figure 1. GOM oil and gas leasing planning areas.

14 to 357 km offshore in water depths ranging from 8-3,000 m. A typical lease sale in the WPA is projected to yield 0.242-0.423 BBO and 1.644-2.647 tcf of gas. The entire WPA will be considered for possible leasing except:

- whole and partial blocks within the boundary of the Flower Garden Banks National Marine Sanctuary; and
- whole and partial blocks that lie within the 1.4-nmi buffer zone north of the continental shelf boundary between the United States and Mexico.

2.2 Project Activities and Operations

The annual activity projections (Table 2) are estimates based on projected exploration and development activities, and impact-producing factors. These scenarios are only approximate because of future factors such as the contemporary economic marketplace, but represent the best assumptions and estimates of a set of future conditions that are considered reasonably foreseeable. Although the proposed action includes only proposed lease sales for the 2007-2012 five-year program, MMS bases estimates for all activities that are projected to occur from past, proposed, and future lease sales during the annual analysis period.

2.2.1 Seismic Surveying

Geophysical seismic surveys are performed to obtain information on surface and near-surface geology and on subsurface geologic formations. The MMS recently completed a programmatic EA (PEA) (U.S. Dept. of the Interior, Minerals Management Service 2004) on geological and geophysical (G&G) activities on the GOM OCS, and is seeking regulations governing the harassment and nonserious injury of several species of marine mammals, including sperm whales, under the Marine Mammal Protection Act (MMPA).

An MMPA petition package for G&G seismic operations, including an environmental assessment (EA), was sent to NMFS in December 2002. A petition was revised and NMFS issued a Notice of Intent in the Federal Register in November 2004. Rulemaking under the MMPA and a programmatic section 7 consultation under the ESA will follow completion of an EIS. The PEA includes a description of seismic surveying technologies and operations and is incorporated by reference. Currently, MMS implements seismic survey mitigation measures for marine mammals and sea turtles through term and conditions and conservation recommendations of previous lease sale biological opinions in the GOM (MMS NTL 2007-G02, APPENDIX A).

Typical seismic surveying operations tow an array of airguns and a streamer (signal receiver cable) behind the vessel 5-10 m (16-33 ft) below the sea surface. Piston-type airguns are used to release compressed air to create impulses. The airgun array produces a burst of underwater sound by releasing compressed air into the water column that creates an acoustical energy pulse. Depending on survey type and depth to the target formations, the release of compressed air every couple of seconds creates a regular series of strong acoustic impulses separated by silent periods lasting 7-16 seconds. Airgun arrays are designed to focus the sound energy downward through the water column. Acoustic (sound) signals are reflected off the subsurface sedimentary layers and recorded near the water surface by hydrophones spaced within streamer cables. These streamer cables are often 3 mi (5 km) or greater in length. Vessel speed is typically 4.5-6 knots (about 4-8 mph) with gear deployed. The 3D surveys carried out by seismic vendors can consist of several hundred OCS blocks. Multiple-source and multiple-streamer technologies are used for 3D seismic surveys. A typical 3D survey might employ a dual array of 18 guns per array. Each array might emit a 3,000-in^3 burst of compressed air at 2,000 pounds per square inch, generating approximately 4,500 kilojoule of acoustic energy for each burst. At 10 m (33 ft) from the source, the pressure experienced is approximately ambient pressure plus 1 atmosphere. The streamer array might consist of 6-8 parallel cables, each 6,000-8,000 m (19,685-26,247 ft) long, spaced 75 m (246 ft) apart.

High-resolution seismic surveys collect data on surficial geology used to identify potential shallow geologic hazards for engineering and site planning for bottom-founded structures. They are also used to identify environmental resources such as chemosynthetic community habitat. Deep-penetration, seismic surveys obtain data about geologic formations greater than 10,000 m (32,800 ft) below the seafloor. High-energy, marine seismic surveys include both 2D and 3D surveys. Data from 2D/3D surveys are used to map structural features to identify potential hydrocarbon traps.

Approximately 400-800 blocks would be surveyed by deep seismic operations in the WPA, and approximately 1,000-2,000 blocks in the CPA from the proposed lease sales. For postlease seismic surveys, it is projected proposed lease sale in the WPA would result in about 20 VSP operations and about 2,000 mi surveyed by high-resolution seismic during the life of the proposed action. Proposed lease sales in the CPA would result in about 30 VSP operations and 3,000-4,000 mi surveyed by high-resolution seismic during the 40-year life of the leases.

MMS estimates that seismic surveys are projected to follow the same trend as exploration activities, which are projected to peak in 2008-2010, steadily decline until 2027, and remain relatively steady throughout the second half of the 40-year lease periods. During the first 2-4 years, it is projected annually there would be 95-130 VSP operations, 12,500-16,500 miles surveyed by high-resolution seismic, and 1,500-3,000 blocks surveyed by deep seismic. During the second half of the lease periods, it is projected annually there would be 60-70 VSP operations, 6,200-8,300 mi surveyed by high-resolution seismic, and 1,200-2,500 blocks surveyed by deep seismic.

2.2.2 Construction

In addition to various pieces of support equipment used in construction, such as vessels and cranes, pile driving is the primary method by which fixed structures are attached to the seafloor and provide stability for other support structures. Classified as either impact hammers or vibratory hammers, the design of the hammer assembly varies depending upon the medium powering the system; however, most assemblies contain a specialized control unit, piston, ram, and anvil. The impact hammer systems used for OCS-related work

Table 2. Five-year annual projections in the Western and Central Planning Areas.

	Central Planning Area	Western Planning Area
Oil (Bbbl)	0.8-0.9	0.1-0.2
Gas (tcf)	3.4-3.5	1.5-1.7
Platforms Installed	108-114	41-48
Exploration and Delineation Wells	188-263	107-156
Production Development Wells	714-756	199-225
Non-Producing Development Wells	107-113	30-34
Vessels (round trips)	187,000–195,000	38,000-43,000
Helicopter (Take Offs/Landings)	1,000,000	500,000
Pipelines (km)	1,200	500

predominantly utilize steam, pneumatic, or hydraulic assemblies. Most of the steam and pneumatic systems used in the GOM are limited to surface operations and have energy outputs (torque) ranging from 15,000-60,000 ft/lbs (20-82 kilonewton meters (kNm)). Hydraulic impact hammer systems can be used in both surface and sub-sea operations and most generally range from 11,000-370,000 ft/lbs (15-500 kNm). Almost all vibratory hammer systems use hydraulic power and due to their configuration, they can be used for both surface and sub-sea operations.

Operators determine the type and size of pile driving equipment they require based upon the dimensions and design of the object being driven, water depths, equipment configuration (surface vs. sub-sea), sediment/substrate types, and the nature of the operations being conducted. Sediment types are varied in the GOM, but for shallow seabed activities such as these they are generally classified as consisting of muds (directly off river deltas/outlets), clays (mostly from the Louisiana-Texas border westward), and unconsolidated sands or silt (most of the shelf of the Northern GOM).

Each sediment type offers differing levels of friction that must be overcome to allow the pile to penetrate to a sufficient depth. There are two primary pile-driving operations on the GOM OCS: 1) the setting of casing conductors (also know as *drive pipe*) for drilling operations; and 2) pile emplacement for the seabed securing of oil and gas structures and facilities.

Casing Conductor (Drive Pipe) Installation
Due to the frequency of exploratory and development drilling operations on the GOM OCS, the greatest number of pile-driving operations involve the setting or installation of casing conductors. Most casing conductors range in diameter from 12-36 in and have wall thicknesses that run from ¼-¾ in and are generally driven into the substrate until the conductor "meets refusal" or cannot be driven further without damage. Conductor casings can also be jetted into the seabed; however, the ease of mobilization of hammer drivers coupled with their speed of penetration, minimizes the use of jetting equipment, which requires more time to deploy and is often unviable due to water depth and sediment type. Most casing conductors driving operations occur in water depths <200 m (Figure 2)

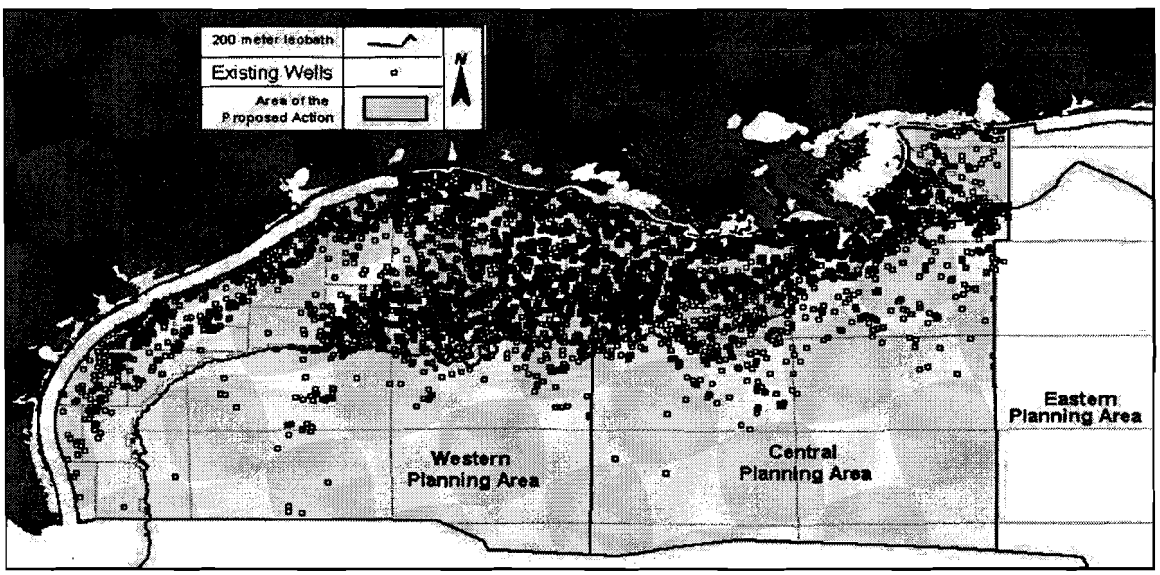

Figure 2. Current well distribution in the Western and Central Planning Areas.

Structure/Facility Pile Installation
Pile-driving operations are also conducted during oil and gas structure/facility installations on the GOM OCS. Structure piles are generally forged or rolled-sheet constructed steel pipes that range in diameter from 24-84 in and have wall thicknesses that run from ½-2 in. The piles are inserted into the legs of the platform jackets, along the inner wall of a caisson, or into sleeves configured into skirt bracings or seafloor templates for structures in certain deepwater/unstable environments. As with conductor casings, piles are generally driven into the substrate until it "meets refusal" or reaches a sufficient depth to ensure stability. Once set to the proper depth/refusal, the pile is then welded or grouted to the jacket leg, caisson, or sleeve to affix the facility to the seabed. Over the last 10 years, an average of 137 structures were installed annually in the Central

and Western GOM with the majority concentrated on the shelf in water depths less than 200 m (Figure 3).

2.2.3 Development and Production Drilling

A production well is drilled to exploit a discovered or known hydrocarbon field. Production wells can collectively be termed development wells. Production wells may be drilled from movable structures, such as jack-up rigs with fixed bottom-supported structures, vertically floating moored structures, floating production facilities (often called semi-submersibles), and drillships (dynamically positioned drilling vessels). The type of production structure installed at a site depends mainly on water depth. The number of wells per structure varies according to the type of production structure used, the prospect size, and the drilling/production strategy deployed for the drilling program and for resource conservation. Systems used to produce hydrocarbons can be fixed, floating, or sub-sea in deeper waters.

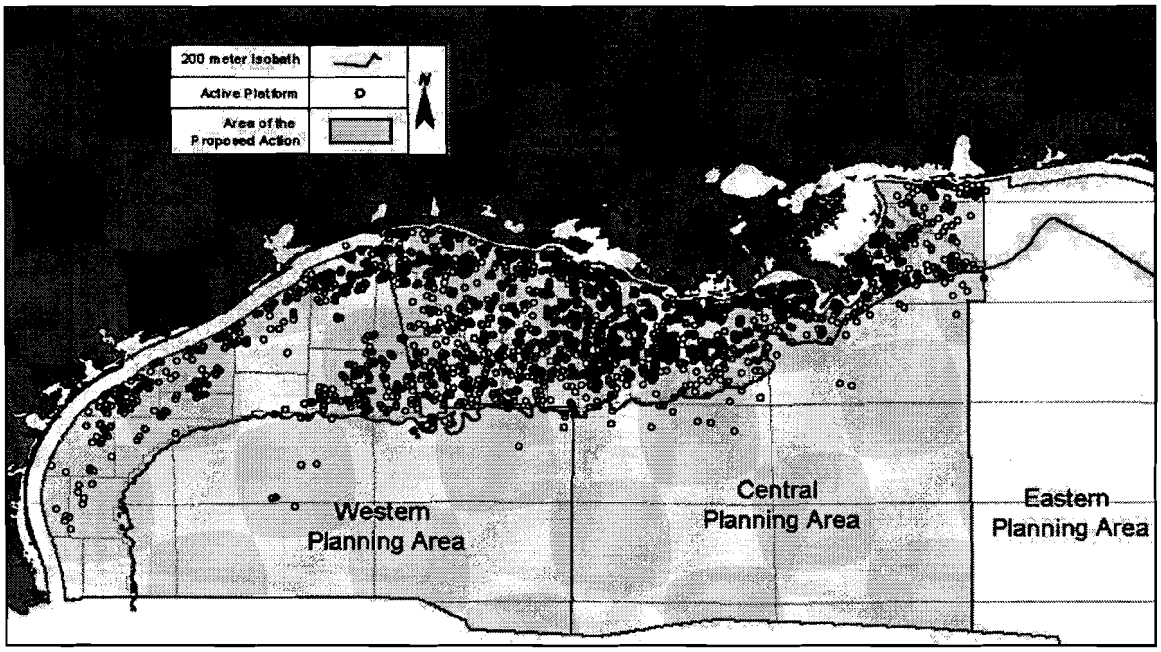

Figure 3. Current platform distribution in the Western and Central Planning Areas.

2.2.4 Production Platforms

Offshore platforms are common structures used in the development of offshore oil and gas resources. The purpose of a platform is to house production and drilling equipment and living quarters for personnel (on manned platforms). A platform consists of two major components: an underwater jacket or tower and an above water deck. Platforms are fabricated onshore and then towed to an offshore location for installation. Facilities where platforms are fabricated are called platform fabrication yards. Production operations at fabrication yards include the cutting and welding of steel components and the construction of living quarters and other structures, as well as the assembly of platform components. Fixed platform fabrication can be subdivided into two major tasks: jacket fabrication and deck fabrication. Platform structures are transported offshore and installation may take place over a period of a week to a month at the beginning of a

platform's 20- to 40-year production life. Derrick barges may be used to upright and position structures. Moorings and anchors are usually attached to keep the structure on station. Many platforms require that piles be driven to which the platform is attached by welding the components together. Commissioning activities involve all of the interconnecting and testing of the structure's modular components.

Several types of production systems are used for offshore oil and gas development in the WPA and CPA, and types vary by water depth in which the structures may be found. A fixed platform is the most commonly used type of production system in the northern GOM. A fixed platform is a large skeletal structure extending from the bottom of the ocean to above the water level. It consists of a metal jacket that is attached to the ocean bottom with the piles, and a deck that accommodates drilling and production equipment and living quarters. Fixed platforms are typically installed in water depths up to 1,500 ft. A compliant tower is similar to a fixed platform; however, the underwater section is not a jacket but a narrow, flexible tower that, because of the flexibility of its structure, can move around in the horizontal dimension, thereby withstanding significant wave and wind impact. Compliant towers are typically installed in water depth from 1,000 to 2,000 ft. Tension and mini-tension leg platforms do not have skeletal structures extending all the way to the ocean floor. Instead, they consist of floating structures that are kept in place by steel tendons attached to the ocean floor. Tension leg platforms can be used in different water depth ranges, up to 4,000 ft. A spar platform (a floating caisson) consists of a large vertical hull that is moored to the ocean floor with up to 20 lines. Above the hull sits the deck with production equipment and living quarters. At present, spar platforms are used in water depths up to 3,000 ft; however, present technology allows installation in waters as deep as 7,500 ft.

A floating production system consists of a semi-submersible unit that is kept stationary either by anchoring with wire ropes and chains or by the use of rotating thrusters, which self propel the semi-submersible unit. Floating production systems are suited for deepwater production in water depths up to 7,500 ft. A sub-sea system consists of a single sub-sea well or several wells producing either to a nearby platform or to a distant production facility through a pipeline and manifold system. At present, sub-sea systems are used in water depths exceeding 5,000 ft. A floating production, storage, and offloading (FPSO) system consists of a large vessel that houses production equipment. It collects oil from several sub-sea wells, stores the oil, and periodically offloads it to a shuttle tanker. FPSO systems are particularly useful in development of remote oil fields where pipeline infrastructure is not available.

2.2.5 Pipelines

Pipelines are the primary method used to transport a variety of liquid and gaseous products between OCS production sites and onshore facilities servicing the GOM. These products include unprocessed (bulk) oil and gas; mixtures of gas and condensate; mixtures of gas and oil; processed condensate, oil, or gas; produced water; methanol; and a variety of chemicals used by the OCS industry offshore. It is expected that pipelines from most of the new offshore production facilities will connect to the existing pipeline infrastructure. Almost 100 percent of produced oil from a lease in the WPA or the CPA,

out to 800 m, is expected to be transported via pipelines. MMS estimates pipelines will continue to be the primary means of transporting oil in the future, with approximately 92 to 99 percent of the oil in the WPA, and 95 to 99 percent of the oil in the CPA transported through pipelines.

Pipelines in the GOM are designated as either gathering lines or trunklines. Gathering lines are typically shorter segments of small-diameter pipelines that transport the well stream from one or more wells to a production facility or from a production facility to a central facility serving one or several leases (e.g., a trunkline or central storage or processing terminal). Trunklines are typically large-diameter pipelines that receive and mix similar production products and transport them from the production fields to shore. A trunkline may contain production from many discovery wells drilled on several hydrocarbon fields. The OCS-related pipelines near shore and onshore may merge with pipelines carrying materials produced in State territories for transport to processing facilities or to connections with pipelines located farther inland.

2.2.6 Vessel Traffic

Barges may be used offshore to transport oil and gas, supplies such as chemicals or drilling mud, or wastes between shore bases and offshore platforms. Barges are non-self-propelled vessels that must be accompanied by one or more tugs. Because of this, barge transport is usually constrained to shallow waters of the GOM, close to the shoreline. Barging is used very infrequently as an interim transport system prior to the installation of a pipeline system. About 1 percent of the oil produced during the proposed actions in less than 60 m in both the WPA and the CPA is expected to be barged to shore over the 40-year life of the leases.

Shuttle tanker transport of OCS-produced oil is expected to be part of industry activities with 1 to 43 percent of oil transport in the CPA and 1 to 59 percent in the WPA. The expectation over the 2007-2046 lifetime of the proposed lease sales, is 1 to 5 percent and 1 to 8 percent, respectively. Floating production, storage, and offloading (FPSO) systems and associated tanker transport of OCS-produced oil may use shuttle tankers or self-propelled barges for transport to shore.

Service vessels are one of the primary modes of transporting personnel between service bases and offshore platforms, drilling rigs, derrick barges, and pipeline construction barges. In addition to offshore personnel, service vessels carry cargo (i.e., freshwater, fuel, cement, barite, liquid drilling fluids, tubulars, equipment, and food) offshore. In general, the new type of vessels built will continue to be larger, deeper drafted, and more technologically advanced for deepwater activities.

Service vessels that support various requirements of offshore oil and gas activities are categorized into supply, crew, and utility vessels. Large supply boats (50 to 70 m in length) with a capacity of 300 tons and draft of 3.5 m when loaded make up a large proportion of service vessels in the GOM. Crew and utility boats are about 30 m in length. Service vessels utilized in deep water include offshore supply vessels, fast supply vessels, and anchor-handling towing supply/mooring vessels; vessels employed in deep-

water operations typically are larger and/or faster than those usually supporting oil and gas operations in shallower water closer to shore. Compared to shelf-bound service vessels, deepwater service vessels have improved hull designs (increased efficiency and speed). Service vessels primarily used in deep water are offshore supply vessels, fast supply vessels, and anchor-handling/towing/supply/mooring vessels. Other deepwater specialty service vessels include well stimulation vessels. The offshore supply vessel and anchor-handling and anchor-handling/towing/supply/mooring vessels carry the same type of cargo (i.e., freshwater, fuel, cement, barite, liquid drilling fluids, tubulars, equipment, food, and miscellaneous supplies) but have different functions. As the number of deep-water development facilities located greater distances from shore increases, larger supply vessels with greater cargo carrying capacities and fast crew boats are being used.

A trip is considered the transportation from a service base to an offshore site and back (a round trip). There are approximately eight round trips per week in support of drilling an exploration well and six round trips per week in support of drilling a development well. A platform is estimated to require one to two vessel trips per week over its 25-year production life. All trips are assumed to originate from the service base. Using some assumptions about the number of vessel crew members per boat, number of trips to existing as well as projected platforms, the number of development wells, the number of trips per well per week, transit times, and distances to sites from service bases, etc., the total number of service vessel trips has been estimated by MMS to be between 225,000-238,000 round trips annually, with most trips occurring in the CPA.

The five-year projections for annual vessel round trips are estimated to be 187,000-195,000 in the CPA, with 4,627,000-5,887,000 service-vessel trips estimated to occur in the CPA over the 40-year OCS Program. In the WPA, five-year projections for annual vessel round trips is estimated to be 38,000-43,000, with 2,087,000-2,722,000 round trips estimated to occur over 40 years.

2.2.7 Helicopters

Helicopters are another mode of transporting personnel between service bases and offshore platforms, drilling rigs, derrick barges, and pipeline construction barges. Helicopters are routinely used for crew changes and at other times to transport management and special service personnel to offshore exploration and production sites. In addition, equipment and supplies are sometimes transported. Deepwater operations require helicopters that travel farther and faster, carry more personnel, are all-weather capable, and have lower operating costs.

In the past, helicopter activity scenarios were based on round trips. However, industry needs and uses of helicopters has been changing and the flight logistics often involve numerous stops, and completing a true round trip (back to the original location) may take days or longer. Helicopter activity scenarios are now given in flight segments; that is, a take-off to a landing, regardless of length. In areas of heavy industry activity, helicopter segments can be a matter of minutes, hopping from one structure to the next. The projected annual number of helicopter segments in the CPA and WPA combined is 1,500,000. Approximately 1,000,000 of these would occur in the CPA and 500,000 in

the WPA. When calculated by depth, the shallowest depths (0-60 m) will have over 80 percent of the helicopter activity over the 40-year OCS Program in the CPA. In the WPA, for the same 40-year OCS Program timeframe, shallow areas are projected to have over 75 percent of the helicopter activity.

2.3 Proposed Harm Avoidance Measures for Protected Species

MMS proposes the *Protected Species Stipulation* that is designed to minimize or avoid potential adverse impacts to federally protected species (e.g., sea turtles, marine mammals, and other listed species). The stipulations (or harm avoidance measures) considered in this biological opinion appear in the Appendices, and include the following:

1. The MMS requires that all seismic surveys employ mandatory mitigation measures including the use of a 500-m "exclusion zone", ramp-up and shut-down procedures, visual monitoring, and reporting. Seismic operations must immediately cease when whales are detected within the 500-m exclusion zone. Ramp-up procedures and seismic surveys may be initiated only during daylight unless alternate monitoring methods approved by MMS are used.

2. The MMS will condition all permits issued to lessees and their operators to require them to collect and remove flotsam resulting from activities related to exploration, development, and production of this lease.

3. The MMS will require that vessel operators and crews watch for marine mammals and sea turtles, reduce vessel speed to 10 knots or less when assemblages of cetaceans are observed, and maintain a distance of 90 m or greater from whales and a distance of 45 m or greater from small cetaceans and sea turtles.

4. The MMS will condition all permits issued to lessees and their operators to require them to post signs in prominent places on all vessels and platforms used as a result of activities related to exploration, development, and production of this lease detailing the reasons (legal and ecological) why the release of debris must be eliminated.

5. The MMS will require lessees and operators to instruct offshore personnel to immediately report all sightings and locations of injured or dead protected species (marine mammals and sea turtles) to the appropriate stranding network. If oil and gas industry activity is responsible for the injured or dead animals (e.g., because of a vessel strike), the responsible parties should remain available to assist the stranding network. If the injury or death is caused by a vessel collision, the responsible party must notify MMS within 24 hours of the strike.

6. The MMS will require oil-spill contingency planning to identify important habitats, including designated critical habitat, used by listed species (e.g., sea

turtle nesting beaches and piping plover critical habitat) and will require the strategic placement of spill cleanup equipment to be used only by personnel trained in less intrusive cleanup techniques on beach and bay shores.

Notice to Lessees and Operators
The MMS also issues Notices to Lessees and Operators (NTLs) in order to clarify, describe, or interpret regulation or OCS standards. The pertinent NTLs considered in this biological opinion, and that describe in greater detail some of the above-mentioned lease stipulations, include:

1. "Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program" (NTL 2007-G02, APPENDIX A).

2. "Vessel Strike Avoidance and Injured/Dead Protected Species Reporting" (NTL 2007-G04, APPENDIX B);

3. "Marine Trash and Debris Awareness and Elimination" (NTL 2007-G03, APPENDIX C); and

3 LISTED SPECIES AND CRITICAL HABITAT

Table 3. Listed species and critical habitat in the action area.

Common Name	Scientific Name	Status
Marine Mammals		
sperm whale	*Physeter macrocephalus*	endangered
Sea Turtles		
leatherback sea turtle	*Dermochelys coriacea*	endangered
Kemp's ridley sea turtle	*Lepidochelys kempii*	endangered
hawksbill sea turtle	*Eretmochelys imbricata*	endangered
green sea turtle[a]	*Chelonia mydas*	threatened
loggerhead sea turtle	*Caretta caretta*	threatened
Fish		
Gulf sturgeon	*Acipenser oxyrinchus desotoi*	threatened
Critical Habitat		
Gulf sturgeon	*Acipenser oxyrinchus desotoi*	Unit 8

[a]Green turtles are listed as threatened, except for breeding populations of green turtles in Florida and on the Pacific coast of Mexico, which are listed as endangered.

The endangered and threatened species, and designated critical habitat under the jurisdiction of NMFS that appear in Table 3 occur in the action area. NMFS has designated critical habitat for the Gulf sturgeon in the action area.

3.1 Effects to Listed Species Considered and Discounted

NMFS has analyzed several aspects of the proposed action during consultation with MMS for potential impacts to listed species and their habitats, and activities determined not to affect any listed species or designated critical habitat in the action area have been excluded from further analysis. Activities that may affect listed species or designated critical habitat were considered further for their potential to adversely affect listed species, and those determined to be insignificant and/or discountable are discussed in the following subsections. In addition to the direct effects of the action on listed species, this section also assesses the indirect effects of the proposed action, and the potential for any interrelated or interdependent effects of other activities (50 CFR 402.02). Indirect effects are those that are caused later in time, but are still reasonably certain to occur. Interrelated actions are those that are part of a larger action and depend upon the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration (50 CFR 402.02). For activities that could potentially result in take, the proposed harm avoidance measures were also assessed for their effectiveness at reducing the likelihood of impacts to discountable levels, or by reducing the magnitude of potential impacts to insignificant levels.

3.1.1 Vessel Strikes and Sperm Whales

Increased traffic from support vessels involved in survey, service, or shuttle functions could increase the probability of collisions between vessels and sperm whales. It is estimated that a maximum of 238,000 vessel round trips will occur annually, of which 55 percent are expected to occur in sperm whale habitat for vessels transiting in water depths greater than 200 m. Adverse reactions by whales to vessel activity have been recorded, and all are vulnerable to collisions with vessels, with incidents of strikes with juveniles and calves occurring more frequently than with adult animals. Some individuals may be able to detect and avoid underway vessels; however, the behavior of some individuals and age classes, and the behavioral characteristics of the species, behavioral state, or physical condition may result in an increased vulnerability to disturbance and injury from vessels operating at speeds over 10 knots (e.g., surface-active animals, sick animals, resting animals, and calfs).

Vessels have the potential to affect sperm whales in deeper, pelagic waters (>200 m) where sperm whales are typically found in the GOM. A vessel's operational speed influences the probability of animal detection and reaction time. Tugs are not believed to pose any significant threat of collision with sperm whales in the GOM because of their relatively slow transit speeds and operation in coastal waters where sperm whales are not found. Vessels are known to strike and injure larger sea life (e.g., sperm whales), mostly due to bow strikes (Laist et al. 2001) from vessels operating at faster speeds. Reported ship collision accounts suggest that serious injury to whales rarely occurs at speeds below 10 knots (Laist et al. 2001). A vessel's operational speed also influences the probability of animal detection and reaction time. At slower vessel speeds, a particular location ahead of the vessel is within visual range for a longer period of time before the vessel arrives at that location. For example, a vessel traveling at 16 knots that sees a whale 1,000 m ahead will arrive at the whale's position in 2.02 minutes; at 10 knots, the vessel will arrive at the whale's position in 3.23 minutes.

NMFS considers vessel approaches within 90 m to have the potential for harassment of marine mammals, and close approaches within tens of meters to have the potential to injure a marine mammal. A few individuals occurring within close proximity may be expected to be at risk of injury over the lifetime of the action. For example, the USS BURKELEY reported striking a whale of uncertain species at night on June 25, 2001, while undergoing high speed sea trials out of Pascagoula, Mississippi. Based on the location and size of the struck animal, it is believed to have been a sperm whale. Although vessel strikes do occur, these events appear to be infrequent with this species in offshore waters of the GOM, and are not expected to injure sperm whales from routine OCS vessel traffic associated with the proposed lease sales. However, there is a potential for sperm whales to be potentially harassed by passing vessels, and magnitude of this risk is considered in the following analysis.

Although the ESA defines prohibited takes of listed animals to include harassment, the ESA does not define harassment, nor has NMFS defined this term through regulation. However, the MMPA of 1972, as amended, defines harassment as any act of pursuit, torment, or annoyance which has the potential to injure a marine mammal or marine mammal stock in the wild, or has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption to behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering (16 USC 1362(18)(A)).

NMFS is particularly concerned about harassment to individuals or populations that may manifest as an animal that fails to feed successfully, breed successfully (which can result from feeding failure), or complete its life history because of altered environmental variables or behavioral patterns. This analysis includes an examination of the responses at the level of individual animals that could result in harassment, and any population level consequences, such as a reduction in numbers, distribution, or reproduction.

Behavioral reactions by whales to vessel activity have been recorded. Aerial surveys have confirmed that sperm whales are present in the GOM throughout the year. Sperm whales are the most often sighted and abundant cetaceans in offshore waters greater than 200 m in depth. Based on active leases as of April 2006, 55 percent of those leases occur in water depths greater than 200 m (3,606 occur on water depths from 0-200 m; 4,501 occur in water depth greater than 200 m); however, fewer leases occur in greater depths where sperm whales are found in higher densities. The mean density of sperm whales in the GOM is 0.35 per 100 km^2 and is used for this analysis. Due to the uncertainties regarding future vessel activity in deeper offshore waters that may affect sperm whales, a conservative estimate of potential harassment was calculated based on the following assumptions:

- sperm whale density of .0035 km^{-2};
- average offshore supply vessel measuring 70 x 16 m (0.070 x 0.016 km);
- a harassment zone of 0.090 km;

- a vessel may affect a sperm whale only once per round trip;
- 55 percent of the maximum number of annual vessel trips will occur in water depth ≥200 m (130,900);
- a random distribution of vessels and whales; and
- whales and vessels are stationary at the surface.

By adding a potential harassment zone to a vessel's dimensions, the harassment dimensions of a vessel is a rectangular-shaped space measuring 0.160 x 0.106 km. A potential harassment area of 0.017 km^2 can be calculated for a single vessel, and a maximum harassment area of 2,225 km^2 resulting from 130,900 vessel trips annually. Based on the mean sperm whale density in the GOM, an estimated 7.8 whales could potentially be found within the area of harassment annually. This estimate assumes a vessel is stationary; however, since vessels are underway between destinations, the probability for a randomly positioned, stationary whale to occur within the harassment zone of a vessel may be expected to increase as a vessel moves through the water, but the assumption that every vessel trip has the potential to affect a sperm whale is considered a conservative estimate of actual encounter rates.

Although the above calculation provides an estimation of potential encounters and potential risks vessels may pose to sperm whales, whales are not randomly distributed and may be expected to occur in greater densities in some regions than others depending on oceanographic features and other factors affecting their distribution. Such changes in distribution may significantly affect where and when sperm whales may be encountered in the GOM. In reality, both sperm whales and vessels may have the opportunity to avoid one another. When encounters within 90 m do occur, sperm whales generally avoid underway vessels.

To reduce the risk of encounters with sperm whales, MMS will implement NMFS' vessel strike avoidance measures for protected species, as implemented in MMS NTL 2007-G04 (APPENDIX B). With implementation of these measures, by maintaining a lookout for marine mammals and taking prudent actions to avoid collisions with them, NMFS believes that the likelihood of collisions between vessels and sperm whales will be reduced to insignificant levels. The observed avoidance of passing vessels by sperm whales is considered an advantageous response to avoid a potential threat, such as may occur in response to a predator such as killer whales, and is not expected to result in any significant response on migration, breathing, nursing, breeding, feeding, or sheltering to individuals, or have any consequences at the level of the population. With implementation of the vessel strike avoidance measures requirement to maintain a distance of 90 m from sperm whales, the potential for harassment of 7 or 8 whales annually is expected to be reduced to discountable levels. The potential for vessels striking sea turtles is discussed in the Effects of the Action in section 7 of this biological opinion.

3.1.2 Effects of Seismic Surveys on Sea Turtles

Studies regarding sea turtle hearing indicate that adult green, loggerhead, and Kemp's ridley turtles are sensitive to low to mid-frequency sounds. Other species of sea turtles with unknown hearing measurements have similar anatomies and are expected to have similar hearing ranges from those that have been measured. Although more hearing measurements are needed, the available data suggest that sea turtles are sensitive to frequencies from approximately 200 to 2,000 Hz. Some possible reactions to low frequency sounds include startle responses, rapid swimming, and swimming towards the surface at the onset of the sound.

In a study measuring the responses of captive green and loggerhead sea turtles exposed to seismic airgun pulses at 10-sec intervals, the sea turtles increased their swimming speeds when exposed to levels above 166 dB re 1 μPa rms (McCauley et al. 2000). The behavior of the sea turtles became more erratic when received levels exceeded 175 dB re 1 μPa. Loggerhead sea turtles' reactions to airguns held in an enclosure in a 10-m deep canal maintained a stand-off range of 30 m when exposed (O'Hara and Wilcox 1990). In another study, loggerhead sea turtles in a netted enclosure initially exhibited avoidance responses, but the avoidance response waned quickly (Moein et al. 1994). The change in behavior may have been due to habituation or reduced hearing sensitivity resulting from exposure to the noise. Other studies have also demonstrated that sea turtles behaviorally respond to exposure to noise, but the exposure levels and frequencies were not reported.

Based on this information, sea turtles exposed to airgun pulses during the proposed survey may exhibit avoidance behavior. Studies suggest that avoidance may begin at levels above 166 dB re 1 μPa. Avoidance behavior may shorten the exposure period; however, the avoidance behavior could potentially disrupt normal behaviors. Although sea turtles may be expected to avoid the vicinity of seismic surveys, important habitat for sea turtles is overall associated with greater habitat quality (i.e., foraging habitat, juvenile habitat, and nesting beaches) along inshore and nearshore waters of the GOM. Any reactions of sea turtles to seismic surveys will be limited to an avoidance response in the vicinity of the surveys. Sea turtles behaviorally disrupted would be expected to resume their behavior after the seismic vessel has moved out of their immediate area, without significant impairment of feeding, migration, or other behaviors due to the short duration of exposure. Sea turtles also occur in greater abundances in closer to shore than in offshore waters, with the exception of foraging leatherbacks. With implementation of the MMS NTL No. 2007-G02 (APPENDIX A), the potentially for adverse effects to sea turtles will be reduced to discountable levels.

3.1.3 Vessel Noise and Operation

Vessels transmit noise through water and cumulatively are a significant contributor to increases in ambient noise levels in many areas. The dominant source of vessel noise from the proposed action is propeller cavitation, although other ancillary noises may be produced. The intensity of noise from service vessels is roughly related to ship size and speed. Large ships tend to be noisier than small ones, and ships underway with a full load (or towing or pushing a load) produce more noise than unladen vessels. Shipping traffic is most significant at frequencies from 20 to 300 Hz. Supertankers may generate

peak sources levels of 185 to 190 dB re 1 μPa-m at about 7 Hz, and 160 dB re 1 μPa-m at frequencies of 20 to 60 Hz (Richardson et al. 1995). However, vessel traffic proposed in the action would produce lower levels of noise of 150 to 170 dB re 1 μPa-m at frequencies below 1,000 Hz. A tug pulling a barge generates 164 dB re 1 μPa-m when empty and 170 dB re 1 μPa-m loaded. A tug and barge underway at 18 km/h can generate broadband source levels of 171 dB re 1 μPa-m. A small crew boat produces 156 dB re 1 μPa-m at 90 Hz.

Increases in ambient noise are believed to be a potential threat for marine animals having greatest hearing sensitivities at lower frequencies that overlap with the main frequency level of energy produced by vessels, such as those of mysticetes, sea turtles, and fishes. Because vessel noise is continuous in the marine environment and can propagate great distances, masking and behavioral disturbance may be important effects on mysticetes, which can hear in the frequency range produced by vessels, but is not expected for odontocetes, such as sperm whales, which hear at higher frequencies.

When higher frequencies are produced by vessel operation, they are generally of lower sound levels and do not propagate great distances. Any potential for disturbance from noise would be within close proximity to a vessel. Sperm whale responses to vessels may vary depending on the type of vessel involved. Sperm whales have been observed to reduce surface times with fewer blows per surface, exhibit shorter intervals between blows, and exhibit reduced frequency of dives with raised flukes, while other whales tolerate boat presence (Gordon et al. 1992). Many reactions observed by sperm whales appear to be associated with the level of noise produced by the vessels (Richardson et al. 1995). The variable reactions by individual sperm whales may indicate some habituation on the part of those individuals that do not exhibit any reactions or may be indicative of individual variation in the behavioral patterns that are also associated with other marine mammals. Vessel noise and the presence of the vessel on the water may potentially affect the behavior of animals at relatively close distances where the vessel noise is more audible and the vessel may be visible from both below and above the surface. To reduce the risk of interactions with sperm whales, MMS will implement NMFS' vessel strike avoidance measures for protected species, as implemented in MMS NTL 2007-G04 (APPENDIX B). The NTL requires that vessel operators maintain a distance of 90 m from sperm whales that would reduce potential disturbances to this species to discountable levels.

Effects on sea turtles are not expected since these species do not appear to greatly utilize environmental sound, at least at far distances in the open ocean. For sea turtles, avoidance appears to be more of a function of the physical presence of the vessel rather than the noise produced. To reduce the potential risk of interactions with sea turtles, MMS will implement NMFS' vessel strike avoidance measures for protected species, as implemented in MMS NTL 2007-G04 (APPENDIX B). The NTL requires that vessel operators maintain a distance of 45 m from sea turtles that would reduce the potential effects from the physical presence of the vessels to discountable levels.

It is not likely that lease sales in the WPA will result in any trips east of the Mississippi River that would affect the designated critical habitat of the Gulf sturgeon. In the CPA major navigation channels are excluded from critical habitat. Gulf sturgeon are not expected to be impacted by noise and direct physical impacts associated with vessel traffic associated with oil and gas activities in the WPA and CPA, since vessels are not expected to operate in this species' habitat.

3.1.4 Helicopter Operation

Aircraft operation may ensonify broad areas, albeit for short periods at any one location while in transit. Helicopters produce sounds (resulting from rotors) generally below 500 Hz with estimated source levels for a Bell 212 helicopter of 149 to 151 dB re 1 μPa-m (Richardson et al. 1995). At incident angles greater than 13° from the vertical, much of the incident noise from passing aircraft is reflected and does not penetrate the water (Urick 1972). Therefore, NMFS believes underwater noise from helicopters is generally very brief in duration, compared with the duration of audibility in the air, and the effects of underwater noise from helicopters on listed species of sperm whales, sea turtles, and Gulf sturgeon will be insignificant.

Helicopter noise may affect sea turtles and sperm whales at the surface by eliciting startle responses due to increasing noise of a helicopter as it rapidly approaches, or due to the physical presence of the helicopter in the air. A hovering or circling aircraft would be expected to have a potentially greater affect on an animal. The modes by which an animal may be affected and the magnitude of those affects may not only depend on the helicopter operation (i.e., hovering or circling), but also on the species, hearing ability, or behavior of the animal. Routine OCS helicopter traffic would not be expected to disturb animals for extended periods, provided pilots do not alter their flight patterns to more closely observe or photograph marine mammals. Helicopters, while flying offshore, generally maintain altitudes above 700 ft during transit to and from a working area, and at an altitude of about 500 ft between platforms. The duration of the effects resulting from a startle response are expected to be short-term during routine flights, and the potential effects will be insignificant to sea turtles and sperm whales.

3.1.5 Marine Debris

Although the intentional discharge of marine debris is prohibited by law (30 CFR 250.40 and MARPOL, Annex V, P.L. 100-220 [101 St. 1458]), accidental losses of debris do occur. Marine debris may originate from a variety of sources, yet the sources are usually not identified. A published study regarding shoreline trash at Padre Island National Seashore reported that approximately 10 percent of marine trash that washed ashore originated from offshore structures and/or vessels associated with the oil and gas industry. The incidental ingestion of marine debris and entanglement continue to adversely affect listed species and has been considered in preparation of the waste management plan for this project. MMS has proposed incorporation of an annual training and certification requirement for marine debris education and elimination for all offshore personnel, including the potential for adverse effects to listed species as required by MMS NTL 2007-G03 (APPENDIX C). NMFS believes that, with implementation of

these measures, the potential for adverse impacts to listed species resulting from accidental discharges of trash and debris is discountable.

3.1.6 Construction Noise

Gulf sturgeon are not expected to be found in any OCS area in which MMS-permitted pile driving activity could occur and will not be affected. Pile driving is not required for deepwater structure installations; however, few activities do occur in waters depths >200 m. Because sperm whales are most commonly found in greater water depths > 1,000 m and most installations occur in shallower depths, the risk of sperm whales being affected by pile driving noise is considered discountable. Although vessel noise is a relatively constant contributor to ambient noise levels in the GOM, NMFS considers pile driving to be a louder and frequent noise source resulting from many, but transient point sources of noise from construction activities. The noise from these activities over the continental shelf and slope regions of the OCS has the greatest potential to affect listed species of sea turtles because the turtles are routinely found in these areas.

Although pile-driving noise is not a continuous signal, repeated blows from the hammer (generally several seconds apart) could potentially affect the behavior of sea turtles in the area. Most structure installation requiring pile driving is expected to occur over the continental shelf in waters less than 400 m. Casing conductor driving operations occur in all water depths throughout the Central and Western GOM, but are concentrated on the shelf in waters less than 200 m in federal waters, and would therefore affect mostly listed species of sea turtles.

Despite a gradual decrease during the past 4 or 5 years due to increased deepwater activities, statistics compiled over the last 10 years indicate that an average of over 1,100 drilling operations are conducted annually in the Central and Western GOM. Since current MMS permitting and database processes do not track the method of conductor casing installation, it is assumed that the majority of the new drilling activities will use an impact hammer, as this is the preferred method of pile driving in the GOM. Pile-driving operations supporting oil and gas activities in the GOM involve the same basic principles as on-shore or coastal/near-shore activities; using specialized equipment to force an object into the sediment to affix an object that requires a stationary hold or foundation. Unlike on-shore activities, pile-driving operations on the GOM OCS involve the added complexity that comes with mobilizing, rigging, powering, and controlling complex equipment from platforms and vessels often dozens to thousands of feet above the substrate surface and in many instances, requiring operations in a sub-sea environment.

Pile driving noise is a relatively broadband signal that may be audible to many species. There is a potential for sea turtles to avoid the ensonified area of pile driving. The sound waves produced by pile driving projects may deter animals by acting as an acoustic deterrent from the construction area. Deterrence may be an important effect of pile driving if it disrupts feeding, mating, or sheltering of individuals. Sea turtles are found in greater abundances in nearshore and inshore waters (Epperly et al. 2002) than offshore habitats where the proposed lease sale activities would potentially occur. The higher abundance of animals in coastal habitats is attributed to the higher quality of these coastal

habitats for these species than those offshore. Although adverse effects on fishes have been reported in riverine and coastal habitats, these effects are not be expected for sea turtles in the offshore environment where they occur in lesser abundances, are more transient, and wouldn't be expected to be attracted to an area where new construction is occurring. Additionally, new construction activities do not have an established marine community surrounding it that may attract marine life (e.g., oil and gas platforms already installed). Based on the above analysis, the likelihood of adverse affects on sea turtles from pile driving is considered to be discountable.

3.1.7 Operation Noise

Noise associated with decommissioning phases has been considered in a programmatic biological opinion completed in 2007. Geological and geophysical surveying is currently being considered in a programmatic consultation with MMS. All offshore activities on the OCS discussed in the section will not affect Gulf sturgeon because these activities are beyond the range of this species. Noise associated with pile driving and vessels are discussed above. The following considers the effects of common noise-producing activities resulting from the proposed action.

Machinery Noise

Machinery noise generated during the operation of fixed structures can be continuous or transient, and variable in intensity. Underwater noise from fixed structures ranges from about 20 to 40 decibels (dB) above background levels within a frequency spectrum of 30-300 Hz at a distance of 30 m from the source (Gales 1982). These levels vary with type of platform and water depth. Underwater noise from platforms standing on metal legs would be expected to be insignificant of the small surface area in contact with the water and the placement of machinery on decks well above the water.

Drilling

Offshore drilling and production involves a variety of activities that produce underwater noises. Noises emanating from drilling activities from fixed, metal-legged platforms are considered not very intense and generally are at very low frequencies; near 5 Hz. Gales (1982) reported received levels of 119 to 127 dB re 1 μPa-m at near-field measurements. Noises from semi-submersible platforms also show rather low sound source levels. Drillships show somewhat higher noise levels than semi-submersibles as a result of mechanical noises generated through the drillship hull. The drillship Canmar Explorer II generates broadband source levels of 174 dB re 1 μPa-m. Noises associated with offshore oil and gas production are generally weak and typically at very low frequencies (~4.5 to 38 Hz) (Gales 1982). Although drilling noise may contribute to increases in ambient noise levels in the GOM while these activities are occurring, based on the available information, drilling is not expected to produce amplitudes sufficient to case hearing or behavioral effects in sea turtles or sperm whales; therefore, these effects are insignificant.

3.1.8 Pipeline Construction Effects on Sea Turtles and Gulf Sturgeon

The conventional construction season for pipeline installation is spring through fall (MMS 2006). Although sea turtles could be found in a pipeline construction area any

time of year, potential impacts to Gulf sturgeon would be avoided during this construction period when Gulf sturgeon are found in riverine habitats. However, since this analysis is based upon anticipated activities in the future and the time of year of pipeline construction is unknown, it is assumed construction may occur any time. Construction of offshore pipelines will result in turbidity from burying of the pipeline as it is deployed by one barge as a second barge cuts (jets) the trenches and buries the pipeline. Sediment disturbance may also occur from jetting and trenching of the seafloor to lay the pipeline. The effects of turbidity are not expected to result in adverse impacts to listed species and are considered discountable. Any potential disturbance would be associated with short-term avoidance of the construction area. Any avoidance behavior that may occur is not expected to result in any detectable change in the foraging success or health of individuals. Sea turtles and Gulf sturgeon that may be in the area of pipeline installation or resting on the seafloor may experience temporary displacement from the area. Any disturbances to listed sea turtle species are expected to be insignificant, having no adverse impacts on listed species of sea turtles or Gulf sturgeon.

Pipelines installed in water depths greater than 500 m use dynamically positioned barges that do not require anchoring to the sea floor or burying of the pipeline. Construction of pipelines is not expected to affect sperm whales, and the potential effects of vessel operations on listed species are discussed above.

3.1.9 Brightly-lit platforms

Lighting of offshore structures presents a potential danger to sea turtle hatchlings (Owens 1983). Artificial lighting is a known threat to nesting sea turtles and interrupts the ocean-finding behavior of neonates. Hatchlings are known to be attracted to light (Witherington and Martin 1996, Witherington 1997). Platform lighting near nesting beaches could potentially affect nesting sea turtles and affect the behavior during the offshore migration of neonates if the structures 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). However, hatchlings may rely less on light cues offshore (Salmon and Wyneken 1990). 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, or swimming parallel to shore where they are subject to a variety of mortality risks. Due to the location of MMS-permitted structures on the OCS, the effects of lighting from offshore structures on sea turtles are insignificant.

3.1.10 Heavy Metals

The environmental risks of chemical products used in GOM oil and gas operations have been analyzed and continue to be studied. 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 (USEPA) National Pollutant and Discharge Elimination System permits. Most of the routinely discharged chemicals are diluted and dispersed when released in offshore areas and are not expected to directly affect any listed species. Accidental or intentional discharges of chemicals have the potential to be released in large volumes that may have deleterious short-term effects (hours to days)

within the immediate marine environment. When an area is drilled, drilling fluids, drill cuttings, produced water, deck drainage, sanitary wastes, and domestic wastes are released. During production, additional waste streams include produced sand and well treatment, workover, and completion fluids. Minor discharges are also released from desalination units, blowout preventer fluids, boiler blowdown, and excess cement slurry.

The chemical profiles, toxicity, and spill analyses have been summarized for some chemical compounds used for development and production and are detailed in MMS 2001a and 2001b. The Lethal Concentration 50 (LC50), Effect Concentration 50 (EC50), and Lowest Observed Effect Concentration (LOEC) of these chemicals have been determined for algae, invertebrates, fish, and benthic organisms. Existing data show that heavy metal concentrations are often present in marine mammal and sea turtle tissues and organs from different locations around the world's oceans. These heavy metals are also detected in eggs and hatchling sea turtles, as well as in the milk of lactating cetaceans. Neff (2002) provides a review of bioaccumulation in marine organisms and the effects of contaminants in oil well produced water.

A comprehensive review of the wastes and pollutants generated by oil and gas activities and their toxicity to selected marine organisms may be found in NPDES evaluation criteria (USEPA 1993a, 1993b). Results of analysis conducted by Neff et al. (1989) looked at the accumulation of mercury and other metals in flounder, clams, and sand worms. Flounder did not accumulate any metals during exposure, and the soft-shell clams and sand worms had only slight increases of some metals. The authors noted that most of the accumulated metals were actually in the gut or gills as barite particles. These investigations led the researchers to conclude that metals associated with drilling fluid barite are not readily available by uptake from marine organisms.

The quantitatively most important sources of mercury from exploration and production activities are drilling fluids and produced water. GOM-produced water rarely contains more than about 0.1 mg/L total mercury (about 10-fold higher than clean natural seawater). Nearly all the mercury in drilling muds is associated with barite, which is added to the mud as a weighting agent. The USEPA limit on mercury in barite is 1 part per million (ppm). The average mercury concentration in modern drilling mud barite is 0.5 ppm. Most drilling muds and cuttings contain <0.1 ppm mercury. The mercury in produced water is diluted rapidly to background concentrations following discharge to the ocean. Most drilling muds discharged to US waters contain <1 ppm mercury. Sediments around offshore platforms in the GOM also rarely contain more than 1 ppm mercury. The background concentration of mercury in marine sediments from the GOM is usually <0.1 ppm.

The mercury in drilling mud barite is sequestered in the solid barium sulfate in sulfide minerals, particularly sphelerite (ZnS). It is extremely insoluble and stable in this form, particularly in anoxic sediments. Very little mercury can be extracted from the barite, even under mildly acidic conditions, as might occur in the digestive tract of a marine animal. Because of its low bioavailability, mercury in barite is not readily available for

methylation, and has consequently been shown to not be readily available in the food chain.

Drilling fluids also contain 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). Statistically significant levels (when compared to background levels) of all these metals except chromium have been measured within 500 m of GOM drilling sites (Boothe and Presley 1989), and dilution to background levels occurs within 1,000 m of the discharge point.

Although elevated levels of mercury may occur within 500 m of drilling sites (Kennicutt 1995), the chemical composition of the mercury in barite is not readily available to biological organisms (Neff et al. 1989). Data for mercury in tissues of fish and shellfish from the GOM show that marine animals collected near offshore platforms do not contain significantly higher concentrations of mercury than the same or related species from elsewhere in the GOM. Although there is some localized heavy metal contamination within 150 m of drilling sites, it is not expected to adversely affect larger, wide-ranging species such as sea turtles and sperm whales. No MMS-permitted oil and gas drilling occurs in or near Gulf sturgeon habitat, and no effects on this species or its designated critical habitat is expected, and not considered further in this biological opinion.

3.1.11 Water Quality

The main sources of wastes and discharges generated from oil and gas operations include treated sewage, treated wastewater, engine waste, biodegradable food waste, and solid waste. Wastes and discharges will result from operation of offshore structures and support vessels. Due to standard practices of the presence of curbs, drip pans, and other pollution prevention equipment on offshore structures, we believe the routine discharges of treated sewage, wastewater, and biodegradable food wastes will not adversely affect listed species of sea turtles, Gulf sturgeon, or sperm whales.

Turbidity could result from construction activities, including pipelines, anchoring, and pile driving. The amount of turbidity from these type of activities is generally localized and short-term in duration. Listed species in any construction area may experience temporary displacement from the area, yet minor disturbance, if any, is expected to occur. Any disturbances to sea turtle, Gulf sturgeon, or sperm whales from turbidity are expected to be short term and insignificant, having no adverse impacts on these species.

Some additional sources of turbidity may be associated with the anchoring of tugboats used in the GBS installation, placement of the GBS on the seafloor, and the installation of other LNG terminal components (e.g., steel jacket, mooring structures, and pipeline riser platform). All these effects are expected to result in minimal disturbance of the seafloor and any turbidity would be expected to have short term, minor effects on water quality. Insignificant effects to listed species are expected from these short-term increases in turbidity.

Summary of Potential Adverse Effects to Listed Species
In summary, NMFS concludes green, hawksbill, Kemp's ridley, leatherback, and loggerhead sea turtles; and Gulf sturgeon are not likely to be adversely affected by the above effects associated with the proposed action; however, the effects of vessel strikes on sea turtles, and the effects of oil spills on all listed species in the action area are considered further in the Effects of the Action in Section 7 of this biological opinion.

4 CRITICAL HABITAT LIKELY TO BE AFFECTED

Gulf sturgeon critical habitat was jointly designated by NMFS and USFWS on April 18, 2003 (50 CFR 226.214). Critical habitat is defined in section 3(5)(A) of the ESA as (i) the specific areas within the geographic area occupied by a species, at the time it is listed in accordance with the Act, on which are found those physical or biological features (I) essential to the conservation of the species and (II) that may require special management considerations or protection; and (ii) specific areas outside the geographic area occupied by a species at the time it is listed, upon a determination that such areas are essential for the conservation of the species. "Conservation" is defined in section 3(3) of the ESA as the use of all methods and procedures that are necessary to bring any endangered or threatened species to the point at which listing under the ESA is no longer necessary.

Gulf sturgeon critical habitat includes areas within the major river systems that support the seven currently reproducing subpopulations (USFWS et al. 1995) and associated estuarine and marine habitats. Gulf sturgeon use the rivers for spawning, larval and juvenile feeding, adult resting and staging, and to move between the areas that support these components. Gulf sturgeon use the lower riverine, estuarine, and marine environments during winter months primarily for feeding and, more rarely, for inter-river migrations. Estuaries and bays adjacent to the riverine units provide unobstructed passage of sturgeon from feeding areas to spawning grounds.

Fourteen areas (units) are designated as Gulf sturgeon critical habitat. Critical habitat units encompass approximately 2,783 river kilometers (km) and 6,042 km^2 of estuarine and marine habitats and include portions of the following GOM rivers, tributaries, estuarine, and marine areas:

Unit 1 = Pearl and Bogue Chitto Rivers in Louisiana and Mississippi
Unit 2 = Pascagoula, Leaf, Bowie, Big Black Creek and Chickasawhay Rivers in Mississippi
Unit 3 = Escambia, Conecuh, and Sepulga Rivers in Alabama and Florida
Unit 4 = Yellow, Blackwater, and Shoal Rivers in Alabama and Florida
Unit 5 = Choctawhatchee and Pea Rivers in Florida and Alabama
Unit 6 = Apalachicola and Brothers Rivers in Florida
Unit 7 = Suwannee and Withlacoochee Rivers in Florida
Unit 8 = Lake Pontchartrain (east of causeway), Lake Catherine, Little Lake, the Rigolets, Lake Borgne, Pascagoula Bay and Mississippi Sound systems in Louisiana and Mississippi, and sections of the state waters within the GOM

Unit 9 = Pensacola Bay system in Florida
Unit 10 = Santa Rosa Sound in Florida
Unit 11 = Nearshore GOM in Florida
Unit 12 = Choctawhatchee Bay system in Florida
Unit 13 = Apalachicola Bay system in Florida, and
Unit 14 = Suwannee Sound in Florida

Critical habitat determinations focus on those physical and biological features, or primary constituent elements (PCEs), that are essential to the conservation of the species (50 CFR 424.12). Federal agencies must insure that their activities are not likely to result in the destruction or adverse modification of the PCEs within defined critical habitats. Therefore, proposed actions that may impact designated critical habitat require an analysis of potential impacts to each PCE.

PCEs identified as essential for the conservation of the Gulf sturgeon consist of:

(1) Abundant food items, such as detritus, aquatic insects, worms, and/ or molluscs, within riverine habitats for larval and juvenile life stages; and abundant prey items, such as amphipods, lancelets, polychaetes, gastropods, ghost shrimp, isopods, molluscs and/or crustaceans, within estuarine and marine habitats and substrates for subadult and adult life stages;

(2) Riverine spawning sites with substrates suitable for egg deposition and development, such as limestone outcrops and cut limestone banks, bedrock, large gravel or cobble beds, marl, soapstone, or hard clay;

(3) Riverine aggregation areas, also referred to as resting, holding, and staging areas, used by adult, subadult, and/or juveniles, generally, but not always, located in holes below normal riverbed depths, believed necessary for minimizing energy expenditures during fresh water residency and possibly for osmoregulatory functions;

(4) A flow regime (i.e., the magnitude, frequency, duration, seasonality, and rate-of-change of fresh water discharge over time) necessary for normal behavior, growth, and survival of all life stages in the riverine environment, including migration, breeding site selection, courtship, egg fertilization, resting, and staging, and for maintaining spawning sites in suitable condition for egg attachment, egg sheltering, resting, and larval staging;

(5) Water quality, including temperature, salinity, pH, hardness, turbidity, oxygen content, and other chemical characteristics, necessary for normal behavior, growth, and viability of all life stages;

(6) Sediment quality, including texture and other chemical characteristics, necessary for normal behavior, growth, and viability of all life stages; and

(7) Safe and unobstructed migratory pathways necessary for passage within and between riverine, estuarine, and marine habitats (e.g., an unobstructed river or a dammed river that still allows for passage).

As stated in the final rule designating Gulf sturgeon critical habitat (68 FR 13399), the following activities, among others, when authorized, funded or carried out by a federal agency, may destroy or adversely modify critical habitat:

(1) Actions that would appreciably reduce the abundance of riverine prey for larval and juvenile sturgeon, or of estuarine and marine prey for juvenile and adult Gulf sturgeon, within a designated critical habitat unit, such as dredging; dredged material disposal; channelization; in-stream mining; and land uses that cause excessive turbidity or sedimentation;

(2) Actions that would appreciably reduce the suitability of Gulf sturgeon spawning sites for egg deposition and development within a designated critical habitat unit, such as impoundment; hard-bottom removal for navigation channel deepening; dredged material disposal; in-stream mining; and land uses that cause excessive sedimentation;

(3) Actions that would appreciably reduce the suitability of Gulf sturgeon riverine aggregation areas, also referred to as resting, holding, and staging areas, used by adult, subadult, and/or juveniles, believed necessary for minimizing energy expenditures and possibly for osmoregulatory functions, such as dredged material disposal upstream or directly within such areas; and other land uses that cause excessive sedimentation;

(4) Actions that would alter the flow regime (the magnitude, frequency, duration, seasonality, and rate-of-change of fresh water discharge over time) of a riverine critical habitat unit such that it is appreciably impaired for the purposes of Gulf sturgeon migration, resting, staging, breeding site selection, courtship, egg fertilization, egg deposition, and egg development, such as impoundment; water diversion; and dam operations;

(5) Actions that would alter water quality within a designated critical habitat unit, including 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, such as dredging; dredged material disposal;

channelization; impoundment; in-stream mining; water diversion; dam operations; land uses that cause excessive turbidity; and release of chemicals, biological pollutants, or heated effluents into surface water or connected groundwater via point sources or dispersed non-point sources;

(6) Actions that would alter sediment quality within a designated critical habitat unit such that it is appreciably impaired for normal Gulf sturgeon behavior, reproduction, growth, or viability, such as dredged material disposal; channelization; impoundment; in-stream mining; land uses that cause excessive sedimentation; and release of chemical or biological pollutants that accumulate in sediments; and

(7) Actions that would obstruct migratory pathways within and between adjacent riverine, estuarine, and marine critical habitat units, such as dams, dredging, point-source-pollutant discharges, and other physical or chemical alterations of channels and passes that restrict Gulf sturgeon movement.

4.1 Effects to Critical Habitat Considered and Discounted

Gulf sturgeon critical habitat was designated in 2003 (50 CFR 226.214). Federal agencies must insure that their activities are not likely to result in the destruction or adverse modification of designated critical habitat through adverse effects to the primary constituent elements (PCEs) within defined critical habitats. The seaward boundary of Louisiana, Mississippi, and Alabama state coastal zones is 3 nautical miles into the territorial sea. Since Gulf sturgeon critical habitat extends only 1 mile beyond the barrier islands, it is fully within State waters. MMS lease sale activities primarily occur offshore and would not be expected to directly affect designated critical habitat for the Gulf sturgeon. However, pipelines and accidental spills were considered and discounted for their potential to adversely affect designated critical habitat.

4.1.1 Pipelines

Various entities regulate pipeline and other activity in State waters with either the COE or the Federal Energy Regulatory Commission (FERC) as the lead federal agency responsible for permitting such activities. Pipeline construction is therefore considered an indirect effect of the proposed action. If a pipeline were to be constructed through designated critical habitat for Gulf sturgeon, pipeline projects would have individual permits associated with them and would be subject to section 7 consultation under the ESA with FERC at that time.

Increasingly, the trend is for new OCS pipelines to tie into existing systems rather than creating new landfalls. Over the last 10 years, there has been an average of about one new OCS pipeline-making landfall per year. Since 2002, only one new pipeline has come to shore in Louisiana from OCS-related activities, but none have been constructed in designated Gulf sturgeon critical habitat since its designation that have been a result of MMS actions. Based on this trend, few if any pipelines are expected to affect Gulf

sturgeon critical habitat. However, considering the duration of proposed action, between the years 2007 and 2046, 80-118 new pipelines are projected in state waters as a result of the OCS Program. Of those pipelines, 32-47 (25-36 in Louisiana, 1-3 in Mississippi and/or Alabama) are projected to make landfall. Any pipelines that make landfall would most likely go ashore in Plaquemines Parish, Louisiana; Jackson County, Mississippi; or Mobile County, Alabama. Landfalls in Plaquemines Parish, Louisiana are not expected to affect critical habitat. However, the estimated three pipelines making landfall in Mississippi and Alabama may affect designated critical habitat unit 8. Currently, no pipelines are currently planned for construction in designated critical habitat; therefore, the following analysis is based upon the best available information for this type of activity with the expectation that a few pipelines may be constructed in designated critical habitat unit 8 over the 40-year lifetime of the action.

Of the seven PCEs of Gulf sturgeon critical habitat discussed above, four are found in critical habitat unit 8: 1) abundant food items; 2) water quality; 3) sediment quality; and 4) migratory pathways. The following PCEs were considered, and discounted for the potential to be adversely affected by the proposed lease sales: water quality, migratory pathways, and sediment quality.

Abundant Food Items

It is assumed that 0.32 ha of bottom is disturbed per kilometer of pipeline installed (MMS 2006). Benthic organisms could be displaced or buried during jetting, trenching, and burial of pipelines. Because the pipeline is expected to be buried at a depth of 1 m in this area and the amount of material side-cast to create the trench is expect to range several inches in depth, invertebrates are expected to be able to recolonize the area by burrowing and/or tunneling back to the sediment depths in which they are usually found. The side-casting of the material resulting from trenching and jetting is expected to be minor and insignificant since the invertebrates will be covered with a relatively shallow amount of sediment and the effects are expected to be short-term and insignificant. Following laying of pipelines in water depths <60 m, they are required to be buried. Pipelines are required to be buried at a minimum depth of 1 m and invertebrates will be able to colonize these sediments following burial, and will be available to foraging Gulf sturgeon. The impacted areas from the potential three pipelines would be expected to affect a very small percentage of the total area of unit 8. The impacts are expected to be temporary and not significantly affect the available foraging habitat in unit 8 while the impacts last.

Anchoring of barges is usually required during construction of the pipeline. Anchor depressions can be as deep as 2.1 to 2.8 m. Each time an anchor is relocated, sediments and benthic organisms beneath the anchor would be displaced, suspended, or crushed. Anchoring methods are designed to minimize movement and sweeping of anchor chains; therefore, impacts are expected to be minimal. The areas affected would be available for recolonization of invertebrate fauna following anchor removal. The effects to invertebrates are expected to be temporary and insignificant.

Potential pipeline leaks were also considered for the potential to affect abundant prey items, sediment quality, and water quality. Because natural gas would bubble to the surface and dissipate, no impacts to Gulf sturgeon critical habitat PCEs would be expected.

Water Quality
The disturbance of approximate 0.32 ha of bottom per kilometer of pipeline installed (MMS 2006) may affect water quality in the Gulf sturgeon critical habitat. Sediments would be suspended resulting in increased turbidity and a short-term degradation of water quality. The turbidity is expected to last from hours to days depending on the amount of sediment suspended. During jetting and trenching, and anchor placement, some turbidity is expected to occur. No changes in temperature, salinity, pH, hardness, oxygen content, or other chemical characteristics are expected from pipeline construction. NMFS does not expect measurable impacts to the status of this PCE, as a result of this project, within unit 8 or designated Gulf sturgeon critical habitat overall.

Sediment Quality
Sediment contaminants were considered for their potential to be suspended and settle during construction operations. The (USEPA) has assessed the overall condition of GOM estuaries (USEPA 1999). Based on this assessment, the USEPA concluded that there was an even distribution of estuary sites between the Florida panhandle and Corpus Christi, Texas, whose sediments were contaminated. However, the majority of estuarine ecosystems in all GOM states were identified as having fair to good sediment quality.

Trenching and jetting will be used to lay the pipeline. Coarse sediment will settle out quickly (hours), while finer sediments may remain suspended for longer periods (hours to days). Because the depth of disturbance is rather shallow (the pipeline will be buried at a depth of 1 m), the quality of sediment settling out on the seafloor is expected to be the same as pre-disturbance conditions.

Based on the available information regarding contaminants and depth of sediment disturbance, no adverse affects to sediment quality are expected from pipeline construction.

Migratory Pathways
Effects on migratory pathways of Gulf sturgeon critical habitat unit 8 were considered during consultation on this project. Because pipeline construction generally occurs in open waters of the GOM and will involve the localized disturbances related to the immediate area of pipe-laying activities, NMFS believes that the project will not reduce or eliminate Gulf sturgeon access to areas nearby or adjacent to the immediate project site. Therefore, pipeline construction is not expected to adversely affect migratory pathways.

4.1.2 Accidental Spills
Potential impacts on designated Gulf sturgeon critical habitat may occur from drilling and produced water discharges, accidental releases of fluids, blowouts, and oil spills.

Designated critical habitat units 8 and 9 were considered in this analysis. If a spill were to contact Gulf sturgeon critical habitat, the PCEs of water quality, sediment quality, and abundant prey items may be affected. Coastal areas are generally more susceptible to contact by inshore or coastal spills. Inshore spills have a low probability of occurrence. Inshore vessel collisions may release fuel and lubricant oils and pipeline ruptures may release crude and condensate oil and may infrequently occur. Because of the floating nature of oil and the small tidal range in the coastal GOM, oil spills alone would typically have very little impact on benthic feeders such as the Gulf sturgeon. Unusually low tidal events, increased wave energy, or the use of oil dispersants increase the risk of impact with bottom-feeding and/or bottom-dwelling fauna. For this reason, dispersants are not usually used in response to coastal spills. Dispersants would likely be used for offshore spills and are expected to disperse about 65 percent of the volume of a spill. Additionally, considering the projected use of shore bases in support of activities resulting from a proposed action, very few of the estimated 46-102 coastal spills resulting from a proposed action in the CPA are likely to occur east of the Mississippi River. No coastal spills are projected to occur in Mississippi, Alabama, or Florida coastal waters as a result of a proposed action in the CPA. NMFS believes that the risk from inshore spills reaching Gulf sturgeon designated critical habitat and affecting any PCEs is so low, it is discountable.

Offshore spills are generally far less likely to affect designated critical habitat than inshore or coastal spills because much of the critical habitat is protected from offshore spills by barrier islands, shoals, shorelines, and currents. Smaller spills (<42,000 gal) are not expected to significantly impact water quality in marine and coastal waters. The dilution and low toxicity of this pollution from small spills offshore are not expected to reach any designated critical habitat and is considered discountable. Larger spills, however, could impact coastal waters, depending on many factors such as the buoyancy of the spilled fluid, distance from the spill, currents, and duration of the spill.

The potential risk of an oil spill affecting Gulf sturgeon critical habitat must be evaluated before the potential affects to PCEs can be assessed. Several factors reduce the probability of spilled oil affecting Gulf sturgeon critical habitat, including:

- The inshore, riverine areas of designated habitat have a negligible probability of impact from accidental oil spills due to geographic protection, location east of the Mississippi River, and distance from major shore bases;
- The floating nature of oil and the lack of large tidal ranges, as well as the influence of the Mississippi River outflow to help disperse slicks, diminishes the probability of significant impact of spilled oil on Gulf sturgeon critical habitat;
- The very low probability (1 percent or less) of a large offshore oil spill contacting Gulf sturgeon critical habitat in all but the very westernmost area diminishes potential impact to, or alteration of, critical habitat; and
- The extremely low probability of a coastal spill impacting east of the Mississippi River and north of Plaquemines Parish diminishes the probability of oil impacts to critical habitat.

Based on oil spill modeling conducted by MMS, the coastal waters inhabited by the Gulf sturgeon are not expected to be at any significant risk from oil spills. The likelihood of a spill >42,000 gal occurring within the WPA and reaching designated critical habitat within 10 days after the spill incident is <0.5 percent and considered discountable (Table 4). Very few of the estimated 46-102 coastal spills resulting from a proposed action in the CPA are likely to occur east of the Mississippi River. No coastal spills are projected to occur in Mississippi, Alabama, or Florida coastal waters as a result of a proposed action in the CPA. However, MMS conducted an analysis of the risk of a spill >42,000 gal occurring offshore as a result of a proposed action and reaching the known locations of the Gulf sturgeon within 10 days after the spill event. It is estimated that there is a 1 percent risk for Louisiana waters east of the Mississippi River to be affected by an oil slick within 10 days. Probabilities decrease below 1 percent to areas further to the east.

Table 4. Probability (% chance) of oil spills ≥42,000 gal occurring and contacting designated Gulf sturgeon critical habitat within 10 days as a result of a WPA or CPA proposed action ("high" and "low" refer to production levels).

Critical Habitat Unit	WPA		CPA	
	Low	High	Low	High
8	<0.5	<0.5	1	1
9	<0.5	<0.5	<0.5	<0.5

Based on the above analysis, the likelihood of spill occurrence and subsequent contact with Gulf sturgeon designated critical habitat is extremely low; therefore the potential affect to any PCE is considered discountable.

Summary of Effects to PCEs

In summary, the PCEs of abundant prey items, water quality, sediment quality, and migratory pathways are not likely to be adversely affected by pipelines construction or accidental spills associated with the proposed action. The probability of an oil or chemical spill reaching designated Gulf sturgeon critical habitat is so low, it is considered discountable.

5 STATUS OF AFFECTED SPECIES IN THE ACTION AREA

The sea turtle subsections focus primarily on the Atlantic Ocean populations of these species since these are the populations that may be directly affected by the proposed action. However, these species are listed as global populations (with the exception of Kemp's ridley and Florida green sea turtles, whose distribution is entirely in the Atlantic including the GOM), and the global status and trends of these species are included as well, in order to provide a basis for our final determination of the effects of the proposed action on the species as listed under the ESA.

5.1 Loggerhead Sea Turtle

The loggerhead sea turtle was listed as a threatened species throughout its global range on July 28, 1978. It was listed because of direct take, incidental capture in various fisheries, and the alteration and destruction of its habitat. Loggerhead sea turtles inhabit the continental shelves and estuarine environments along the margins of the Atlantic, Pacific, and Indian Oceans. In the Atlantic, developmental habitat for small juveniles is the pelagic waters of the North Atlantic and the Mediterranean Sea (NMFS and USFWS, 1991a). Within the continental United States, loggerhead sea turtles nest from Texas to New Jersey. Major nesting areas include coastal islands of Georgia, South Carolina, and North Carolina, and the Atlantic and GOM coasts of Florida, with the bulk of the nesting occurring on the Atlantic coast of Florida.

5.1.1 Pacific Ocean

In the Pacific Ocean, major loggerhead nesting grounds are generally located in temperate and subtropical regions with scattered nesting in the tropics. Within the Pacific Ocean, loggerhead sea turtles are represented by a northwestern nesting aggregation located in Japan and a smaller southwestern nesting aggregation, which occurs in eastern Australia (Great Barrier Reef and Queensland) and New Caledonia (NMFS 2001a). There are no reported loggerhead nesting sites in the eastern or central Pacific Ocean basin. Data from 1995 estimated the Japanese nesting aggregation at 1,000 female loggerhead turtles (Bolten et al. 1996). Recent genetic analyses on female loggerheads nesting in Japan suggest that this "subpopulation" is comprised of genetically distinct nesting colonies (Hatase et al. 2002) with precise natal homing of individual females. As a result, Hatase et al. (2002) indicate that loss of one of these colonies would decrease the genetic diversity of Japanese loggerheads; recolonization of the site would not be expected on an ecological time scale. In Australia, long-term census data has been collected at some rookeries since the late 1960s and early 1970s, and nearly all the data show marked declines in nesting populations since the mid-1980s (Limpus and Limpus 2003). The nesting aggregation in Queensland, Australia, was as low as 300 females in 1997.

Pacific loggerhead turtles are captured, injured, or killed in numerous Pacific fisheries including Japanese longline fisheries in the western Pacific Ocean and South China Seas; direct harvest and commercial fisheries off Baja California, Mexico; commercial and artisanal swordfish fisheries off Chile, Columbia, Ecuador, and Peru; purse seine fisheries for tuna in the eastern tropical Pacific Ocean; and California/Oregon drift gillnet fisheries. In addition, the abundance of loggerhead turtles on nesting colonies throughout the Pacific basin has declined dramatically over the past 10 to 20 years. Loggerhead turtle colonies in the western Pacific Ocean have been reduced to a fraction of their former abundance by the combined effects of human activities that have reduced the number of nesting females and reduced the reproductive success of females that manage to nest (e.g., due to egg poaching).

5.1.2 Atlantic Ocean

In the western Atlantic, most loggerhead sea turtles nest from North Carolina to Florida and along the Gulf coast of Florida. There are at least five western Atlantic

subpopulations, divided geographically as follows: (1) A northern nesting subpopulation, occurring from North Carolina to northeast Florida at about 29°N; (2) a south Florida nesting subpopulation, occurring from 29oN on the east coast to Sarasota on the west coast; (3) a Florida Panhandle nesting subpopulation, occurring at Eglin Air Force Base and the beaches near Panama City, Florida; (4) a Yucatán nesting subpopulation, occurring on the eastern Yucatán Peninsula, Mexico (Márquez 1990, TEWG 2000); and (5) a Dry Tortugas nesting subpopulation, occurring in the islands of the Dry Tortugas, near Key West, Florida (NMFS 2001a). The fidelity of nesting females to their nesting beach is the reason these subpopulations can be differentiated from one another. Fidelity for nesting beaches makes recolonization of nesting beaches with sea turtles from other subpopulations unlikely.

Life History and Distribution

Past literature gave an estimated age at maturity of 21-35 years (Frazer and Ehrhart 1985, Frazer et al. 1994), with the benthic immature stage lasting at least 10-25 years. However, based on data from tag returns, strandings, and nesting surveys (NMFS 2001a), NMFS estimates ages of maturity ranging from 20-38 years with the benthic immature stage lasting from 14-32 years.

Mating takes place in late March through 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/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). Generally, 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. Stranding records indicate that when pelagic immature loggerheads reach 40-60 cm straight-line carapace length they begin to live in coastal inshore and nearshore waters of the continental shelf throughout the U.S. Atlantic and GOM, although some loggerheads may move back and forth between the pelagic and benthic environment (Witzell 2002). Benthic immature loggerheads (sea turtles that have come back to inshore and nearshore waters), 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.

Tagging studies have shown loggerheads that have entered the benthic environment undertake routine migrations along the coast that are limited by seasonal water temperatures. Loggerhead sea turtles occur year round in offshore waters off North Carolina where water temperature is influenced by the Gulf Stream. As coastal water temperatures warm in the spring, loggerheads begin to immigrate to North Carolina inshore waters (e.g., Pamlico and Core Sounds) and also move up the coast (Epperly et al. 1995a, Epperly et al. 1995b, Epperly et al. 1995c), occurring in Virginia foraging areas as early as April and on the most northern foraging grounds in the Gulf of Maine in June. The trend is reversed in the fall as water temperatures cool. The large majority leave the Gulf of Maine by mid-September but some may remain in mid-Atlantic and Northeast areas until late fall. By December loggerheads have emigrated from inshore

North Carolina waters and coastal waters to the north to waters offshore North Carolina, particularly off Cape Hatteras, and waters further south where the influence of the Gulf Stream provides temperatures favorable to sea turtles (≥11°C) (Epperly et al. 1995a, Epperly et al. 1995b, Epperly et al. 1995c). Loggerhead sea turtles are year-round residents of central and south Florida.

Pelagic and benthic 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 dwelling and typically prey on benthic invertebrates such as mollusks and decapod crustaceans in hard bottom habitats.

Population Dynamics and Status

A number of stock assessments (TEWG 1998, TEWG 2000, NMFS 2001a, Heppell et al. 2003) have examined the stock status of loggerheads in the waters of the United States, but have been unable to develop any reliable estimates of absolute population size. Based on nesting data of the five western Atlantic subpopulations, the south Florida-nesting and the northern-nesting subpopulations are the most abundant (TEWG 2000, NMFS 2001a). 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 (TEWG 2000). On average, 90.7 percent of these nests were of the south Florida subpopulation and 8.5 percent were from the northern subpopulation (TEWG 2000). The TEWG (2000) assessment of the status of these two better-studied populations concluded that the south Florida subpopulation was increasing at that time, while no trend was evident (may be stable but possibly declining) for the northern subpopulation. A more recent, yet-to-be-published analysis of nesting data from 1989-2005 by the Florida Wildlife Research Institute indicates there is a declining trend in nesting at beaches utilized by the south Florida nesting subpopulation (2006 FWRI letter (McRae) to NMFS, based on statewide nesting beach survey data analyzed by FWRI). Nesting data obtained for the 2006 nesting season is also consistent with the decline in loggerhead nests (Meylan pers. comm. 2006). It is unclear at this time whether the nesting decline reflects a decline in population, or is indicative of a failure to nest by the reproductively mature females as a result of other factors (resource depletion, nesting beach problems, oceanographic conditions, etc.). NMFS has convened a new Turtle Expert Working Group for loggerhead sea turtles that will gather available data and examine the potential causes of the nesting decline and what the decline means in terms of population status. A final report by the loggerhead TEWG is expected by the end of summer 2007.

For the northern subpopulations, recent estimates of loggerhead nesting trends in Georgia from standardized daily beach surveys showed significant declines ranging from 1.5 to 1.9 percent annually (Mark Dodd, Georgia Department of Natural Resources, pers. comm., 2006). Nest totals from aerial surveys conducted by the South Carolina Department of Natural Resources showed a 3.3 percent annual decline in nesting since 1980. Another consideration that may add to the importance and vulnerability of the northern subpopulation is the sex ratios of this subpopulation. NMFS scientists have estimated that the northern subpopulation produces 65 percent males (NMFS 2001a). However, new research conducted over a limited time frame has found opposing sex

ratios (Wyneken et al. 2004) so further information is needed to clarify the issue. Since nesting female loggerhead sea turtles exhibit nest fidelity, the continued existence of the northern subpopulation is related to the number of female hatchlings that are produced. Producing fewer females will limit the number of subsequent offspring produced by the subpopulation.

The remaining three subpopulations – Dry Tortugas, Florida Panhandle, and Yucatán – are much smaller, but also relevant to the continued existence of the species. Nesting surveys for the Dry Tortugas subpopulation are conducted as part of Florida's statewide survey program. Survey effort has been relatively stable during the 9-year period from 1995-2003 (although the 2002 year was missed). Nest counts ranged from 168-270 but with no detectable trend during this period (Florida Fish and Wildlife Conservation Commission, Florida Marine Research Institute, Statewide Nesting Beach Survey Data). Nest counts for the Florida Panhandle subpopulation are focused on index beaches rather than all beaches where nesting occurs. Currently, there is not enough information to detect a trend for the subpopulation (Florida Fish and Wildlife Conservation Commission, Florida Marine Research Institute, Index Nesting Beach Survey Database). Similarly, nesting survey effort has been inconsistent among the Yucatán nesting beaches and no trend can be determined for this subpopulation. However, there is some optimistic news. Zurita et al. (2003) found a statistically significant increase in the number of nests on seven of the beaches on Quintana Roo, Mexico, from 1987-2001 where survey effort was consistent during the period.

Threats

The diversity of a sea turtle's life history leaves them susceptible to many natural and human impacts, including impacts while they are on land, in the benthic environment, and in the pelagic environment. Hurricanes are particularly destructive to sea turtle nests. Sand accretion and rainfall that result from these storms as well as wave action can appreciably reduce hatchling success. For example, in 1992, all of the eggs over a 90-mile length of coastal Florida were destroyed by storm surges on beaches that were closest to the eye of Hurricane Andrew (Milton et al. 1994). Also, many nests were destroyed during the 2004 hurricane season. Other sources of natural mortality include cold stunning and biotoxin exposure.

Anthropogenic factors that impact hatchlings and adult female turtles on land, or the success of nesting and hatching include: beach erosion, beach armoring and nourishment, artificial lighting, beach cleaning, increased human presence, recreational beach equipment, beach driving, coastal construction and fishing piers, exotic dune and beach vegetation, and poaching. An increase in human presence at some nesting beaches or close to nesting beaches has led to secondary threats such as the introduction of exotic fire ants, feral hogs, dogs and an increased presence of native species (e.g., raccoons, armadillos, and opossums) which raid and feed on turtle eggs. Although sea turtle nesting beaches are protected along large expanses of the northwest Atlantic coast (e.g., Merritt Island, Archie Carr, and Hobe Sound National Wildlife Refuges), other areas along these coasts have limited or no protection. Sea turtle nesting and hatching success

on unprotected high density east Florida nesting beaches from Indian River to Broward County are affected by all of the above threats.

Loggerhead sea turtles are affected by a completely different set of anthropogenic threats in the marine environment. These include oil and gas exploration, coastal development, and transportation, marine pollution, underwater explosions, hopper dredging, offshore artificial lighting, power plant entrainment and/or impingement, entanglement in debris, ingestion of marine debris, marina and dock construction and operation, boat collisions, poaching, and fishery interactions. Loggerheads in the pelagic environment are exposed to a series of longline fisheries, which include the Atlantic highly migratory species (HMS) pelagic longline fisheries, an Azorean longline fleet, a Spanish longline fleet, and various longline fleets in the Mediterranean Sea (Aguilar et al. 1995, Bolten et al. 1996). Loggerheads in the benthic environment in waters off the coastal United States are exposed to a suite of fisheries in federal and state waters including trawl, purse seine, hook and line, gillnet, pound net, longline, and trap fisheries (see further discussion in Section 4.2, Environmental Baseline).

5.1.3 Summary of Status for Loggerhead Sea Turtles

The abundance of loggerhead turtles on nesting beaches throughout the Pacific basin has declined dramatically over the past 10 to 20 years. Data from 1995 estimated the Japanese nesting aggregation at 1,000 female loggerhead turtles (Bolten et al. 1996), but it has probably declined since 1995 and continues to decline (Tillman 2000). The nesting aggregation in Queensland, Australia, was as low as 300 females in 1997.

In the Atlantic Ocean, absolute population size is not known, but based on extrapolation of nesting information, loggerheads are likely much more numerous than in the Pacific Ocean. NMFS recognizes five subpopulations of loggerhead sea turtles in the western north Atlantic based on genetic studies. Cohorts from all of these are known to occur within the action area of this consultation. The South Florida subpopulation may be critical to the survival of the species in the Atlantic Ocean because of its size (over 90 percent of all U.S. loggerhead nests are from this subpopulation). In the past, this nesting aggregation was considered second in size only to the nesting aggregation on islands in the Arabian Sea off Oman (Ross 1979, Ehrhart 1989, NMFS and USFWS 1991a). However, the status of the Oman colony has not been evaluated recently and 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 for sea turtles (Meylan et al. 1995). Given the lack of updated information on this population, the status of loggerheads in the Indian Ocean basin overall is essentially unknown.

All loggerhead subpopulations are faced with a multitude of natural and anthropogenic effects that negatively influence the status of the species. Many anthropogenic effects occur as a result of activities outside of U.S. jurisdiction (i.e., fisheries in international waters).

5.2 Green Sea Turtle

Federal listing of the green sea turtle occurred on July 28, 1978, with all populations listed as threatened except for the Florida and Pacific coast of Mexico breeding populations, which are endangered. The nesting range of the green sea turtles in the southeastern United States includes sandy beaches of mainland shores, barrier islands, coral islands, and volcanic islands between Texas and North Carolina, the U.S. Virgin Islands (USVI) and Puerto Rico (NMFS and USFWS 1991b). Principal U.S. nesting areas for green sea turtles are in eastern Florida, predominantly Brevard through Broward counties (Ehrhart and Witherington 1992). Green sea turtle nesting also occurs regularly on St. Croix, USVI, and on Vieques, Culebra, Mona, and the main island of Puerto Rico (Mackay and Rebholz 1996).

5.2.1 Pacific Ocean

Green turtles are thought to be declining throughout the Pacific Ocean, with the exception of Hawaii, from a combination of overexploitation and habitat loss (Seminoff 2002). In the western Pacific, the only major (>2,000 nesting females) populations of green turtles occur in Australia and Malaysia, with smaller colonies throughout the area. Indonesia has a widespread distribution of green turtles, but has experienced large declines over the past 50 years. Hawaii green turtles are genetically distinct and geographically isolated, and the population appears to be increasing in size despite the prevalence of fibropapilloma and spirochidiasis (Aguirre et al., 1998 in Balazs and Chaloupka 2003). In the eastern Pacific, mitochondrial DNA analysis has indicated that there are three key nesting populations: Michoacan, Mexico; Galapagos Islands, Ecuador; and Islas Revillagigedos, Mexico (Dutton 2003). There is also sporadic green turtle nesting along the Pacific coast of Costa Rica.

5.2.2 Atlantic Ocean

Life History and Distribution

The estimated age at sexual maturity for green sea turtles is between 20-50 years (Balazs 1982, Frazer and Ehrhart 1985). 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 eggs/nest. Females usually have 2-4 or more years between breeding seasons, whereas 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. At approximately 20 to 25 cm carapace length, juveniles leave pelagic habitats and enter benthic foraging areas (Bjorndal 1997).

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.

Green sea turtle foraging areas in the southeastern United States include any coastal shallow waters having macroalgae or sea grasses. This includes areas 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 1991b). Principal benthic foraging areas in the southeastern United States include Aransas Bay, Matagorda Bay, Laguna Madre, and the Gulf inlets of Texas (Doughty 1984, Hildebrand 1982, Shaver 1994), the GOM 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.

Population Dynamics and Status

The vast majority of green sea turtle nesting within the southeastern United States occurs in Florida (Meylan et al. 1995, Johnson and Ehrhart 1994). Green sea turtle nesting in Florida has been increasing since 1989 (Florida Fish and Wildlife Conservation Commission, Florida Marine Research Institute Index Nesting Beach Survey Database). Current nesting levels in Florida are reduced compared to historical levels, reported by Dodd (1981). However, total nest counts and trends at index beach sites during the past decade suggest the numbers of green sea turtles that nest within the southeastern United States are increasing.

Although nesting activity is obviously important in determining population distributions, the remaining portion of the green turtle's life is spent on the foraging and developmental grounds. Some of the principal feeding pastures in the western Atlantic Ocean include the upper west coast of Florida and the northwestern coast of the Yucatán Peninsula. Additional important foraging areas in the western Atlantic include the Mosquito and Indian River Lagoon systems and nearshore wormrock reefs between Sebastian and Ft. Pierce Inlets in Florida, Florida Bay, the Culebra archipelago and other Puerto Rico coastal waters, the south coast of Cuba, the Mosquito Coast of Nicaragua, the Caribbean Coast of Panama, and scattered areas along Colombia and Brazil (Hirth 1997). The summer developmental habitat for green turtles also encompasses estuarine and coastal waters from North Carolina to as far north as Long Island Sound (Musick and Limpus 1997).

There are no reliable estimates of the number of immature green sea turtles that inhabit coastal areas (where they come to forage) of the southeastern United States. However, information on incidental captures of immature green sea turtles at the St. Lucie Power Plant (they have averaged 215 green sea turtle captures per year since 1977) in St. Lucie County, Florida (on the Atlantic coast of Florida) show that the annual number of immature green sea turtles captured has increased significantly in the past 26 years (FPL 2002).

It is likely that immature green sea turtles foraging in the southeastern United States come from multiple genetic stocks; therefore, the status of immature green sea turtles in the southeastern United States might also be assessed from trends at all of the main regional nesting beaches, principally Florida, Yucatán, and Tortuguero. Trends at Florida

beaches were previously discussed. Trends in nesting at Yucatán beaches cannot be assessed because of a lack of consistent beach surveys over time. Trends at Tortuguero (ca. 20,000-50,000 nests/year) showed a significant increase in nesting during the period 1971-1996 (Bjorndal et al. 1999), and more recent information continues to show increasing nest counts (Troëng and Rankin 2004). Therefore, it seems reasonable that there is an increase in immature green sea turtles inhabiting coastal areas of the southeastern United States; however, the magnitude of this increase is unknown.

Threats

The principal cause of past declines and extirpations of green sea turtle assemblages has been the over-exploitation of green sea turtles for food and other products. Although intentional take of green sea turtles and their eggs is not extensive within the southeastern United States, green sea turtles that nest and forage in the region may spend large portions of their life history outside the region and outside U.S. jurisdiction, where exploitation is still a threat. However, there are still significant and ongoing threats to green sea turtles from human-related causes in the United States. These threats include beach armoring, erosion control, artificial lighting, beach disturbance (e.g., driving on the beach), pollution, foraging habitat loss as a result of direct destruction by dredging, siltation, boat damage, other human activities, and interactions with fishing gear. Sea sampling coverage in the pelagic driftnet, pelagic longline, southeast shrimp trawl, and summer flounder bottom trawl fisheries has recorded takes of green turtles. There is also the increasing threat from green sea turtle fibropapillomatosis disease. 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).

5.2.3 Summary of Status for Atlantic Green Sea Turtles

Green turtles range in the western Atlantic from Massachusetts to Argentina, including the GOM and Caribbean, but are considered rare in benthic areas north of Cape Hatteras (Wynne and Schwartz 1999). Green turtles face many of the same natural and anthropogenic threats as for loggerhead sea turtles described above. In addition, green turtles are also susceptible to fibropapillomatosis, which can result in death. In the continental United States, green turtle nesting occurs on the Atlantic coast of Florida (Ehrhart 1979). Recent population estimates for the western Atlantic area are not available. The pattern of green turtle nesting shows biennial peaks in abundance, with a generally positive trend during the ten years of regular monitoring since establishment of index beaches in Florida in 1989. However, given the species' late sexual maturity, caution is warranted about over-interpreting nesting trend data collected for less than 15 years.

5.3 Kemp's Ridley Sea Turtle

The Kemp's ridley was listed as endangered on December 2, 1970. Internationally, the Kemp's ridley has been considered the most endangered sea turtle (Zwinenberg 1977, TEWG 2000). Kemp's ridleys nest primarily at Rancho Nuevo, a stretch of beach in Mexico, Tamaulipas State. This species occurs mainly in coastal areas of the GOM and the northwestern Atlantic Ocean. Occasional individuals reach European waters

(Brongersma 1972). Adults of this species are usually confined to the GOM, although adult-sized individuals sometimes are found on the east coast of the United States.

5.3.1 Atlantic Ocean

Life History and Distribution

The TEWG (1998) estimates age at maturity from 7-15 years. Females return to their nesting beach about every 2 years (TEWG 1998). Nesting occurs from April into July and is essentially limited to the beaches of the western GOM, 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.

Little is known of the movements of the post-hatchling stage (pelagic stage) within the GOM. 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). Benthic immature Kemp's ridleys have been found along the eastern seaboard of the United States and in the GOM. Atlantic benthic immature sea turtles travel northward as the water warms to feed in the productive, coastal waters off Georgia through New England, returning southward with the onset of winter (Lutcavage and Musick 1985, Henwood and Ogren 1987, Ogren 1989). Studies suggest that benthic immature Kemp's ridleys stay in shallow, warm, nearshore waters in the northern GOM until cooling waters force them offshore or south along the Florida coast (Renaud 1995).

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

Population Dynamics and Status

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 mid-1980s nest numbers were below 1,000 (with a low of 702 nests in 1985). However, observations of increased nesting with 6,277 nests recorded in 2000, 10,000 nests in 2005, and 12,143 nests recorded during the 2006 nesting season (Gladys Porter Zoo nesting database) show the decline in the ridley population has stopped and the population is now increasing.

A period of steady increase in benthic immature ridleys has been occurring since 1990 and appears to be due to increased hatchling production and an apparent increase in survival rates of immature sea turtles beginning in 1990. The increased survivorship of immature sea turtles is attributable, in part, to the introduction of turtle excluder devices (TEDs) in the United States and Mexican shrimping fleets and Mexican beach protection efforts. As demonstrated by nesting increases at the main nesting sites in Mexico, adult ridley numbers have increased over the last decade. The population model used by

TEWG (2000) projected that Kemp's ridleys could reach the Recovery Plan's intermediate recovery goal of 10,000 nesters by the year 2015.

Next to loggerheads, Kemp's ridleys are the second most abundant sea turtle in Virginia and Maryland waters, arriving in these areas during May and June (Keinath et al. 1987, Musick and Limpus 1997). The juvenile population of Kemp's ridley sea turtles in Chesapeake Bay is estimated to be 211 to 1,083 turtles (Musick and Limpus 1997). These juveniles frequently forage in submerged aquatic grass beds for crabs (Musick and Limpus 1997). Kemp's ridleys consume a variety of crab species, including Callinectes spp., Ovalipes spp., Libinia sp., and Cancer spp. Mollusks, shrimp, and fish are consumed less frequently (Bjorndal 1997). Upon leaving Chesapeake Bay in autumn, juvenile ridleys migrate down the coast, passing Cape Hatteras in December and January (Musick and Limpus 1997). These larger juveniles are joined there by juveniles of the same size from North Carolina sounds, as well as smaller juveniles from New York and New England, to form one of the densest concentrations of Kemp's ridleys outside of the GOM (Musick and Limpus 1997, Epperly et al. 1995a, Epperly et al. 1995b).

Threats

Kemp's ridleys face many of the same natural threats as loggerheads, including destruction of nesting habitat from storm events, natural predators at sea, and oceanic events such as cold-stunning. Although cold-stunning can occur throughout the range of the species, it may be a greater risk for sea turtles that utilize the more northern habitats of Cape Cod Bay and Long Island Sound. For example, in the winter of 1999-2000, there was a major cold-stunning event where 218 Kemp's ridleys, 54 loggerheads, and 5 green turtles were found on Cape Cod beaches (R. Prescott, pers. comm. 2001). Annual cold-stunning events do not always occur at this magnitude; the extent of episodic major cold-stunning events may be associated with numbers of turtles utilizing Northeast waters in a given year, oceanographic conditions, and the occurrence of storm events in the late fall. Many cold-stunned turtles can survive if found early enough, but cold-stunning events can still represent a significant cause of natural mortality.

Although changes in the use of shrimp trawls and other trawl gear have helped to reduce mortality of Kemp's ridleys, this species is also affected by other sources of anthropogenic impacts similar to those discussed above. For example, in the spring of 2000, five Kemp's ridley carcasses were recovered from the same North Carolina beaches where 275 loggerhead carcasses were found. Cause of death for most of the turtles recovered was unknown, but the mass mortality event was suspected to have been from a large-mesh gillnet fishery operating offshore in the preceding weeks. The five ridley carcasses that were found are likely to have been only a minimum count of the number of Kemp's ridleys that were killed or seriously injured as a result of the fishery interaction because it is unlikely that all of the carcasses washed ashore.

5.3.2 Summary of Kemp's Ridley Status

The only major nesting site for ridleys is a single stretch of beach near Rancho Nuevo, Tamaulipas, Mexico (Carr 1963). The number of nests observed at Rancho Nuevo and nearby beaches increased at a mean rate of 11.3 percent per year from 1985 to 1999.

Current totals are 12,059 nests in Mexico in 2006 (August 8, 2006, e-mail from Luis Jaime Peña - Conservation Biologist, Gladys Porter Zoo). Kemp's ridleys mature at an earlier age (7-15 years) than other chelonids, thus "lag effects" as a result of unknown impacts to the non-breeding life stages would likely have been seen in the increasing nest trend beginning in 1985 (USFWS and NMFS 1992).

The largest contributors to the decline of Kemp's ridleys in the past were commercial and local exploitation, especially poaching of nests at the Rancho Nuevo site, as well as the GOM trawl fisheries. The advent of TED regulations for trawlers and protections for the nesting beaches has 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 potential threats to the nesting beaches from such sources as global climate change, development, and tourism pressures.

5.4 Leatherback Sea Turtle

The leatherback sea turtle was listed as endangered throughout its global range on June 2, 1970. Leatherbacks are widely distributed throughout the oceans of the world, and are found in waters of the Atlantic, Pacific, and Indian Oceans (Ernst and Barbour 1972). Leatherback sea turtles are the largest living turtles and range farther than any other sea turtle species. The large size of adult leatherbacks and their tolerance to relatively low temperatures allows them to occur in northern waters such as off Labrador and in the Barents Sea (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 their tropical nesting beaches. In 1980, the leatherback population was estimated at approximately 115,000 adult females globally (Pritchard 1982). That number, however, is probably an overestimation as it was based on a particularly good nesting year in 1980 (Pritchard 1996). By 1995, the global population of adult females had declined to 34,500 (Spotila et al. 1996). Pritchard (1996) also called into question the population estimates from Spotila et al. (1996), and felt they may be somewhat low, because it ended the modeling on data from a particularly bad nesting year (1994) while excluding nesting data from 1995, which was a good nesting year. However, Spotila et al. (1996) represents the best overall estimate of adult female leatherback population size.

5.4.1 Pacific Ocean

Based on published estimates of nesting female abundance, leatherback populations have collapsed or have been declining at all major Pacific basin nesting beaches for the last two decades (Spotila et al. 1996, NMFS and USFWS 1998, Sarti et al. 2000, Spotila et al. 2000). For example, the nesting assemblage on Terengganu, Malaysia – which was one of the most significant nesting sites in the western Pacific Ocean – has declined severely from an estimated 3,103 females in 1968 to two nesting females in 1994 (Chan and Liew 1996). Nesting assemblages of leatherback turtles are in decline along the coasts of the Solomon Islands, a historically important nesting area (D. Broderick, pers. comm., in Dutton et al. 1999). In Fiji, Thailand, Australia, and Papua New Guinea (East Papua), leatherback turtles have only been known to nest in low densities and scattered colonies.

Only an Indonesian nesting assemblage has remained relatively abundant in the Pacific basin. The largest extant leatherback nesting assemblage in the Indo-Pacific lies on the north Vogelkop coast of Irian Jaya (West Papua), Indonesia, with over 3,000 nests recorded annually (Putrawidjaja 2000, Suarez et al. 2000). During the early-to-mid 1980s, the number of female leatherback turtles nesting on the two primary beaches of Irian Jaya appeared to be stable. More recently, this population has come under increasing threats that could cause this population to experience a collapse that is similar to what occurred at Terengganu, Malaysia. In 1999, for example, local Indonesian villagers started reporting dramatic declines in sea turtle populations near their villages (Suarez 1999). Unless hatchling and adult turtles on nesting beaches receive more protection, this population will continue to decline. Declines in nesting assemblages of leatherback turtles have been reported throughout the western Pacific region, with nesting assemblages well below abundance levels observed several decades ago (e.g., Suarez 1999).

In the western Pacific Ocean and South China Seas, leatherback turtles are captured, injured, or killed in numerous fisheries, including Japanese longline fisheries. The poaching of eggs, killing of nesting females, human encroachment on nesting beaches, beach erosion, and egg predation by animals also threaten leatherback turtles in the western Pacific.

In the eastern Pacific Ocean, nesting populations of leatherback turtles are declining along the Pacific coast of Mexico and Costa Rica. According to reports from the late 1970s and early 1980s, three beaches on the Pacific coast of Mexico supported as many as half of all leatherback turtle nests for the eastern Pacific. Since the early 1980s, the eastern Pacific Mexican population of adult female leatherback turtles has declined to slightly more than 200 individuals during 1998-99 and 1999-2000 (Sarti et al. 2000). Spotila et al. (2000) reported the decline of the leatherback turtle population at Playa Grande, Costa Rica, which had been the fourth largest nesting colony in the world. Between 1988 and 1999, the nesting colony declined from 1,367 to 117 female leatherback turtles. Based on their models, Spotila et al. (2000) estimated that the colony could fall to less than 50 females by 2003-2004. Leatherback turtles in the eastern Pacific Ocean are captured, injured, or killed in commercial and artisanal swordfish fisheries off Chile, Columbia, Ecuador, and Peru, and purse seine fisheries for tuna in the eastern tropical Pacific Ocean, and California/Oregon drift gillnet fisheries. Because of the limited data, we cannot provide high-certainty estimates of the number of leatherback turtles captured, injured, or killed through interactions with these fisheries. However, between 8-17 leatherback turtles were estimated to have died annually between 1990 and 2000 in interactions with the California/Oregon drift gillnet fishery; 500 leatherback turtles are estimated to die annually in Chilean and Peruvian fisheries; 200 leatherback turtles are estimated to die in direct harvests in Indonesia; and before 1992, the North Pacific driftnet fisheries for squid, tuna, and billfish captured an estimated 1,000 leatherback turtles each year, killing about 111 of them each year.

Although all causes of the declines in leatherback turtle colonies in the eastern Pacific have not been documented, Sarti et al. (1998) suggest that the declines result from egg

poaching, adult and sub-adult mortalities incidental to high seas fisheries, and natural fluctuations due to changing environmental conditions. Some published reports support this suggestion. Sarti et al. (2000) reported that female leatherback turtles have been killed for meat on nesting beaches like Píedra de Tiacoyunque, Guerrero, Mexico. Eckert (1997) reported that swordfish gillnet fisheries in Peru and Chile contributed to the decline of leatherback turtles in the eastern Pacific. The decline in the nesting population at Mexiquillo, Mexico, occurred at the same time that effort doubled in the Chilean driftnet fishery. In response to these effects, the eastern Pacific population has continued to decline, leading some researchers to conclude that the leatherback is on the verge of extinction in the Pacific Ocean (e.g., Spotila et al. 1996, Spotila et al. 2000). The NMFS assessment of three nesting aggregations in its February 23, 2004, biological opinion supports this conclusion: If no action is taken to reverse their decline, leatherback sea turtles nesting in the Pacific Ocean either have high risks of extinction in a single human generation (for example, nesting aggregations at Terrenganu and Costa Rica) or they have a high risk of declining to levels where more precipitous declines become almost certain (e.g., Irian Jaya) (NMFS 2004a).

5.4.2 Atlantic Ocean

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 (NMFS 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 (NMFS 2001). Genetic analyses of leatherbacks to date indicate that within the Atlantic basin there are genetically different nesting populations; the St. Croix nesting population (U.S. Virgin Islands), the mainland nesting Caribbean population (Florida, Costa Rica, Suriname/French Guiana), and the Trinidad nesting population (Dutton et al. 1999). When the hatchlings leave the nesting beaches, they 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 recorded dives to depths in excess of 1,000 m (Eckert et al. 1999, Hayes et al. 2004).

Life History and Distribution

Leatherbacks are a long-lived species, living for over 30 years. They reach sexual maturity somewhat faster than other sea turtles (except Kemp's ridley), with an estimated range from 3-6 years (Rhodin 1985) to 13-14 years (Zug and Parham 1996). They nest frequently (up to 10 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). However, a significant portion (up to approximately 30 percent) of the eggs can be infertile. Thus, the actual proportion of eggs that can result in hatchlings is less than this seasonal estimate. The eggs incubate for 55-75 days before hatching. Based on a review of all sightings of leatherback sea turtles of <145 cm curved carapace length (ccl), Eckert (1999) found that leatherback juveniles remain in waters warmer than 26°C until they exceed 100 cm ccl.

Although leatherbacks are the most pelagic of the sea turtles, they enter coastal waters on a seasonal basis to feed in areas where jellyfish are concentrated. Leatherback sea turtles feed primarily on cnidarians (medusae, siphonophores) and tunicates.

Evidence from tag returns and strandings in the western Atlantic suggests that adult leatherback sea turtles engage in routine migrations between boreal, temperate, and tropical waters (NMFS and USFWS 1992). A 1979 aerial survey of the outer continental shelf from Cape Hatteras, North Carolina, to Cape Sable, Nova Scotia showed leatherbacks to be present throughout the area with the most numerous sightings made from the Gulf of Maine south to Long Island. Leatherbacks were sighted in waters where depths ranged from 1-4,151 m, but 84.4 percent of sightings were in areas where the water was less than 180 m deep (Shoop and Kenney 1992). Leatherbacks were sighted in waters of a similar sea surface temperature as loggerheads; from 7-27.2°C (Shoop and Kenney 1992). However, this species appears to have a greater tolerance for colder waters because more leatherbacks were found at the lower temperatures (Shoop and Kenney 1992). This aerial survey estimated the in-water leatherback population from near Nova Scotia, Canada to Cape Hatteras, North Carolina at approximately 300-600 animals.

Population Dynamics and Status

The status of the Atlantic leatherback population is less clear than the Pacific population. The total Atlantic population size is undoubtedly larger than in the Pacific, but overall population trends are unclear. In 1996, the entire western Atlantic population was characterized as stable at best (Spotila et al. 1996), with numbers of nesting females reported to be on the order of 18,800. A subsequent analysis by Spotila (pers. comm.) indicated that by 2000, the western Atlantic nesting population had decreased to about 15,000 nesting females. The nesting aggregation in French Guiana has been declining at about 15 percent per year since 1987 (NMFS 2001). However, from 1979-1986, the number of nests was increasing at about 15 percent annually which could mean that the current 15 percent decline could be part of a nesting cycle which coincides with the erosion cycle of Guiana beaches described by Schultz (1975). In Suriname, leatherback nest numbers have shown large recent increases (with more than 10,000 nests per year since 1999 and a peak of 30,000 nests in 2001), and the long-term trend for the overall Suriname and French Guiana population may show an increase (Girondot 2002 in Hilterman and Goverse 2003). The number of nests in Florida and the U.S. Caribbean has been increasing at about 10.3 percent and 7.5 percent, respectively, per year since the early 1980s, but the magnitude of nesting is much smaller than that along the French Guiana coast (NMFS 2001). Also, because leatherback females can lay 10 nests per season, the recent increases to 400 nests per year in Florida may represent as few as 40 individual female nesters per year.

In summary, the conflicting information regarding the status of Atlantic leatherbacks makes it difficult to characterize the current status. Numbers at some nesting sites are increasing, but are decreasing at other sites. Tag return data emphasize the wide-ranging nature of the leatherback and the link between South American nesters and animals found

in U.S. waters. For example, a nesting female tagged May 29, 1990, in French Guiana was later recovered and released alive from the York River, Virginia. Another nester tagged in French Guiana on June 21, 1990, was later found dead in Palm Beach, Florida (STSSN database). Genetic studies performed within the Northeast Distant Fishery Experiment indicate that the leatherbacks captured in the Atlantic highly migratory species pelagic longline fishery were primarily from the French Guiana and Trinidad nesting stocks (over 95 percent). Individuals from West African stocks were surprisingly absent.

There are a number of problems contributing to the uncertainty of the leatherback nest counts and population assessments. The nesting beaches of the Guianas (Guyana, French Guiana, and Suriname) and Trinidad are by far the most important in the western Atlantic. However, beaches in this region undergo cycles of erosion and reformation, so that the nesting beaches are not consistent over time. Additionally, leatherback sea turtles do not exhibit the same degree of nest-site fidelity demonstrated by loggerhead and other hardshell sea turtles, further confounding analysis of population trends using nesting data. Reported declines in one country and reported increases in another may be the result of migration and beach changes, not true population changes. Nesting surveys, as well as being hampered by the inconsistency of the nesting beaches, are themselves inconsistent throughout the region. Survey effort varies widely in the seasonal coverage, aerial coverage, and actual surveyed sites. Surveys have not been conducted consistently throughout time, or have even been dropped entirely as the result of wars, political turmoil, funding vagaries, etc. The methods vary in assessing total numbers of nests and total numbers of females. Many sea turtle scientists agree that the Guianas (and some would include Trinidad) should be viewed as one population and that a synoptic evaluation of nesting at all beaches in the region is necessary to develop a true picture of population status (Reichart et al. 2001). No such region-wide assessment has been conducted recently.

The most recent, complete estimates of regional leatherback populations are in Spotila et al. (1996). As discussed above, nesting in the Guianas may have been declining in the late 1990s but may have increased again in the early 2000s. Spotila et al. estimated that the leatherback population for the Atlantic basin, including all nesting beaches in the Americas, the Caribbean, and West Africa totaled approximately 27,600 nesting females, with an estimated range of 20,082-35,133. We believe that the current population probably still lies within this range, taking into account the reported nesting declines and increases and the uncertainty surrounding them. We therefore choose to rely on Spotila et al.'s (1996) published total Atlantic population estimates, rather than attempt to construct a new population estimate here, based on our interpretation of the various, confusing nesting reports from areas within the region.

Threats

Zug and Parham (1996) pointed out that the main threat to leatherback populations in the Atlantic is the combination of fishery-related mortality (especially entanglement in gear and drowning in trawls) and the intense egg harvesting on the main nesting beaches.

Other important ongoing threats to the population include pollution, loss of nesting habitat, and boat strikes.

Of sea turtle species, leatherbacks seem to be the most vulnerable to entanglement in fishing gear. This susceptibility may be the result of their body type (large size, long pectoral flippers, and lack of a hard shell), their attraction to gelatinous organisms and algae that collect on buoys and buoy lines at or near the surface, possibly their method of locomotion, and perhaps their attraction to the lightsticks used to attract target species in longline fisheries. They are also susceptible to entanglement in gillnets and pot/trap lines (used in various fisheries) and capture in trawl gear (e.g., shrimp trawls).

Leatherbacks are exposed to pelagic longline fisheries in many areas of their range. Unlike loggerhead turtle interactions with longline gear, leatherback turtles do not usually ingest longline bait. Instead, leatherbacks are foul hooked by longline gear (e.g., on the flipper or shoulder area) rather than getting mouth hooked or swallowing the hook (NMFS 2001). 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 released dead (NMFS 2001). The U.S. fleet accounts for only 5 to 8 percent of the hooks fished in the Atlantic Ocean, and adding up the under-represented observed takes of the other 23 countries that actively fish in the area would lead to annual take estimates of thousands of leatherbacks over different life stages. Basin-wide, Lewison et al. (2004) estimated that 30,000-60,000 leatherback sea turtle captures occurred in Atlantic pelagic longline fisheries in the year 2000 alone (note that multiple captures of the same individual are known to occur, so the actual number of individuals captured may not be as high).

Leatherbacks are also susceptible to entanglement in the lines associated with trap/pot gear used in several fisheries. From 1990-2000, 92 entangled leatherbacks were reported from New York through Maine (Dwyer et al. 2002). Additional leatherbacks stranded wrapped in line of unknown origin or with evidence of a past entanglement (Dwyer et al. 2002). Fixed gear fisheries in the mid-Atlantic have also contributed to leatherback entanglements. In North Carolina, two leatherback sea turtles were reported entangled in a crab pot buoy inside Hatteras Inlet (D. Fletcher, pers. comm. to S. Epperly in NMFS 2001). A third leatherback was reported entangled in a crab pot buoy in Pamlico Sound near Ocracoke. This turtle was disentangled and released alive; however, lacerations on the front flippers from the lines were evident (D. Fletcher, pers. comm. to S. Epperly in NMFS SEFSC 2001). In the Southeast, leatherbacks are vulnerable to entanglement in Florida's lobster pot and stone crab fisheries. In the U.S. Virgin Islands, where one of five leatherback strandings from 1982 to 1997 was due to entanglement (Boulon 2000), leatherbacks have been observed with their flippers wrapped in the line of West Indian fish traps (R. Boulon, pers. comm. to J. Braun-McNeill in NMFS SEFSC 2001). Because many entanglements of this typically pelagic species likely go unnoticed, entanglements in fishing gear may be much higher.

Leatherback interactions with the southeast Atlantic shrimp fishery, which operates predominately from North Carolina through southeast Florida (NMFS 2002), have also

been a common occurrence. Leatherbacks, which migrate north annually, are likely to encounter shrimp trawls working in the coastal waters off the Atlantic coast from Cape Canaveral, Florida, to the Virginia/North Carolina border. Leatherbacks also interact with the GOM shrimp fishery. For many years, TEDs required for use in these fisheries were less effective at excluding leatherbacks than the smaller, hard-shelled turtle species. To address this problem, on February 21, 2003, the NMFS issued a final rule to amend the TED regulations. Modifications to the design of TEDs are now required in order to exclude leatherbacks and large and sexually mature loggerhead and green turtles.

Other trawl fisheries are also known to interact with leatherback sea turtles. In October 2001, a Northeast Fisheries Science Center observer documented the take of a leatherback in a bottom otter trawl fishing for Loligo squid off of Delaware; TEDs are not required in this fishery. The winter trawl flounder fishery, which did not come under the revised TED regulations, may also interact with leatherback sea turtles.

Gillnet fisheries operating in the nearshore waters of the mid-Atlantic states are also suspected of capturing, injuring, and/or killing leatherbacks when these fisheries and leatherbacks co-occur. Data collected by the NEFSC Fisheries Observer Program from 1994 through 1998 (excluding 1997) indicate that a total of 37 leatherbacks were incidentally captured (16 lethally) in drift gillnets set in offshore waters from Maine to Florida during this period. Observer coverage for this period ranged from 54 to 92 percent.

Poaching is not known to be a problem for nesting populations in the continental U.S. However, in 2001 the NMFS Southeast Fishery Science Center (SEFSC) noted that poaching of juveniles and adults was still occurring in the U.S. Virgin Islands and the Guianas. In all, four of the five strandings in St. Croix were the result of poaching (Boulon 2000). A few cases of fishermen poaching leatherbacks have been reported from Puerto Rico, but most of the poaching is on eggs.

Leatherback sea turtles may be more susceptible to marine debris ingestion than other species due to their pelagic existence and the tendency of floating debris to concentrate in convergence zones that adults and juveniles use for feeding areas and migratory routes (Lutcavage et al. 1997, Shoop and Kenney 1992). Investigations of the stomach contents of leatherback sea turtles revealed that a substantial percentage (44 percent of the 16 cases examined) contained plastic (Mrosovsky 1981). Along the coast of Peru, intestinal contents of 19 of 140 (13 percent) leatherback carcasses were found to contain plastic bags and film (Fritts 1982). The presence of plastic debris in the digestive tract suggests that leatherbacks might not be able to distinguish between prey items and plastic debris (Mrosovsky 1981). Balazs (1985) speculated that the object might resemble a food item by its shape, color, size or even movement as it drifts about, and induce a feeding response in leatherbacks.

It is important to note that, like marine debris, fishing gear interactions and poaching are problems for leatherbacks throughout their range. Entanglements are common in Canadian waters where Goff and Lien (1988) reported that 14 of 20 leatherbacks encountered off the coast of Newfoundland/Labrador were entangled in fishing gear

including salmon net, herring net, gillnet, trawl line and crab pot line. Leatherbacks are reported taken by many other nations that participate in Atlantic pelagic longline fisheries, including Taipei, Brazil, Trinidad, Morocco, Cyprus, Venezuela, Korea, Mexico, Cuba, U.K., Bermuda, People's Republic of China, Grenada, Canada, Belize, France, and Ireland (see NMFS SEFSC 2001, for a description of take records). Leatherbacks are known to drown in fish nets set in coastal waters of Sao Tome, West Africa (Castroviejo et al. 1994, Graff 1995). Gillnets are one of the suspected causes for the decline in the leatherback sea turtle population in French Guiana (Chevalier et al. 1999), and gillnets targeting green and hawksbill turtles in the waters of coastal Nicaragua also incidentally catch leatherback turtles (Lagueux et al. 1998). Observers on shrimp trawlers operating in the northeastern region of Venezuela documented the capture of six leatherbacks from 13,600 trawls (Marcano and Alio-M 2000). An estimated 1,000 mature female leatherback sea turtles are caught annually in fishing nets off of Trinidad and Tobago with mortality estimated to be between 50 to 95 percent (Eckert and Lien 1999). However, many of the turtles do not die as a result of drowning, but rather because the fishermen butcher them in order to get them out of their nets (NMFS 2001).

5.4.3 Summary of Leatherback Status

In the Pacific Ocean, the abundance of leatherback turtle nesting individuals and colonies has declined dramatically over the past 10 to 20 years. Nesting colonies throughout the eastern and western Pacific Ocean have been reduced to a fraction of their former abundance by the combined effects of human activities that have reduced the number of nesting females. In addition, egg poaching has reduced the reproductive success of the remaining nesting females. At current rates of decline, leatherback turtles in the Pacific basin are a critically endangered species with a low probability of surviving and recovering in the wild.

In the Atlantic Ocean, our understanding of the status and trends of leatherback turtles is much more confounded, although the picture does not appear nearly as bleak as in the Pacific. The number of female leatherbacks reported at some nesting sites in the Atlantic Ocean has increased, while at others they have decreased. Some of the same factors that led to precipitous declines of leatherbacks in the Pacific also affect leatherbacks in the Atlantic: leatherbacks are captured and killed in many kinds of fishing gear and interact with fisheries in state, federal, and international waters. Poaching is a problem and affects leatherbacks that occur in U.S. waters. Leatherbacks also appear to be more susceptible to death or injury from ingesting marine debris than other turtle species.

5.5 Sperm Whale

Distribution

The sperm whale is the largest of the toothed whales, reaching a length of 18.3 meters in males and 12.2 meters in females (Odell 1992). Sperm whales are distributed in all of the world's seas and oceans. For the purposes of management, the International Whaling Commission (IWC) defines four stocks: the North Pacific, the North Atlantic, the Northern Indian Ocean, and Southern Hemisphere. However, Dufault et al.'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 et al. 1999). Females and juveniles form pods that are generally within 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). The home ranges of individual females seem to span distances of approximately 1,000 km (Best 1979, Dufault and Whitehead 1995). However, occasionally females travel several thousand kilometers across large parts of an ocean basin (Kasuya and Miyashita 1988). In the western North Atlantic they range from Greenland to the GOM and the Caribbean.

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. Waring et al. (1993) suggest sperm whale distribution in the Atlantic is closely correlated with the Gulf Stream edge. 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.

Life history

Female sperm whales attain sexual maturity at the mean age of 8 or 9 years and a length of about 9 m (Kasuya 1991, see 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 m, after a 15 to 16 month gestation period. Sperm whales exhibit alloparental (the assistance by individuals other than the parents in the care of offspring) guarding of young at the surface (Whitehead 1996), and alloparental nursing (Reeves and Whitehead 1997). Calves are nursed for 2 to 3 years (in some cases, up to 13 years); and the calving interval is estimated to be about 4 to 7 years (Kasuya 1991, see 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, see 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. Potential sources of natural mortality in sperm whales include killer whales and the papilloma virus (Lambertsen et al. 1987).

Cephalopods (i.e., squid, octopi, cuttlefishes, and nautili) are the main dietary component of sperm whales. The ommastrephids, onychoteuthids, cranchids, and enoploteuthids are the cephalopod families that are numerically important in the diet of sperm whales in the GOM (Davis et al. 2002). Other populations are known to 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 and 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 (Norris and Mohl 1983, and Berzin 1971, as cited in Würsig et al. 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).

Diving and social behavior

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) and individuals may spend extended periods of time at the surface to recover. Descent rates recorded from echo-sounders were approximately 1.7 m/sec and nearly vertical (Goold and Jones 1995). There are no data on diurnal differences in dive depths in sperm whales. Dive depth may be dependent upon temporal variations in prey abundance.

Vocalizations and hearing

Evidence suggests that the disproportionately large head of the sperm whale is an adaptation to produce acoustic signals (Norris and Harvey 1972, Cranford 1992). This suggests that vocalizations are extremely important to sperm whales. The function of 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. 1985), 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).

Population status and trend

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 IWC estimates that nearly a quarter-million sperm whales were killed worldwide in whaling activities between 1800 and 1900. From 1910 to 1982, there were nearly 700,000 sperm whales killed worldwide from whaling activities (IWC Statistics 1959-1983). Sperm whales have been protected from commercial harvest by the IWC since 1981, although the Japanese continued to harvest sperm whales in the North Pacific until

1988 (Reeves and Whitehead 1997). 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. 2002), yet the effects of these activities on the behavior of sperm whales has just recently begun to be studied. Presently, the global population of sperm whales is estimated to be at 32 percent of its pre-whaling number (Whitehead 2002).

Impacts of human activities
Documented takes of sperm whales 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 the longline fishery 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 GOM 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. 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.

5.6 Gulf Sturgeon

NMS and the FWS listed the Gulf sturgeon, also known as the GOM sturgeon, as a threatened species on September 30, 1991 (56 CFR 49653). The present range of the Gulf sturgeon 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).

Life history
The Gulf sturgeon is an anadromous fish; adults spawn in freshwater then migrate to feed and grow in estuarine/marine habitats. After spawning in the upper river reaches, both adult and subadult Gulf sturgeon migrate from the estuaries, bays, and the GOM to the coastal rivers in early spring (i.e., March through May) when river water temperatures range from 16 to 23°C (Huff 1975, Carr 1983, Wooley and Crateau 1985, Odenkirk 1989, Clugston et al. 1995, Foster and Clugston 1997, Fox and Hightower 1998, Sulak and Clugston 1999, Fox et al. 2000). Fall downstream migration from the river into the

estuary/GOM begins in September (at water temperatures around 23°C) and continues through November (Huff 1975, Wooley and Crateau 1985, Foster and Clugston 1997).

Most subadult and adult Gulf sturgeon spend cool months (October or November through March or April) in estuarine areas, bays, or in the GOM (Odenkirk 1989, Foster 1993, Clugston et al. 1995, and Fox et al. 2002). Research indicates that in the estuary/marine environment both subadult and adult Gulf sturgeon show a preference for sandy shoreline habitats with water depths less than 3.5 m and salinity less than 6.3 parts per thousand (Fox and Hightower 1998). The majority of tagged fish have been located in areas lacking seagrass (Fox et al. 2002), in shallow shoals 1.5 to 2.1 m and deep holes near passes (Craft et al. 2001), and in unvegetated, fine to medium-grain sand habitats, such as sandbars, and intertidal and subtidal energy zones (Menzel 1971, Abele and Kim 1986). These shifting, predominantly sandy, areas support a variety of potential prey items including estuarine crustaceans, small bivalve mollusks, ghost shrimp, small crabs, various polychaete worms, and lancelets (Menzel 1971, Abele and Kim 1986, AFS 1989, and M. Brim, USFWS pers. comm. 2002).

Once subadult and adult Gulf sturgeon migrate from the river to the estuarine/marine environment, having spent at least 6 months in the river fasting, it is presumed that they immediately begin foraging. Upon exiting the rivers, Gulf sturgeon are found in high concentrations near their natal river mouths; these lakes and bays at the mouth of the river are important because they offer the first opportunity for Gulf sturgeon to forage. Specifics regarding Gulf sturgeon diet items and foraging are discussed within Section IV (Effects of the Action) of this biological opinion.

Gulf sturgeon are long-lived, with some individuals reaching at least 42 years in age (Huff 1975). Age at sexual maturity for females ranges from 8 to 17 years, and for males from 7 to 21 years (Huff 1975). Chapman et al. (1993) estimated that mature female Gulf sturgeon weighing between 29 and 51 kg produce an average of 400,000 eggs.

Based on the fact that male Gulf sturgeon are capable of annual spawning, and females require more than one year between spawning events (Huff 1975, Fox et al. 2000), we assume that the Gulf sturgeon are similar to Atlantic sturgeon (*A. o. oxyrhinchus*); that is, they exhibit a long inter-spawning period, with females spawning at intervals ranging from every 3 to 5 years, and males every 1 to 5 years (Smith 1985). Spawning occurs in the upper river reaches in the spring when water temperature is around 15° to 20°C. While Sulak and Clugston (1999) suggested that sturgeon spawning activity is related to moon phase, other researchers have found little evidence of spawning associated with lunar cycles (Slack et al. 1999, Fox et al. 2000). Fertilization is external; females deposit their eggs on the river bottom and males fertilize them. Gulf sturgeon eggs are demersal, adhesive, and vary in color from gray to brown to black (Vladykov and Greeley 1963, Huff 1975, Parauka et al. 1991).

Genetic studies conclude that Gulf sturgeon exhibit river-specific fidelity. Stabile et al. (1996) analyzed tissue taken from Gulf sturgeon in eight drainages along the GOM for genetic diversity; they noted significant differences among Gulf sturgeon stocks, and

suggested region-specific affinities and likely river-specific fidelity. Five regional or river-specific stocks (from west to east) have been identified: (1) Lake Pontchartrain and Pearl River, (2) Pascagoula River, (3) Escambia and Yellow Rivers, (4) Choctawhatchee River, and (5) Apalachicola, Ochlockonee, and Suwannee Rivers (Stabile et al. 1996).

Tagging studies also indicate that Gulf sturgeon exhibit a high degree of river fidelity (Carr 1983). Of 4,100 fish tagged, 21 percent (860/4100 fish) were later recaptured in the river of their initial collection, eight fish (0.009 percent) moved between river systems, and the remaining fish (78 percent) have not yet been recaptured (USFWS et al. 1995). There is no information documenting the presence of spawning adults in non-natal rivers. However, there is some evidence of inter-riverine (from natal rivers into non-natal) movements by both male and female Gulf sturgeon (n=22) (Wooley and Crateau 1985, Carr et al. 1996, Craft et al. 2001, Ross et al. 2001b, Fox et al. 2002). It is important to note that gene flow is low in Gulf sturgeon stocks, with each stock exchanging less than one mature female per generation (Waldman and Wirgin 1998).

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), the Recovery/Management Plan approved by NMFS and the U.S. Fish and Wildlife Service in September 1995, and the final rule designating Gulf sturgeon critical habitat (68 FR 13370).

Population dynamics and status

Gulf sturgeon occur in most major tributaries of the northeastern GOM, from the Mississippi River east to Florida's Suwannee River, and in the central and eastern nearshore Gulf waters as far south as Charlotte Harbor (Wooley and Crateau 1985). In Florida, Gulf sturgeon are present in the Escambia, Yellow, Blackwater, Choctawhatchee, Apalachicola, Ochlockonee, and Suwannee Rivers (Reynolds 1993). 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 USFWS calculated an average (from 1984-1993) of 115 individuals (> 45 cm TL) over-summering in the Apalachicola River below Jim Woodruff Lock and Dam (USFWS et al. 1995). Preliminary estimates of the Gulf sturgeon subpopulation in the Choctawhatchee River system are 2,000 to 3,000 fish over 61 cm TL. The Suwannee River Gulf sturgeon population (i.e., fish > 60 cm TL and older than age 2) has recently been calculated at approximately 7,650 individuals (Sulak and Clugston 1999). Although the size of the Suwannee River population is considered stable, the population structure is highly dynamic as indicated by length frequency histograms (Sulak and Clugston 1999). Strong and weak year classes coupled with the regular removal of larger fish (by natural mortality) limits the growth of the Suwannee River population but stabilizes the average population size (Sulak and Clugston 1999).

6 ENVIRONMENTAL BASELINE

This section contains a description of the effects of past and ongoing human activities leading to the current status of the species, their habitat, and the ecosystem, within the

action area. The environmental baseline is a snapshot of the factors affecting the species and includes federal, state, tribal, local, and private actions already affecting the species, or that will occur contemporaneously with the consultation in progress. Unrelated, future federal actions affecting the same species that have completed formal or informal consultation are also part of the environmental baseline, as are implemented and ongoing federal and other actions within the action area that may benefit listed species.

6.1 Status of Listed Species in the Action Area

Sea turtles found in the action area may travel widely throughout the Atlantic, GOM, and Caribbean Sea; therefore, individuals found in the action area can potentially be affected by activities anywhere within this wide range.

Leatherback Sea Turtle

The leatherback is the most abundant sea turtle in waters over the northern GOM continental slope (Mullin and Hoggard 2000). Leatherbacks appear to spatially use both continental shelf and slope habitats in the GOM (Fritts et al. 1983, Collard 1990), but primarily utilize pelagic waters >200 m (Davis and Fargion 1996) throughout the northern GOM. Recent 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). Surveys of sea turtles in the eastern GOM reported densities of 0.0026 individuals/km^2 (95 percent CI = 0.0004 - 0.0140) in 0-10 fathoms and 0.0029 individuals/km^2 (95 percent CI = 0.0015 - 0.0057) in 10-40 fathoms (Epperly et al. 2002). Leatherbacks are year-round inhabitants in the GOM with frequent sightings during both summer and winter (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.

Green Sea Turtle

Green sea turtles are found throughout the GOM. They occur in small numbers over seagrass beds along the south Texas and the Florida GOM coasts. Areas known as important feeding areas include the Homosassa River, Crystal River, and Cedar Key, Florida, and seagrass meadows and algae-laden jetties along the Texas coast. Sea turtle surveys in the eastern GOM have reported densities of 0.0021 individuals/km^2 (95 percent CI = 0.0006 - 0.0075) in 0-10 fathoms and 0.0137 individuals/km^2 (95 percent CI = 0.0060 - 0.0317) in 10-40 fathoms (Epperly et al. 2002).

Kemp's Ridley Sea Turtle

The nearshore waters of the GOM are believed to provide important developmental habitat for juvenile Kemp's ridley sea turtles. Ogren (1988) suggests that the GOM coast, from Port Aransas, Texas, through Cedar Key, Florida, represents the primary habitat for subadult ridleys in the northern GOM. This species generally remains within the 50-m isobath of coastal areas throughout the GOM (Renaud 2001). Surveys of sea turtles in the eastern GOM reported densities of 0.0079 individuals/km^2 (95 percent CI = 0.0030 - 0.0207) in 0-10 fathoms and 0.0011 individuals/km^2 (95 percent CI = 0.0004 - 0.0035) in 10-40 fathoms (Epperly et al. 2002). Stomach contents from Kemp's ridleys also indicate a nearshore distribution by their prey distribution which is consistent with other

reported density estimates of 0.065 turtles per km^2 in 0-10 fathoms compared to a decrease of 0.013 turtles per km^2 in 10-40 fathoms (Epperly et al. 2002).

Loggerhead Sea Turtle

The nearshore waters of the GOM are believed to provide important developmental habitat for loggerhead sea turtles. Loggerhead nesting along the GOM coast occurs primarily along the Florida Panhandle, although some nesting has been reported from Texas through Alabama as well (NMFS and FWS 1991b). Surveys of sea turtles in the eastern GOM resulted in reported densities of 0.0532 individuals/km^2 (95 percent CI = 0.0295 - 0.0961) in 0-10 fathoms and 0.0452 individuals/km^2 (95 percent CI = 0.0233 - 0.0880) in 10-40 fathoms (Epperly et al. 2002). Loggerhead abundance does not appear to be significantly different between winter and summer months over shelf waters in the GOM (Davis et al. 2000a, 200b). Although loggerheads are widely distributed during both summer and winter, their abundance in surface waters over the continental slope may be greater during winter than in summer (Mullin and Hoggard 2000), and many sightings occurred near the 100-m isobath (Davis et al. 2000a, 200b). Sightings of loggerheads in waters over the continental slope suggest that they may be in transit through these waters to distant foraging sites or seeking warmer waters during the winter. The majority of sightings have occurred in waters over the continental shelf, although many sightings have been reported over the continental slope.

In addition to some distribution over the slope waters, surface sightings of this species have also been made over the outer slope, approaching the 2,000-m isobath. Loggerheads found in deep waters may be traveling to distant nesting beaches, traveling between forage sites on distant and disjunct areas of the continental shelf, or seeking warmer waters during winter (Davis et al. 2000a, 200b).

Sperm whale

Sperm whale pods have been observed throughout the GOM from the upper continental slope near the 100-m isobath to the seaward extent of the United States EEZ 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). Based on NOAA surveys, opportunistic sightings, whaling catches, and stranding records, sperm whales in the GOM occur year-round. Sperm whales appear to favor water depths of about 1,000 m and appear to be concentrated in at least two geographic regions of the Northern GOM: an area off the Dry Tortugas and offshore of the Mississippi River delta (Maze-Foley and Mullin 2006); however, distribution also appears influenced by occurrence and movement of cyclonic/anti-cyclonic currents in the GOM. Davis et al. (2000a) noted the presence of a resident, breeding population of endangered sperm whales within 50 km of the Mississippi River Delta and suggested that this area may be essential habitat for sperm whales. The Southeast United States Marine Mammal Stranding Network received reports of 17 sperm whales that stranded along the GOM coastline from 1987 to 2003 in areas ranging from Pinellas County, Florida, to Matagorda County, Texas. The GOM sperm whale abundance has most recently been estimated at 1,349 whales (CV = 0.23) (Mullin and Fulling 2003), calculated from an average of estimates from surveys conducted between 1996 and 2001.

The GOM stock is comprised of mostly females and calves, although large mature bulls have been recently sighted in the GOM. Based on seasonal aerial surveys, sperm whales are present in the northern GOM in all seasons, but sightings in the northern GOM are more common during the summer months (Davis et al. 2000a). Based on recent survey efforts, sperm whales concentrations are regularly sighted, and the boundaries of these areas of concentration in the Northern GOM appear to be approximately 86.5°W to 90.0°W, north of 27.0°N (Mullin 2002), and off southern Florida in an area approximately 86.5°W to 85.5°W, 24.0°N to 26.0°N (Mullin 2002); however, sperm whales have been reported throughout the GOM in waters greater than 200 m.

Recent research on the genetic stock structure of GOM sperm whales, gender composition, and kinship patterns during 2000, 2001 and 2002 indicate a distinct matrilineal population structure of sperm whales in the GOM (Engelhaupt pers. comm. 2003). In this study, 89 individuals (including satellite-tagged, D-tag tagged, opportunistic, and stranded whales) were genotyped using both mtDNA and microsatellite techniques and gender determined using molecular sexing techniques. The majority of whales sampled from groups throughout the north-central GOM fit the classic 'mixed' group scenario, comprised of females and subadults of both sexes. A comparative analysis of matrilineal ntDNA and biparentally inherited nuclear genetic markers has begun to show population structure for these female lineages. Only four mtDNA haplotypes were found in the northern Gulf, with two being unique on a global scale to this geographic area.

Gulf Sturgeon

The Gulf sturgeon is found in the GOM primarily from Tampa Bay, Florida west to the mouth of the Mississippi River. The action area includes the entire geographic range of the species, all five genetically distinct Gulf sturgeon river-specific stocks, and winter habitat for all known (seven) reproducing riverine populations.

Gulf sturgeon will be present in the project area from about September through May; they are not likely to be present in the project area in the summer (approximately May to September) when they are upstream at spawning areas. Upstream migration from the estuarine/marine area to riverine spawning areas occurs in early spring (i.e., March through May) when river water temperatures range from 16° to 23°C (Huff 1975, Carr 1983, Wooley and Crateau 1985, Odenkirk 1989, Clugston et al. 1995, Foster and Clugston 1997, Fox and Hightower 1998, Sulak and Clugston 1999, Fox et al. 2000). Fall downstream migration from the river into the estuary/marine environment is cued by water temperature (around 23°C), generally beginning in September and continuing through November (Huff 1975, Wooley and Crateau 1985, Foster and Clugston 1997).

Gulf sturgeon use the lower riverine, estuarine, and marine environment from about September through May for feeding and migration. Following a period of fasting in the river, the Gulf sturgeon are presumed to begin foraging as soon as they enter suitable brackish and marine habitat; they have been located in seagrass and sand in depths of 1.5 to 5. 9 m (Fox and Hightower 1998, Craft et al. 2001, Parauka et al. in press) which supports a variety of potential prey items including estuarine crustaceans, small bivalve

mollusks, and lancelets (Menzel 1971, Abele 1986, AFS 1989). In the estuarine/marine environment, Gulf sturgeon must consume sufficient prey to not only regain the body weight lost during the summer in the riverine environment, they must also obtain enough energy necessary for growth and reproduction (Fox et al. 2002, Murie and Parkyn pers. comm.). In addition to foraging, the Gulf sturgeon are migrating within the project area between habitats and, more rarely, between rivers.

6.2 Federal Actions

In recent years, NMFS has undertaken numerous ESA section 7 consultations to address the effects of federally-permitted fisheries and other federal actions on threatened and endangered listed species in the action area. Each of those consultations sought to develop ways of reducing the probability of adverse effects of the action on listed species. Similarly, recovery actions NMFS has undertaken under the ESA are addressing the problem of take of listed species in the fishing and shipping industries and other activities such as COE dredging operations. The summary below of anticipated sources of incidental take of listed species from federal actions includes only those actions which have already concluded or are currently undergoing formal section 7 consultation.

Fisheries

Adverse effects on threatened and endangered sea turtles from several types of fishing gear occur in the action area. These gears, including gillnet, hook-and-line (i.e., vertical line), and trawl gear have all been documented as interacting with sea turtles. For all fisheries for which there is a fishery management plan (FMP) or for which any federal action is taken to manage that fishery, the impacts have been evaluated via section 7 consultation. Formal section 7 consultations have been conducted on the following fisheries: the HMS shark fishery and the southeast shrimp trawl fishery. An ITS has been issued for the take of sea turtles in each of the fisheries. A summary of each consultation is provided below but more detailed information can be found in the respective biological opinions (NMFS 2001b; NMFS 2002; NMFS 2003).

The Southeast shrimp trawl fishery affects more sea turtles than all other activities combined (NRC 1990). NMFS completed the biological opinion (NMFS 2002a) for shrimp trawling in the southeastern United States under proposed revisions to the TED regulations (68 FR 8456, February 21, 2003). This biological opinion determined that the shrimp trawl fishery under the revised TED regulations would not jeopardize the continued existence of any sea turtle species. This determination was based, in part, on the biological opinion's analysis that shows the revised TED regulations are expected to reduce shrimp trawl related mortality by 94 percent for loggerheads and 97 percent for leatherbacks.

GOM shark fisheries include commercial shark bottom longline and drift gillnet fisheries and recreational shark fisheries under the FMP for Atlantic Tunas, Swordfish, and Sharks (HMS FMP). The shark bottom longline and drift gillnet fisheries were both found likely to adversely affect sea turtles. An ESA section 7 consultation was completed on October 29, 2003, on the continued operation of those fisheries and the July 2003, Proposed Rule for Draft Amendment 1 to the HMS FMP (NMFS 2003a). The biological opinion

concluded the proposed action was not likely to jeopardize the continued existence of any listed sea turtles. An ITS was provided authorizing non-lethal takes.

On June 1, 2004, NMFS completed a biological opinion on the continued operation of the Atlantic HMS pelagic longline fishery and reef fish fishery in the Atlantic, GOM, and Caribbean under proposed rules changing gear and management measures to, among other things, require the use of only large circle hooks in the fishery. The biological opinion found that the continued prosecution of the pelagic longline fishery was likely to jeopardize the continued existence of leatherback sea turtles. However, NMFS implemented an RPA to allow for the continuation of the pelagic longline fishery without jeopardizing that species. The provisions of the RPA included measures to: (1) Reduce post-release mortality of leatherbacks; (2) improve monitoring of the effects of the fishery; (3) confirm the effectiveness of the hook and bait combinations that are required as part of the proposed action; and (4) take management action to avoid long-term elevations in leatherback takes or mortality. All other sea turtles were found not likely to be jeopardized. An ITS was provided.

On February 12, 2005, NMFS issued a biological opinion (NMFS 2005c) on the continued authorization of reef fish fishing under the GOM reef fish fishery management plan (RFFMP) and proposed amendment 23. The fishery uses three basic types of gear: spear and powerhead, trap and hook-and-line gear. Hook-and-line gear used in the fishery includes both commercial bottom longline and commercial and recreational vertical line (e.g., handline, bandit gear, rod and reel). The biological opinion concluded that loggerhead, leatherback, hawksbill, green, and Kemp's ridley sea turtles may be adversely affected by operation of the fishery and an ITS was provided. However, the proposed action was not expected to jeopardize the continued existence of any of these species.

Formal section 7 consultations have also been conducted for the issuance of several exempted fishing permits (EFP). These biological opinions have concluded the proposed activities may adversely affect but were not likely to jeopardize the continued existence of any sea turtles. ITSs for each EFP issued were provided.

Vessel Operation

Potential sources of adverse effects from federal vessel operations in the action area include operations of the U.S. Department of Defense (DOD), Navy (USN), Air Force and Coast Guard (USCG), the USEPA, NOAA, and the COE. The NMFS has conducted formal consultations with the USCG, the USN, and NOAA on their vessel operations. NMFS has also conducted section 7 consultations with vessel traffic related to energy projects in the GOM (MMS, FERC, and MARAD) to implement conservation measures. Through the section 7 process, where applicable, the NMFS 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 present the potential for some level of interaction. 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. NMFS and the USCG (who permit these events) are in consultation on these events, but a thorough analysis has not been completed. Refer to the biological opinions for the USCG (NMFS 1995; NMFS 1996; NMFS 1998) and the USN (NMFS 1997a) for detail on the scope of vessel operations for these agencies and conservation measures being implemented as standard operating procedures.

Since the USN consultation only covered operations out of Mayport, Florida, potential still remains for USN vessels to adversely affect sea turtles when they are operating in other areas within the range of these species. Similarly, operations of vessels by other Federal agencies within the action area (NOAA, USEPA, COE) may adversely affect sea turtles. However, the in-water activities of those agencies are limited in scope, as they operate a limited number of vessels or are engaged in research/operational activities that are unlikely to contribute a large amount of risk.

Military Operations

The air space over the GOM is used extensively by the Department of Defense (DoD) for conducting various air-to-air and air-to-surface operations. Nine military warning areas and five water test areas are located within the GOM. The western GOM has four warning areas that are used for military operations. The areas total approximately 21 million acres (ac) or 58% of the area. In addition, six blocks in the western GOM are used by the Navy for mine warfare testing and training. The central GOM has five designated military warning areas that are used for military operations. These areas total approximately 11.3 million ac. Portions of the Eglin Water Test Areas (EWTA) comprise an additional 0.5 million ac in the Central Planning Area (CPA). The total 11.8 million ac is about 25% of the area of the CPA.

NMFS has recently completed four consultation on Eglin Air Force Base testing and training activities in the GOM. These activities have not been found to adversely Gulf sturgeon or sperm whales, but have concluded that the incidental take of sea turtles in likely to occur. These biological opinion have issued incidental take for these actions: loggerheads, Kemp's ridley, leatherback, and green sea turtles for the Eglin Gulf Test and Training Range (NMFS 2004c), the Precision Strike Weapons Tests (NMFS 2005a), and the Santa Rosa Island Mission Utilization Plan (NMFS 2005b); and loggerheads, a Kemp's ridley, and a green sea turtle for the Naval Explosive Ordnance Disposal School (NMFS 2004d). The USN Mine Warfare Center in Corpus Christi, Texas, may take, annually, up to five loggerheads and two leatherbacks, hawksbills, greens, or Kemp's ridleys, in combination, during training activities in the western GOM. Formal consultation on overall USCG or USN activities in the Gulf of Mexico has not been conducted.

Dredging

The construction and maintenance of Federal navigation channels has also been identified as a source of turtle mortality. Hopper dredges, which are frequently used in ocean bar channels and sometimes in harbor channels and offshore borrow areas, 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

the magnitude of the overall problem. The 2001 HMS biological opinion (NMFS 2001b) has an excellent summary of turtles taken in state fisheries through out the action area.

To address data gaps, several state agencies have initiated observer programs to collect information on interactions between listed species and certain gear types. Other states have closed nearshore waters to gear-types known to have high encounter rates with listed species. Depending on the fishery in question, many state permit holders also hold federal permits; therefore, existing section 7 consultations on federal fisheries may address some of the state fishery impacts. NMFS is also actively participating in a cooperative effort with Atlantic States Marine Fisheries Commission to standardize and/or implement programs to collect information on level of effort and bycatch in state fisheries.

Additional information on impact of take (i.e., associated mortality) is also needed for analysis of impacts to sea turtles from these fisheries. Certain gear types may have high levels of sea turtle takes, but very low rates of serious injury or mortality. For example, hook-and-line takes rarely are dead upon retrieval of gear, but trawls and gillnets frequently result in immediate mortality. Leatherbacks seem to be susceptible to a more restricted list of fisheries, while hardshell turtles, particularly loggerheads, seem to appear in data from almost all state fisheries. The HMS biological opinion also summarizes sea turtle interactions with flynets and various trawl techniques that occur within the action area.

Louisiana, Mississippi, Alabama, and Florida have placed restrictions on gillnet fisheries within state waters such that very little commercial gillnetting takes place in southeast waters.

Observations of state recreational fisheries have shown that loggerhead, leatherback, and green sea turtles are known to bite baited hooks, and loggerheads frequently ingest the hooks. Hooked turtles have been reported by the public fishing from boats, piers, and beach, banks, and jetties and from commercial fishermen fishing for reef fish and for sharks with both single rigs and bottom longlines (NMFS 2001b). A detailed summary of the known impacts of hook-and-line incidental captures to loggerhead sea turtles can be found in the TEWG reports (1998, 2000).

Oil and Gas Activities

State oil and gas exploration, production, and development are expected to result in similar effects to protected species as reported in the analysis of federal activities for oil and gas lease sale biological opinions with the MMS, including impacts associated with the explosive removal of offshore structures, seismic exploration, marine debris, oil spills, and vessel operation.

6.4 Other Potential Sources of Impacts in the Environmental Baseline

A number of activities that may indirectly affect listed species in the action area of this consultation include ocean dumping and disposal, aquaculture, and anthropogenic marine debris. The impacts from these activities are difficult to measure. Where possible,

conservation actions are being implemented to monitor or study impacts from these sources. Close coordination is occurring through the section 7 process on both dredging and disposal sites to develop monitoring programs and ensure that vessel operators do not contribute to vessel-related impacts.

Marine Pollution

Sources of pollutants in the GOM coastal regions include atmospheric loading of pollutants such as PCBs, stormwater runoff from coastal towns, cities and villages, runoff into rivers emptying into the bays, groundwater and other discharges, and river input and runoff. Nutrient loading from land-based sources such as coastal community discharges is known to stimulate plankton blooms in closed or semi-closed estuarine systems. The effects on larger embayments are unknown. Although pathological effects of oil spills have been documented in laboratory studies of marine mammals and sea turtles (Vargo et al. 1986), the impacts of many other anthropogenic toxins have not been investigated.

Acoustic Impacts

NMFS has also been working to establish criteria to predict varying levels of responses of marine mammals to anthropogenic noise, based upon hearing injury and behavioral responses of marine mammals. Responses to noise exposure may include lethal or non-lethal injury, temporary hearing impairment, behavioral harassment and stress, or no apparent response. Ambient noise in the GOM is approximately 40 dB re 1 μPa above estimated baseline levels prior to industrialization, and it is expected to increase. Contributions to ambient noise levels include vessels; geophysical exploration; and the construction, operational, and decommissioning of offshore structures. It is expected that the policy on managing anthropogenic sound in the oceans will provide guidance for programs such as incidental harassment permits under the Marine Mammal Protection Act and permits for research involving sound-producing activities. NOAA is working cooperatively with the ship-building industry to find technologically-based solutions to reduce the amount of noise produced by commercial vessels. Through ESA consultation with NMFS, MMS has implemented GOM-wide measures to reduce the risk of harassment to sperm whales from noise produced by geological and geophysical surveying activities and the explosive removal of offshore structures.

Hypoxia

A large area of the Louisiana continental shelf with seasonally-depleted oxygen levels (< 2mg/l) is caused by eutrophication from both point and non-point sources. Most aquatic species cannot survive at such low oxygen levels and these areas are known as "dead zones." The oxygen depletion, referred to as hypoxia, begins in late spring, reaches a maximum in mid-summer, and disappears in the fall. After the Mississippi River flood of 1993, the spatial extent of this zone more than doubled in size, to over 18,000 km^2, and has remained about that size each year through mid-summer of 1997. The hypoxic zone has impacts on the animals found there, including sea turtles, and the ecosystem-level impacts continue to be investigated.

Natural Seeps
Naturally occurring hydrocarbon seepage has long been identified as a significant source of hydrocarbons. Tarballs coming from natural seeps were used by early indigenous man living along the GOM coast to construct hunting tools. Given that the GOM is a prolific petroleum-producing province, its seafloor is pocketed with areas from which oil and gas seep. Accurately calculating the volume of naturally seeping oil is problematic. Often the volume measured floating on the surface of the water or beached has been used as the best indicator of the volume originally seeped.

6.5 Conservation and Recovery Actions Shaping the Environmental Baseline

NMFS has implemented a series of regulations aimed at reducing potential for incidental mortality of sea turtles in commercial fisheries. In particular, NMFS 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 percent of the sea 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. Analyses by Epperly and Teas (2002) indicated that the minimum requirements for the escape opening dimensions in TEDs in use at that time were too small, and that as many as 47 percent of the loggerheads stranding annually along the Atlantic Seaboard and GOM were too large to fit through existing openings. On February 21, 2003, NMFS published a final rule to require larger escape openings in TEDs used in the Southeast shrimp trawl fishery (68 FR 8456, February 21, 2003). Based upon the analyses in Epperly et al. (2002), leatherback and loggerhead sea turtles will greatly benefit from the new regulations, with expected reductions of 97 percent and 94 percent, respectively, in mortality from shrimp trawling. Several states have regulations requiring the use of TEDs in state-regulated trawl fisheries, and the federal regulations also apply in state waters.

NMFS has also 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, NMFS recently conducted a number of workshops with Atlantic HMS pelagic longline fishermen to discuss bycatch issues including protected species, and to educate them regarding handling and release guidelines. NMFS intends to continue these outreach efforts and hopes to reach all fishermen participating in the Atlantic HMS pelagic longline fishery over the next one to two years. There is also an extensive network of STSSN participants along the Atlantic and GOM coasts who not only collect data on dead sea turtles, but also rescue and rehabilitate any live stranded sea turtles.

Loggerheads, leatherbacks, greens, and Kemp's ridleys are known to bite a baited hook, frequently ingesting the hook. Hooked turtles have been reported by the public fishing from boats, piers, beaches, banks, and jetties. Necropsies have revealed hooks internally, which often were the cause of death. NMFS currently is exploring adding questions about encounters with sea turtles to intercept interviews of recreational fishermen conducted by the Texas Parks and Wildlife Department under the auspices of the Marine

Recreational Fishery Statistics Surveys conducted throughout the GOM and along the Atlantic Coast as well as adding such information to the MRFSS database. NMFS is also considering questioning recreational fishermen aboard headboats throughout the southeast U.S. Atlantic and the GOM to quantify their encounters with sea turtles (TEWG 2000). Detailed summaries of the impact of hook-and-line incidental captures on loggerhead sea turtles can be found in the TEWG reports (1998, 2000).

The Recovery Plans for loggerhead and Kemp's ridley sea turtles are in the process of being updated. Recovery teams comprised of sea turtle experts have been convened and are currently working towards revising these plans based upon the latest and best available information.

7 EFFECTS OF THE ACTION

Regulations implementing section 7(a)(2) of the ESA requires biological opinions to evaluate the direct and indirect effects of federal actions to determine if it would be reasonable to expect them to appreciably reduce listed species' likelihood of surviving and recovering in the wild by reducing their reproduction, numbers, or distribution (16 U.S.C. '1536; 50 CFR 402.02). Section 7 of the ESA also requires biological opinions to determine if federal actions would destroy or adversely modify designated critical habitat (16 U.S.C. '1536).

In this section NMFS analyzes the adverse effects expected to occur as a result of the proposed five-year lease sale plan for the WPA and CPA. MMS actions will allow oil and gas operations to take place in association with the lease sales, with effects to the near-shore and offshore environments. A description of activities is provided in the Description of the Proposed Action section, and those effects that were considered, but determined to be insignificant or discountable appear in sections 3 and 4 of this biological opinion. The potential for Gulf sturgeon critical habitat to be adversely affected was considered in section 4.1.

Approach to the Assessment

The ESA requires biological opinions to include details of how the agency action affects listed species or their critical habitat along with the information that forms the basis of the biological opinion (16 U.S.C. 1536). Regulations that implement Section 7 of the ESA require biological opinions to include an evaluation of whether the action would be reasonably expected to appreciably reduce the likelihood of survival and recovery of listed species in the wild by reducing their reproduction, numbers, or distribution or would be reasonably expected to destroy or adversely modify critical habitat (50 CFR 402.02). We approach the analysis by identifying the probable direct and indirect effects of an action on the environment of the action area. In the second step, we assess the risk to individual animals (of listed species) from exposure to such changes in the environment, taking into consideration any potential responses of the animals, and then conduct an analysis to determine if any expected changes result in jeopardy to those populations of listed species.

7.1 Vessel Strikes

Sea turtles may be accidentally injured or killed by collisions with vessels over the 40-year life of operations resulting from the proposed action. 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 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, and stranding records frequently document evidence of interactions such as cracked carapaces, missing limbs, and propeller cuts or scars. Sea turtles could, on occasion, be killed or injured by collisions with oil and gas service vessels.

In the wild, most adult sea turtles spend at least 3-6 % of their time at the surface for respiration. Despite the brevity of their respiratory phases, sea turtles sometimes spend as much as 26 % of their time at the surface, engaged in surface basking, feeding, orientation, and mating (Lutcavage et al. 1997). Sea turtles located in shallower waters have shorter surface intervals, whereas turtles occurring in deeper waters have longer surface intervals. Data show that vessel traffic is one cause of sea turtle mortality in the GOM (Lutcavage et al. 1997). Stranding data for the U.S. GOM and Atlantic coasts show that vessel-related injuries were noted in 13 % of stranded turtles examined during 1993 (Teas 1994), but this figure includes those that may have been struck by boats post-mortem. In Florida, where there are a high number of recreational vessels, the frequency of boat injuries between 1991 and 1993 was 18% of strandings (Lutcavage et al. 1997). Data indicate that live- and dead-stranded sea turtles showing signs of vessel-related injuries continue in a high percentage of stranded sea turtles in coastal regions of the southeastern United States.

Based on active leases as of April 2006, 55 percent of those leases occur in water depths greater than 200 m (3,606 occur on water depths from 0-200 m; 4,501 occur in water depth greater than 200 m). Due to the uncertainties in the factors affecting interactions between vessels and sea turtles, the following assumptions have been made to calculate the encounter rates in Table 5:

- sea turtle densities in Table 5;
- an average offshore supply vessel measuring 70 m x 16 m (0.0700 km x 0.0160 km);
- 100 percent of the maximum number of annual vessel trips will occur in water depths <200 m (238,000 trips)
- 55 percent of the maximum number of annual vessel trips will occur in water depths ≥200 m (130,900 trips);
- a random distribution of vessels and sea turtles;
- turtles are stationary at the surface; and
- a vessel may affect a sea turtle once per round trip.

Based on the above assumptions, the dimensions of a vessel is a rectangular-shaped space occupying a potential impact area of 0.0011 km^2 for a single vessel, a maximum

harassment area of 262 km^2 resulting from a total of 238,000 vessel trips annually in water depths <200 m, and an area of 144 km^2 resulting from 130,900 vessel trips annually in water depths ≥200 m. Based on sea turtle densities in the GOM, the greatest estimated annual encounter rates between vessels and sea turtles would be expected in water depths <200 m (Table 5). This estimate assumes a vessel is stationary; however, since vessels are underway between destinations, the probability for a randomly positioned, stationary sea turtle to be encountered may be expected to increase as a vessel moves through the water. The operating speeds and actual distances traveled by the annual number of vessel transits can be highly variable, and is therefore considered qualitatively in this analysis.

Table 5. Sea turtle densities in the GOM and estimates of encounters between vessels and sea turtles.

Species	Density (individuals km^{-2})	Annual Encounters	Encounters Over 40 Years
<200 m[a]			
leatherback	0.0026	0.6812	27.25
green	0.0142	3.7204	148.82
Kemp's ridley	0.0047	1.2314	49.26
loggerhead	0.0443	11.6066	464.26
hawksbill	0.0000	0.0000	0.00
>200 m[b]			
leatherback	0.0024	0.3456	13.82
green[c]	0.0005	0.0720	2.88
Kemp's ridley[c]	0.0005	0.0720	2.88
loggerhead	0.0020	0.2880	11.52

[a]Density estimates are upper confidence limits of greatest reported density in water depths <200 m of the western GOM reported in Epperly et al. 2002.
[b]Density estimates from seasonal averages reported in Davis et al. 2000b.
[c]Unidentified chelonids from Davis et al. 2000b are assumed to be Kemp's ridleys or greens sea turtles. Hawksbills are not expected to occur in deep water habitats are excluded from the >200 m analysis.

Table 5 provides an estimate of potential encounter rates with sea turtles based on the probability that one sea turtle will occupy the same space as a vessel during each vessel trip. Although sea turtles are not randomly distributed and may be expected to occur in greater densities in some regions than others, we consider the assumptions reasonable to estimate the potential risk of vessels strikes with sea turtles on an annual basis. The distribution of sea turtles may be affected by a variety of biotic and abiotic factors, including season, water temperature, prey distribution, and life history stage. These factors may significantly affect where and when sea turtles may be encountered in the GOM. In reality, both sea turtles and vessels may have the opportunity to avoid one another and encounter rates may be highly variable. When underway vessels do come upon sea turtles, sea turtles may respond by swimming away at the surface or diving and vessels may take prudent actions to avoid striking an animal. Avoidance behavior by sea

turtles is advantageous to avoid being struck, and avoidance behavior is expected to be insignificant on both the individual and the population; however, a few individuals would be expected to be at risk of injury or mortality over the lifetime of the action (Table 5).

To reduce the risk of potential injury and mortality resulting from vessel collisions with sea turtles, MMS will implement NMFS' vessel strike avoidance measures for protected species, as implemented in MMS NTL 2007-G04. With implementation of these measures, by maintaining a lookout for sea turtles and taking prudent actions to avoid collisions with them, NMFS believes that the likelihood of collisions between vessels and sea turtles will be reduced. However, due to nighttime operation of vessels and the small size of sea turtles, some individuals may go unobserved and may be accidentally struck by an underway vessel.

The following take estimates are based on the assumptions in the risk analysis conducted, and the following considerations. Although vessel operators are required to maintain a watch for and avoid sea turtles, NMFS estimates sightings will be reduced by 55 percent due to darkness, and reduced an additional 20 percent due to poor sea state and visibility, and other factors such as operator fatigue resulting in sea turtles going unobserved. The magnitude of the impact on vessel-struck sea turtles may range from minor annoyance to injury, or death, which is dependent on the speed of the vessel, depth of the turtle, and angle of impact. Due to the variable operational speeds and conditions under which animals may be struck, we estimate that 1/3 of vessels striking sea turtles will result in mortality. Based on the greatest encounter rate for each species calculated in Table 5, a detection and collision avoidance rate of 25%, and estimate that 1/3 of all strikes will be lethal the incidental take of each sea turtle species by vessel strike over 40-years of the proposed lease sales is calculate as follows:

Species	Encounters Over 40 Years	Number at Risk of Strike	Non-Lethal Take	Lethal Take
leatherback	41	31	21	10
green	152	114	76	38
Kemp's ridley	52	39	26	13
loggerhead	476	357	238	119
hawksbill	3	2	1	1

Numbers with decimal places >0.50 were rounded to the next nearest whole number.

7.2 Geological and Geophysical Surveys

NMFS has completed two biological opinions on seismic surveys occurring in the WPA and CPA of the GOM (NMFS 2002b and 2002c) and most recently for lease sales occurring in the Eastern Planning Area (NMFS 2003c) and are incorporated by reference in the following analysis. In these biological opinions we anticipated incidental takes of sperm whales, but an incidental take statement was not included for sperm whales since a take authorization has not yet been issued under Section 101(a) (5) of the MMPA. On December 26, 2002, the MMS submitted a request for 5-year regulations under the MMPA for the taking, by harassment, of sperm whales incidental to oil and gas

industry's seismic surveys to discover oil and gas deposits offshore in the GOM. NMFS published an Advance Notice of Proposed Rulemaking regarding the small take authorization on March 3, 2003 (68 FR 9991). Following issuance of such regulations under the MMPA, NMFS intends to estimate the number of potential takes of sperm whales and authorize any take that may be necessary. Seismic surveys associated with the proposed lease sales occur in deep, offshore waters of the OCS that is well outside the range of Gulf sturgeon; therefore, the effects of seismic surveys on this species are not considered further.

7.2.1 Effects of Seismic Surveys on Sperm Whales

The received sound level resulting in behavioral changes (and harassment) has not been measured in sperm whales, but do not expect the received level to be lower than that of baleen whales. Unlike baleen whales, sperm whales are not likely to be low-frequency specialists, but are believed to be most sensitive in the mid-frequency hearing range (Madsen et al. 2002). Low frequency sounds travel further distances than higher frequency sounds, resulting in a greater potential of disturbance for baleen whales.

Previous biological opinions, herein incorporated by reference, have considered the potential for sperm whales to experience hearing loss, disturbance, habituation, sensitization, and masking with exposure to seismic surveys. There is no new information available from the date of those biological opinions that would alter the conclusions of those biological opinions and summarized below. The proposed action would result in multiple seismic surveys in the lease sale areas, which overlap with known habitat and presence of sperm whales. We believe that permanent hearing loss (permanent threshold shift or PTS) is unlikely to occur given that seismic survey operators would continue to implement the seismic minimization measures according to the MMS Notice to Lessees. Masking also would be unlikely to occur due to the characteristics of the airgun pulses. The primary concerns are with the potential for temporary hearing loss, important sperm whale behaviors to be disrupted, cow-calf pair disturbance, habituation to seismic pulses, and possible effects to their prey. Given that a seismic survey could be conducted over a broad area for weeks or months, a social group that remains in a particular location would be repeatedly exposed to airgun pulses at a variety of received levels. This exposure could result in repeated disruptions to a group that is caring for a calf or some reduction in feeding due to prey relocations or the disruption of a sperm whale's hunt. Exposed sperm whales may also be subject to some level of stress that is not evident or observable through any changes in behavior. Though the available information indicates that some avoidance or disturbance from airgun noise is possible, the reported observations do not indicate that any immediate physical injury is occurring. Furthermore, seismic surveys have been conducted in the proposed lease sale area and other parts of the northern GOM, yet sperm whales continue to be present there and their population appears to be stable. If behavioral disruptions do occur during seismic surveys, we expect that the disruption would be limited to the duration of exposure to the noise, which may be highly variable.

The nutritional status of females is linked to annual calf production in whales and other animals. A reduction in hearing ability, prey availability, or hunting success could likely

affect milk production and nutritional status of lactating females, and depending on the level of disruption, calf production could possibly be reduced in any given year depending on the number and duration of seismic surveys. This further highlights the continued importance of implementation of MMS's NTL No. 2007-G02.

Summary of Effects on Sperm Whales
In summary, sperm whales are expected to be harassed through disruption of important biological behaviors as a result of the use of airguns in seismic surveys associated with the proposed action and these behavioral responses are likely to result in a biological effect which may adversely affect sperm whales. However, the continued implementation of the impact minimization measures from seismic surveys in MMS's NTL (APPENDIX A) is expected to reduce this harassment and to prevent this harassment from resulting in actual loss of individual sperm whales.

7.3 Oil spills

Offshore oil spills associated with a proposed action can result from platform accidents, pipeline breaks, or navigation accidents. Coastal oil spills can result from storage, barge, or pipeline accidents. The most likely locations of coastal spills are at pipeline terminals and other shore bases, oil spills have been described in the GOM (Bedinger et. al 1982, Van Vleet and Pauly 1987, Van Vleet et al. 1984). Spills from support vessels could occur from navigation accidents and will be largely confined in navigation channels and canals. Slicks may quickly spread through the channel by tidal, wind, and traffic (vessel) currents. The severity of the effects of an oil spill on listed species would be 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.

The following analysis first considers the potential effects to sea turtles, Gulf sturgeon, and sperm whales from accidental oil spills, and then considers MMS' oil spill risk analysis (OSRA). Using the results of the OSRA, the probable likelihood of oil spills occurring in each species habitat is determined. Oil spill trajectory simulations are generated by MMS to be used to estimate spill risk. The MMS uses a numerical computer model that simulates the likely trajectory of a surface slick, represented as a point launched from locations projected onto a gridded area. The point's trajectory simulates a spill's movement on the surface of water by using modeled ocean current and wind fields. The model uses temporally and spatially varying, numerically computed ocean currents and winds. Finally, the number of exposures to each species is estimated, and the potential for take resulting from those exposures is evaluated.

7.3.1 Effects on Sea Turtles

Spilled oil could affect any life history stage or age class of sea turtles (Vargo et. al 1986). Offshore and coastal spills could affect any species or age class of sea turtle coming into contact with a slick. Direct contact would continue to occur for as long as the slick persists, but physiological effects could continue for long periods once the slick diminishes. If a sea turtle were not directly exposed to a slick, hydrocarbons continue to persist in the sea for decades or longer. Tarballs are a byproduct of accidentally spilled oil, normal and accepted ship operations (e.g., bilge tank flushing), illegal discharges

from tank washings, and natural oil seeps on the seafloor. They are found in every ocean and on every beach; features such as convergence zones and Langmuir cells can aggregate even widely dispersed tarballs into an area where sea turtles concentrate. USFWS biologists from Texas recently commented to MMS that they are still finding tarballs, probably from the *Ixtoc* oil spill in Mexico that occurred decades ago, washing up on Padre Island National Seashore. Tarballs ingested by any age class of sea turtle are likely to have a variety of effects, including starvation from gut blockage, decreased absorption efficiency, absorption of toxins, effects of general intestinal blockage (such as local necrosis or ulceration), interference with fat metabolism, and buoyancy problems caused by the buildup of fermentation gases (floating prevents turtles from feeding and increases their vulnerability to predators and boats), among others.

Effects of Oil on Sea Turtle Nesting

Spilled oil reaching a sea turtle nesting beach could have affects on nesting sea turtles and egg development. An oiled beach could affect nest site selection or result in no nesting at all (e.g., false crawls). A nesting sea turtle crawling up a beach could result in external oiling of the skin and carapace. Upon successful nesting, some indirect effects of beach oiling could result in changed sex ratios on a nesting beach. Hays et al. (2001) determined that subtle differences in sand color or albedo can significantly affect underlying temperatures. Because sex determination in turtles is temperature-dependent, shifts in albedo could potentially change hatchling sex ratios. Even light surface oiling that does not penetrate directly to the eggs could therefore affect gender distribution in a population. To simulate heavier beach oiling, Fritts and McGehee (1982) conducted laboratory studies by exposing eggs to fresh oil during the last half to last quarter of the incubation period. Oil-exposed eggs showed a significant lower rate of egg survival, than eggs that were not exposed to oil. Weathered oil appeared to lose its toxic effect on eggs and it was concluded that oil spilled even a few weeks prior to the nesting season would have little effect on successful egg development.

Effects of Oil on Hatchlings

Upon hatching and successfully reaching the water, hatchlings are subject to the same types of oil spill exposure hazards as adults. Hatchlings that contact oil residues while crossing a beach can exhibit a range of effects, from acute toxicity to impaired movement and normal bodily functions. However, differences in size and behavior increase the risk of oils spills on hatchlings. Most reports of oiled hatchlings originate from convergence zones, ocean areas where currents meet to form collection points for material at or near the surface of the water. These zones aggregate oil slicks as well as smaller, weaker sea turtles. Because hatchlings spend a greater proportion of their time at the surface than adults, their risk of exposure to floating oil slicks would be increased.

In convergence zones off the east coast of Florida, tar was found in the mouths, esophagi, or stomachs of 65 out of 103 post-hatchling loggerheads (Loehefener et al. 1989). In another study (Witherington 1994), 34 percent of post-hatchlings at "weed lines" off the Florida coast had tar in their mouths or esophagi, and over half had tar caked in their jaws. Lutz (1989) reported that hatchlings have been found apparently starved to death, their beaks and esophagi blocked with tarballs. Hatchlings sticky with oil residue may

have a more difficult time crawling and swimming, rendering them more vulnerable to predation.

Effects of Oil on Sea Turtle Juveniles and Adults
Studies of oil effects on loggerheads in a controlled setting (Lutcavage et al. 1995) suggest that sea turtles show no avoidance behavior when they encounter an oil slick and any sea turtle in an affected area would be expected to be exposed. Sea turtles' diving behaviors also puts them at risk. Sea turtles rapidly inhale a large volume of air before diving and continually resurface over time that may result in repeated exposure to volatile vapors and oiling.

Lutcavage et al. (1995) studies provided qualitative evidence that oil exposure disrupted lachrymal gland (salt gland) function, in which the glands physiologically did not function for several days. Experiments on physiological and clinicopathological effects of oil on loggerhead sea turtles approximately 15 to 18 months old showed that the turtles' major physiological systems are adversely affected by both chronic and acute exposures (96-hour exposure to a 0.05-cm layer of South Louisiana crude oil versus 0.5 cm for 48 hours). The skin of exposed turtles, particularly the soft pliable areas of the neck and flippers, sloughed off in layers for up to 2 weeks and recovery taking up to 3 weeks. Oil was also detected in the nares, eyes, upper esophagus, and feces, indicating that turtles were ingesting oil, though apparently not enough to cause intestinal bleeding and anemia. Internal effects of oil exposure also include significant changes in blood and blood chemistry. Hematocrits (red blood cell volume) decreased nearly 50 percent in oiled turtles and did not increase again during the recovery period. An immune response indicated by significant increases in white blood cells lasted more than a week in sea turtles exposed to oil.

Turtles also indiscriminately eat anything that registers as being an appropriate size for food, including tarballs. Oil ingested by a turtle does not pass rapidly through its digestive tract. It may be retained for several days, increasing internal contact and the likelihood that toxic compounds will be absorbed. The risk of gut impaction also increases for turtles that have ingested oil.

Risk of Oil Spills in Sea Turtle Habitat
To their widespread distribution throughout the GOM, and life history stages on both beach and marine environments, sea turtles have a high potential to be affected by an oil spill resulting from the proposed lease sales. Sea turtle habitat in the GOM includes inshore, shelf, and oceanic waters, as well as numerous beaches in the region. Based on the OSRA, many, frequent, small spills; few, infrequent, moderate-sized spills; and a single, unlikely, large spill have been estimated.

In nearshore waters of the WPA, spill estimates indicate that spills <42 U.S. gallons (gal) (42 U.S. gallons = 1 bbl) will introduce 546-1,218 gal of oil into coastal waters over the 40-year life of the proposed lease sales. Spills >42 gal and <42,000 gal of oil are expected to introduce 6,426-12,852 gal of oil in coastal waters of the WPA. A single

spill >42,000 gal of oil may occur and the total volume of spilled oil introduced into coastal waters of the WPA ranges from 6,972-140,070 gal.

In nearshore waters of the CPA, spill estimates indicate that between 42 and 92 spills of <42 gal of oil will be introduced into coastal waters. An additional 12,852-32,004 gal of oil are estimated to be spilled into coastal waters of the CPA from spills of >42 to <42,000 gal. A total of 14,616-161,868 gal of spilled oil is estimated for coastal waters of the CPA.

In offshore waters of the WPA, estimates from spill data indicate many frequent small spills (<42 gal); few, infrequent, moderately-sized spills (>42 gal and <42,000 gal); and/ or rare large spills as a result of the proposed actions. An estimated 2,394-4,158 gal of oil will be introduced in offshore waters from small spills (<42 gal). An additional 15,582-52,290 gal of oil will be spilled in quantities of a >42 to <42,000 gal spill event. A single, large spill (>42,000 gal) is estimated to introduce approximately 193,200 gal of oil. A single, but unlikely, spill may occur that introduces as much as 630,000 gal of oil. The total volume of oil spilled in offshore waters as a result of the proposed actions in the WPA is estimated at 15,582-875,490 gal of oil spread over the 40-year life span of the proposed actions. In offshore waters of the CPA, small spills (<42 gal) are projected to introduce 7,644-12,768 gal of oil. Moderate-sized spills (>42 and <42,000 gal), though occurring less frequently than smaller spills, will introduce an estimated 37,128-86,982 gal of oil. One or two large spills (>42,000 gal) are assumed to introduce approximately 193,200-386,400 gal of oil as a result of proposed actions in the CPA. In the rare event that a spill exceeding 420,000 gal should occur, it is estimated that approximately 630,000 gal of oil will be spilled over the 40-year lifetime of the proposed leases in the CPA.

7.3.2 Effects of Oil on Sperm Whales

A large accidental spill may impact sperm whales in the GOM. Because the of the matriarchal social structure of sperm whales, an accidental oil spill affecting sperm whales could potentially affect the whole group in the area, including adult females, calves, and juveniles of either sex. Sperm whales are deep divers and generally forage over large areas so that the magnitude of oil exposure would depend, in part, on the location of the spill, the composition of the spilled material, and the movement and fate of the spilled hydrocarbons/wastes in the offshore environment. Spilled hydrocarbons could affect sperm whales through various pathways including surface contact, oil inhalation, and oil ingestion. Direct contact with oil can result in irritation and damage to skin and soft tissues of cetaceans. Hydrocarbons absorbed in the blood stream may accumulate in the brain and liver and result in neurological disorders. Sperm whales in the GOM could be exposed to residuals of oils spilled as a result of proposed actions over the life of the lease resulting from the proposed lease sales.

Risk of Oil Spills in Sperm Whale Habitat

Blowouts, oil spills, and spill-response activities have the potential to adversely affect sperm whales in the offshore environment. There are 1-2 blowouts projected to occur from a proposed lease sale in the WPA and 2-3 blowouts projected from a proposed lease

sale in the CPA. It is expected that slicks from spills <42,000 gal will persist a few minutes (<42 gal), a few hours (<420 gal), or a few days (420-42,000 gal) on the open ocean. Large spills, particularly those continuing to flow fresh hydrocarbons into oceanic and/or outer shelf waters for extended periods (days, weeks, months), pose an increased likelihood of impacting cetacean populations inhabiting these waters. Oil-spill data derived from historical trends estimate that a total volume of 237,972-1,116,150 gal of oil will be introduced into federal offshore waters over 40 years as a result of the proposed lease sales in the CPA. Small spills (<42 gal) are projected to introduce 7,644-12,768 gal of oil. Moderate-sized spills (>42 and <42,000 gal), though occurring less frequently than smaller spills, will introduce an estimated 37,128-86,982 gal of oil. One or two large spills (>42,000 gal) are assumed to introduce approximately 193,200-386,400 gal of oil as a result of proposed actions in the CPA. In the rare event that a spill exceeding 420,000 gal should occur, it is estimated that approximately 630,000 gal of oil will be spilled. Spilled oil would rapidly spread out, evaporate, and weather, quickly becoming dispersed into the water column. Potential effects include physical injury and irritation, respiratory stress from inhalation of toxic fumes, food reduction or contamination, direct ingestion of oil and/or tar, and temporary displacement from preferred habitats.

7.3.3 Effects of Oil on Gulf Sturgeon

The risk of exposure of Gulf sturgeon to such a spill would be dependent upon the species abundance in the area affected by a spill, as well as the size and persistence of the slick. Oil spill probability models were run for Gulf sturgeon critical habitat and for a swath from the mouth of the Mississippi River to Tampa Bay for known Gulf sturgeon locations. The Gulf sturgeon is an anadromous fish; adults spawn in freshwater then migrate to feed and grow in estuarine/marine habitats. After spawning in the upper river reaches, both adult and subadult Gulf sturgeon migrate to the estuaries, bays, and the GOM and return to the coastal rivers in early spring (i.e., March through May) when river water temperatures range from 16°C to 23°C (Huff 1975, Carr 1983, Wooley and Crateau 1985, Odenkirk 1989, Clugston et al. 1995, Foster and Clugston 1997, Fox and Hightower 1998, Sulak and Clugston 1999, Fox et al. 2000). Surveys have located adult Gulf sturgeon in rivers predominantly in the summer months (May-August) with adults rare or absent in the rivers during fall and winter months when they migrate seaward into the adjacent estuarine and marine habitats (Craft et al. 2001, Berg 2004). Based on the life history of this species, subadult and adult would be most vulnerable to an estuarine or marine oil spill, and would only be vulnerable during winter months (between September 1 through April 30) when this species is foraging in estuarine and marine habitats.

Risk of Oil Spills in Gulf Sturgeon Habitat

The area analyzed for oil spill probability is the area in which Gulf sturgeon are known to occur, from the Mississippi River to Charlotte Harbor in western Florida. This geographic range of Gulf sturgeon is larger than the designated critical habitat.

The inclusion of the eastern Louisiana portion differs from the oil spill analysis performed for critical habitat and results in different oil spill contact probabilities. Gulf sturgeon designated critical habitat does not include the Mississippi River delta (southeastern-most portion of Louisiana to the river mouth); resulting in greater risk of an

oil spill affecting Gulf sturgeon than their critical habitat. Based on the OSRA conducted for Gulf sturgeon, the area of the Mississippi River delta has the highest risk of being affected by an oil spill. There is a 6 to 9 percent chance that a spill >42,000 gal would occur as a result of a proposed action in the CPA and reach coastal waters of the delta region within 10 days.

7.3.4 Estimation of Exposure and Take from Oil Spills

Oil spills are rare events, but they have the potential to be devastating to the listed species in the area affected when they occur. The time, location, and size of an oil spill, and oil spill response activities may determine the potential impacts to listed species. Immediately upon being spilled, oil begins to weather, including the evaporation of volatile hydrocarbons, dissolution of soluble components, dispersion into the water column, emulsification and spreading at the water's surface.

The relative risk of exposure to smaller and larger sized slicks is very much dependent on the size of the slick, how long it lasts, and where and when it occurs. Many of the variables are highly unpredictable; however, the majority of spills (75.1 percent) and the majority of spills by volume (83.8 percent) occur within 3 nmi of shore. Such spills place species inhabiting nearshore environments, or occurring in greater densities, are at greater risk than offshore species.

Table 6. Mean number of spills expected over the 40-year lifetime of the proposed lease sales (data on spill size, spill area, and number of spills provided by MMS).

Median Spill Size (gal)	Spill Area at 24 hours (km^2)[a]	Maximum Number of Spills in WPA and CPA	Days Individual Slick Area Persists[b]	Total Spill Area (km^2) Over 40 Yrs
3	0.0000124	5,757	2	0.1427736
126	0.0005261	129	2	0.1357338
840	0.0040470	28	3	0.2266320
3,780	0.0809400	11	4	3.5613600
26,880	0.1133000	2	4	0.9064000
193,200	0.8094000	3	5	12.141000
Total	1.0082255	5,933	27	17.1138994

[a]The spill area is based on the projected maximum surface area of the slick. The slick will become thinner and smaller over time, and the actual number of days a slick will persist will vary depending on weathering and other factors.

[b]Estimate based volume of spilled oil and maximum spill area. Actual persistence of slicks may occur for longer periods, depending on volume, and is accounted for by applying the maximum slick area over a period of days.

Many small spills are expected to be common from the proposed action (Table 6). MMS estimates slicks from spills <42,000 gal will persist for a few minutes and would have little chance of directly contacting a listed species unless individuals were in the immediate area at the time of the spill. The amount of oil spilled from many small sources is potentially greater than that of a few larger-sized spills. However, it is not simply infrequent or episodic spills that threaten listed species, but also the continuous

low-level exposure to oil in the form of tarballs, small slicks, or elevated background concentrations also challenge animals facing other natural and anthropogenic stresses. Chronic exposure may not be lethal by itself, but it may impair an animal's overall fitness so that it is less able to withstand other stressors.

Larger spills greater than 420 gal would persist for days to over a week depending on the size and weathering of the slick. Although larger spills are expected to occur much less frequently (Table 6), these larger spills have the greatest potential to adversely affect listed species, and may result in more severe affects. MMS expects that approximately one major oil spill could occur over the 40 years of the proposed action.

Sea Turtles

Spills originating in or migrating through coastal waters of Texas or Louisiana may impact any of the five sea turtle species inhabiting the GOM. Spills occurring in offshore waters would be expected to have less a chance of affecting sea turtles due to their lower densities in deep water; however, leatherback sea turtles may be expected to have a greater risk of adverse effects in offshore environments than nearshore environments. Takes from oil spills may be lethal or non-lethal ranging from a wide array of effects including changes in biologically important behaviors to mortality. It has been estimated that approximately 1 percent of annual sea turtle strandings are associated with oil. Higher percentages are attributed to oil in South Florida (3 percent) and Texas (3 to 6 percent) (Lutcavage et al. 1997). Oil removed from stranded sea turtles in Florida and Texas has been identified primarily as tanker discharges, not the result of accidental spills.

Based on projected spill estimates, there is a small risk that an individual sea turtle will encounter a single small oil slick that does not persist long in the environment. Long-term exposure to contaminants from many small oil spills may play a cumulative role, but these potential effects are mostly unknown at this time. Small spills are expected to be much more numerous than large spills, but the fewer, larger slicks have a greater potential for adverse affects due to the increased chance that sea turtles will be exposed to large slicks over short periods due to its larger size and greater persistence in the environment than smaller slicks.

Because oil spills are unpredictable, we look to a catastrophic oil spill, the Ixtoc I oil spill in 1979, to estimate impacts. During this spill, prevailing northerly currents in the western Gulf of Mexico carried spilled oil toward the United States. A 60-mile by 70-mile patch of sheen containing a 300 ft by 500 ft patch of heavy crude moved toward the Texas coast. The heavy crude impacts a relatively small area and contributes to the sheen, tarballs, and other residuals through weathering. On August 6, 1979, tarballs from the spill impacted a 17 mile stretch of Texas beach. With new technologically advances and oil spill prevention and response plans, a major oil spill in the GOM would not likely be as large as Ixtoc I (Minerals Management Service 2006). In the following analysis we use one-half estimates of the approximate maximum spill area from Ixtoc I to estimate potential impacts from a major oil spill occurring as a result of the proposed action. It should be noted that this estimate likely applies to all oil and gas operations in the GOM

over a 40-year period, but the risk of any one action (i.e., a lease sale) must be assumed to be equal. Table 7 uses the following oil spill scenario and assumptions in the calculations:

- a 30-mile by 40-mile wide area would affect approximately 3,108 km^2 of ocean surface with oil sheen,
- a 150 ft by 250 ft area of heavy crude would affect 0.0035 km^2 of water,
- a 9-mile long by 3-mile wide stretch of coastal habitat affected by tarballs would impact approximately 70 km^2 of water, and
- individuals are assumed to be resident in the area during the duration of the spill so animals aren't repeatedly counted, but may be repeatedly exposed during the duration of the spill.

Table 7. One-day exposure estimates of sea turtles to a major oil slick occurring over the 40-year lifetime of the proposed lease sales.

Spill Area (km^2)[b]	leatherback (0.0026)	green (0.0142)	Kemp's ridley (0.0047)	loggerhead (0.0443)	hawksbill (0.0000)
3,108 (sheen)	8.08	44.13	14.61	137.68	<0.05
0.0035 (heavy crude)	<0.05	<0.05	<0.05	<0.05	<0.05
70 (tarballs)	0.18	1	0.33	3.10	<0.05

[a]Numbers in ( ) following each species name are upper confidence limits of greatest reported density in water depths <200 m of the western GOM reported in Epperly et al. 2002.

In the event an oil spill were to occur, the actual numbers of individuals affected would be dependent upon the size and location of the slick, the type of oil released, and the abundance of sea turtles in the area. Since tarballs may persist in the environment over a much longer period than the slick lasts, an additional number of turtles could potentially be adversely affected by tarball ingestion. Although direct exposure to heavy crude would likely be lethal due to heavy oiling of the entire body surface, the risk of exposure to heavy crude is very low due to the small surface area. Risk of exposure to the sheen is much greater due to the greater surface area of oil spreading across the surface the water.

Hatchlings and juveniles are expected to be more vulnerable to lethal effects of oil spills due to their increased time at the surface, smaller size, and lesser mobility than that of adults. Although short-term physiological effects may occur depending on the level and duration of exposure, most fatalities due to oiling are from covering of the mouth and nares (nostrils) that can prevent an animal from breathing if the individuals we not treated. Because the amount of oiling of hatchlings may vary depending on factors such as the thickness of the sheen at the surface, the duration of the spill, and whether or not the animals were recovered and rehabilitate during oil spill response, we expect approximately one-half of exposed hatchlings and juveniles to be killed due to a major oil spill. Lethality of adults would be expected to be much lower than that of hatchlings due to their greater size, strength, and mobility. Although short-term physiological effects have been shown to occur in adult sea turtles, we estimate that approximately 1 in 10 adults will suffer chronic affects resulting in death from a major oil spill.

The exposure estimates to a surface sheen of a given area are considered reliable since animals must surface to breathe. However, when considering tarball ingestion, tarballs will not be evenly distributed and a sea turtle must actually ingest the tarball to be affected such that exposure does not necessarily equate to a take. Addtionally, although tarballs may persist in the environment for unknown durations, making predictions of take by ingestion is problematic due to uncertainties in actually encounter rates during foraging, and whether the tarballs resulted from an accidental spill, or from other sources such as natural seeps and bilge water discharges. Due to the uncertainty regarding actually encounter rates between sea turtles and tarballs in the environment, we must rely on an approximate estimate that tarballs from a large oil spill would persist for 5 years and be encountered by any individual once per year.

Although the occurrence, size, time of year, and location of an oil spill is highly unpredictable, we expect sea turtles to be adversely affected by a major oil spill. Due to the lack of data of life history stages and the unpredictable location of a major oil spill occurring, we have made the assumption that hatchlings/juveniles and adult sea turtle have an equal chance of being affected by an oil spill; however, when the number of individuals taken is an odd number, we expect adults to have the slightly higher risk of tarball ingestion due to their generally greater amount of prey ingested than smaller individuals. We estimate the following take of sea turtles from a major oil spill occurring during the 40-year lifetime of the proposed action.

Species	**Sheen**		**Tarball Ingestion**	
	Lethal	Non-Lethal	Lethal	Non-Lethal
Hatchlings/Juveniles (0.50 lethal)				
leatherback	2	2	0	0
green	11	11	0	2
Kemps' ridley	8	7	0	1
loggerhead	35	34	0	7
Adults (0.10 lethal)				
leatherback	0	4	0	1
green	2	20	0	3
Kemps' ridley	1	7	0	1
loggerhead	7	62	0	8
hawksbill	0	0	0	1

Numbers greater than 0.50 have been rounded up to the nearest whole number. The risk of hawksbill sea turtles being is low, but spills occurring in south Texas may affect this species through tarball ingestion.

Sperm Whales

Although some sperm whales may be able to avoid oil spills or slicks following detection of hydrocarbons at the surface, it is highly unlikely that they are capable of avoiding spill residuals in their environment. Consequently, the probability that a marine mammal is exposed to hydrocarbons resulting from a spill extends well after the oil spill has dispersed, and may be exposed to residuals of oils spilled as a result of the proposed actions during their lifetimes, but the effects of these residuals is largely unknown. Although an interaction with a spill could occur, primarily sublethal effects are expected

due to avoidance and natural dispersion/weathering of the spill in the offshore environment or long-term exposure to hydrocarbons in the marine environment.

Based on the majority of oil production closer to shore and oil spills 75% of oil spills occurring within 3 nmi of the shoreline, there is a lower likelihood of sperm whales being exposed to oil slicks over the 40-year lifetime of the action. However, because spills are unpredictable events and sperm whales can be found throughout the GOM, it is likely at least one sperm whale will come into contact with a slick if a spill were to occur in an area being used by sperm whales at that time. Considering the density of sperm whales in the GOM (0.0035 individuals km^{-2}) and the spill area of a major oil spill sheen in Table 7 (3,108 km^2), we estimate the following take of sperm whales:

- 11 non-lethal takes of sperm whales over the 40-year lifetime of the action.

Gulf sturgeon
Due to benthic habits of Gulf sturgeon, their presence in marine waters only during the winter, and the low risk of an oil spill contacting them in only the western-most area of their range, there is a relatively low risk of exposure to oil. Because they are not known to do not breach the surface in estuarine and marine waters, an exposure analysis to the surface slick has not been conducted. However, based on the oil spill risk probability, some oil may be expected to come into contact with Gulf sturgeon habitat over the 40-year life of the proposed lease sales, and in NMFS opinion may affect some individuals due to weathering of the slick in nearshore environments along the coastline. In general, a surface slick would not be expected to adversely affect Gulf sturgeon due their benthic habits; however, NMFS expects that a slick reaching shallow coastal waters less than 15 feet may mix throughout the water column and potentially affect sturgeon. two Gulf sturgeon are likely to be lethally taken and another two non-lethally taken by an oil spill over the 40-year life of the proposed lease sales that affect shallow water environments where oil may mix throughout the water column. Although oil spills are unpredictable events, the OSRA indicates a 6 to 9 percent chance that a spill >42,000 gal would reach coastal waters of the westernmost portion of the Gulf sturgeon's range within 10 days. Due to the risk of oil spills on the fringe of Gulf sturgeon's range, we estimate the following:

- Two lethal takes of Gulf sturgeon over the 40-year lifetime of the proposed action.

8 CUMULATIVE EFECTS

Cumulative effects include the effects of future state, tribal, local, or private actions, not involving federal activities, reasonably certain to occur within the action area considered in this biological opinion (i.e., the WPA and CPA of the GOM). Future 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.

Cumulative effects may affect sea turtle species, Gulf sturgeon, sperm whales, and their habitats in the action area. The actions and their effects described as occurring within the action area in the *Environmental Baseline* are expected to continue in the future. We are not aware of any proposed or anticipated changes to these actions that would substantially change the impacts that each threat has on listed species considered by this biological opinion. Therefore, we expect the effects of these actions on listed species will continue at similar levels into the foreseeable future.

9 JEOPARDY ANALYSIS

This section considers the likelihood that the proposed five-year lease sale plan will jeopardize the continued existence of listed species in the wild that have been considered in the effects of the action. To *Jeopardize the continued existence of* is defined as "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50 CFR 402.02). The effects of the action considered the effects of vessel strikes on sea turtles, the effects of seismic exploration on sperm whales, and the effects of accidental oil spills on listed species of sea turtles, sperm whales, and Gulf sturgeon resulting from the proposed five-year lease sale plan. The following jeopardy analysis first considers the effects of the action to determine if we would reasonably expect the action to result in reductions in reproduction, numbers, or distribution of these listed species. The analysis next considers the effects of the action in light of the status of the species, the environmental baseline, and cumulative effects, to determine whether the likelihood of survival of each species in the wild, and the likelihood of recovery of each species in the wild, would be appreciably reduced.

9.1 Effects of the Action on the Likelihood of Survival in the Wild

This section analyzes the effects of the action on the likelihood of survival of each species in the wild. In this context, the survival of the species refers to the continued existence of the species in the wild, and whether or not any anticipated take of that species will result in any reduction in reproduction, numbers, or distribution of that species that may appreciably increase a species' risk of extinction in the wild.

Likelihood of Loggerhead Sea Turtle Survival

In the following analysis, we demonstrate that although some short-term reduction in numbers and reproduction is expected, the anticipated take of loggerhead sea turtles will not appreciably increase the risk of extinction of this species in the wild.

The non-lethal take of 238 individuals by vessel strike and 111 individuals by oil spill over the 40-year lifetime of the action could potentially result in short-term affects on individuals. Sea turtles are generally known to not avoid oil slicks, and are often found near oil and gas operations. Changes in distribution, even short-term, are not expected from non-lethal takes from oil spills. However, interactions with vessels may elicit startle or avoidance responses and the effects of the proposed lease sales may result in

temporary changes in behavior of sea turtles (minutes to hours) over small areas, but are not expected to reduce the distribution of any loggerhead sea turtles in the action area. Lethal takes by vessel strike or oil spill may occur anywhere throughout the GOM. The removal of 119 individuals by vessel strike and 42 individuals by oil spill is anticipated over 40 years of the proposed action. Because all the potential takes are expected to occur anywhere in the action area and sea turtles generally have large ranges in which they disperse, no reduction in the distribution of loggerheads is expected from the take of these individuals.

Although changes in distribution will not occur, there is some potential for the reproductive ability of non-lethally taken turtles to be affected due to the presence of nesting beaches within reach of potential oil spills. For example, if a nesting beach was affected by an oil slick, nesting ability or hatchling survival could potentially be affected for that year, but the individual is expected to survive and return to unimpeded reproduction in subsequent years. Some long-term, non-lethal effects to hydrocarbon residues from spills and ingestion of tarballs may affect sea turtle physiology. In spite of these effects, it appears non-lethal, chronic exposure or repeated ingestion of oil is necessary for any long-term affects to be detectable, yet no effects on the reproduction or number of sea turtles from long-term exposure to residuals or tarball ingestions have been observed in the wild. Non-lethal takes by vessel strike aren't expected to have any measurable impact on the reproduction of numbers of loggerheads. The reaction to and injury incurred from vessel impacts would be dependent on the operational speed of the vessel, depth of the turtle, bow type, and other factors. The non-lethal takes may range from startle reactions to minor injury, and are expected to recover within an appropriate amount of time, depending on the magnitude of impact. Although the range of impacts of non-lethal takes are variable, all are expected to be fully recoverable such that no reductions in reproduction or numbers of loggerheads are anticipated.

The removal of 119 individuals by vessel strike and 42 individuals by oil spill (approximately 4 individuals annually), would result in an instantaneous, but temporary reduction in total population numbers. Sea turtles lethally affected by vessels and spilled oil may be juveniles or adults, with about 2 adults and 3 juveniles every 1.5 years, of which half those adults would be mature females (about 33 adult females over the 40-year lifetime of the lease sales). Thus, the action will result in a reduction of loggerhead numbers. Sea turtle mortality resulting from vessel interactions or spilled oil could result in the loss of reproductive value of an adult turtle. An adult loggerhead sea turtle can lay 3 or 4 clutches of eggs every 2 to 4 years, with 100 to 130 eggs per clutch. The annual loss of 1.5 adult females, on average, could preclude the production of thousands of eggs and hatchlings, of which a small percentage are expected to survive to sexual maturity. Thus, the death of a female eliminates an individual's contribution to future generations, and the action will result in a reduction in loggerhead reproduction. Below, we consider the population trends for loggerhead sea turtles and the effect that the anticipated reduction in numbers and reproduction has on the survival of the species.

Five northwestern Atlantic loggerhead subpopulations have been identified (NMFS SEFSC 2001). The most recent reviews show that only two loggerhead nesting beaches

have greater than 10,000 females nesting per year: South Florida (U.S.) and Masirah Island (Oman). Total estimated nesting in the U.S. is approximately 68,000 to 90,000 nests per year. A yet-to-be-published analysis of nesting data from 1989-2005 by FWRI indicates there is a trend for declining nesting at beaches utilized by the south Florida nesting subpopulation (2006 FWRI letter (McRae) to NMFS, based on statewide nesting beach survey data analyzed by FWRI). Similarly, long-term nesting data show loggerhead nesting declines in North Carolina, South Carolina, and Georgia. Loggerhead populations in Honduras, Mexico, Colombia, Israel, Turkey, Bahamas, Cuba, Greece, Japan, and Panama have been declining.

In other regions, the Eastern Atlantic, the Cape Verde Islands support an intermediately-sized loggerhead nesting assemblage. In 2000, researchers tagged over 1,000 nesting females on just 5 km (3.1 mi) of beach on Boavista Island (Ehrhart et al. 2003). In the Western Atlantic (excluding the U.S.), published and unpublished reports provide an estimate of about 4,000 nests per year in Brazil (Ehrhart et al. 2003). In the Mediterranean, the recorded number of nests per year in Cyprus, Greece, Israel, Tunisia, and Turkey, loggerhead nesting in the Mediterranean ranges from about 3,300 to 7,000 nests per season (Margaritoulis et al. 2003). A small, but unknown nesting population size of loggerheads nest throughout the Indian Ocean.

All life stages are important to the survival of the species; however, it is important to note that individuals of one life stage are not equivalent to those of other life stages. Loggerhead sea turtles have very long developmental times before reaching maturity (up to 38 years). Individuals in earlier life stages are subject to many potential sources of mortality, both natural and human-induced, prior to reaching sexual maturity. Only a fraction of pelagic juveniles are ever expected to contribute to the population through reproduction, and thus are not as valuable to the population as a breeding age adult. The loss of a certain number of pelagic juveniles, therefore, is less of a threat to the species' survival compared to an equal loss of sexually-mature adults.

It is unclear at this time if the current data from major nesting beaches indicate a declining trend in total population size, or is the result of some other factor such as regional failure to nest by the reproductively mature females, variable recruitment resulting in a biased age structure in the population, environmental factors (e.g., resource depletion, nesting beach conditions, oceanographic conditions, etc.), or some natural variation in nesting patterns over time. Whether the decreased trend some subpopulations are currently experiencing are associated with affects these populations experienced decades ago, or is associated with some other variable currently affecting nesting numbers is unknown. How these nesting trends will change in the future is uncertain at this time and being analyzed by the TEWG. Although some natural variability is expected in nesting trends, recruitment of adults into the breeding population could potentially occur if this trend continues over the long-term.

The low number of expected loggerhead mortalities (approximately four individuals annually of different sex and age classes) is not detectable. Considering the population size in the Western North Atlantic, we believe the loggerhead population is sufficiently

large enough to persist and recruit new individuals to replace those expected to be taken. The TEWG (1998) estimated the total loggerhead population of benthic individuals in U.S. waters – a subset of the whole Western Atlantic population – at over 200,000. Based on this estimate, the mortality of 161 loggerheads (approximately 81 juveniles, 40 male adults, and 40 female adults) over the 40-year lifetime of the proposed action would be less than 0.0009% of the current total eastern U.S. population.

Although the anticipated mortalities would result in an instantaneous reduction in absolute population numbers, it is likely that the U.S. populations of sea turtles would not be appreciably affected considering the following. For a population to remain stable, sea turtles must replace themselves through successful reproduction at least once over the course of their reproductive lives, and at least one offspring must survive to reproduce itself. If the hatchling survival rate to maturity is greater than the mortality rate of the population, the loss of breeding individuals would be replaced through recruitment of new breeding individuals from successful reproduction of non-taken sea turtles. Although the causes of the declining trend of major nesting subpopulations are unknown at this time, the present population size is sufficiently large for the persistence of this species. This is evident in this analysis by the fact that loggerheads are expected to be taken in greater numbers than other species of sea turtles due to their higher abundance and densities in the GOM, despite the negative trend in nesting observed over the last several years. Although the declining numbers of major nesting subpopulations requires further study and analysis to determine the causes and long-term effects on population dynamics, the species' likelihood of survival in the wild will not be appreciably reduced as a result of this action..

Summary of Loggerhead Sea Turtle Survival
Based on the above analysis, we believe that the lethal and non-lethal takes of loggerhead sea turtles associated with the proposed action are not reasonably expected to cause, directly or indirectly, an appreciable reduction in the likelihood of survival of loggerhead sea turtles in the wild.

Likelihood of Leatherback Sea Turtle Survival
In the following analysis, we demonstrate that although some short-term reduction in numbers and reproduction is expected, the anticipated take of leatherback sea turtles will not appreciably increase the risk of extinction of this species in the wild.

The non-lethal take of 21 individuals by vessel strike and 7 individuals by oil spill over the 40-year lifetime of the action could potentially result in short-term affects on individuals. Sea turtles are generally known to not avoid oil slicks, and are often found near oil and gas operations. Changes in distribution, even short-term, are not expected from non-lethal takes from oil spills. However, interactions with vessels may elicit startle or avoidance responses and the effects of the proposed lease sales may result in temporary changes in behavior of sea turtles (minutes to hours) over small areas, but are not expected to appreciably reduce the distribution of leatherback sea turtles in the action area. Lethal takes by vessel strike or oil spill may occur anywhere throughout the GOM. The removal of 10 individuals by vessel strike and 2 individuals by oil spill is anticipated

over 40 years of the proposed action. Because all the potential takes are expected to occur anywhere in the action area and sea turtles generally have large ranges in which they disperse, no reduction in the distribution of leatherbacks is expected from the take of these individuals.

When considering the non-lethal effects of an oil spill, leatherbacks have the greatest potential to be affected by spills in pelagic environments. Nesting by leatherbacks in the GOM is sporadic and no major nesting beaches occur in this region. The habitat of leatherbacks in the GOM is typically found in deeper, offshore waters. Due to this habitat, they are typically less vulnerable to spills, of which 75 percent occur within 3 nmi of shore. Leatherbacks are deep divers foraging on prey in the water column and may ingest tarballs. Although some physiological effects may occur from exposure, they are expected to be inconsequential on reproduction. Non-lethal takes by vessel strike aren't expected to have any measurable impact on the reproduction of leatherbacks. The reaction to and injury incurred from vessel impacts would be dependent on the operational speed of the vessel, depth of the turtle, bow type, and other factors. The non-lethal takes may range from startle reactions to minor injury, and individuals are expected to recover within an appropriate amount of time, depending on the magnitude of impact. Although the range of impacts of non-lethal takes are variable, all are expected to be fully recoverable such that no reduction in reproduction or numbers of leatherbacks are anticipated.

A total of 10 leatherbacks are expected to be lethally taken by vessel strike and 2 by oil spill over the 40-year lifetime of the proposed lease sales (approximately 1 individual every 3.3 years, on average). Leatherbacks lethally taken by vessels and spilled oil may be juveniles or adults, with about 5 adults and 7 juveniles over a period of 40 years, of which half those adults would be mature females (about 2-3 adult females over the 40-year lifetime of the lease sales). Thus, the action will result in a reduction of leatherback numbers. The expected mortalities will eliminate an individual's contribution to future generations; thus, resulting in a reduction in reproduction. Below, we consider the population trends for leatherback sea turtles and the effect that the anticipated reduction in numbers and reproduction has on the survival of the species.

The Pacific Ocean leatherback population is generally smaller in size than that in the Atlantic Ocean. Because adult female leatherbacks frequently nest on different beaches, nesting population estimates and trends are especially difficult to monitor. In the Pacific, the World Conservation Union (IUCN) notes that most leatherback nesting populations have declined more than 80%. In other areas of the leatherback's range, observed declines in nesting populations are not as severe, and some population trends are increasing or stable. Nesting trends on U.S. beaches have been increasing in recent years. Leatherback nesting trends for individual beaches are considerably variable, dependent upon natural fluctuations in beach conditions throughout the Atlantic basin; therefore, basin-wide estimates may be a better indicator of population trends than nesting data trends for individual beaches. Spotila et al. (2001) estimated that the mean population number of leatherbacks in the Atlantic basin totaled approximately 27,600 nesting

females (20,082-35,133). We believe that the current population probably still lies within this range, taking into account the natural variation at individual nesting beaches.

Similar to the discussion of the relative importance of various life stages in the loggerhead section above, the removal of different age classes or sexes has different consequences on the population of leatherbacks as well. According to Spotila et al. (1996), survivorship in the juvenile/sub-adult stage of leatherback sea turtles is vitally important to the future of the species; population models are most sensitive to variation in juvenile/sub-adult survival. The number of individuals in the various stages would also not be as disparate in leatherbacks as in loggerheads. Assuming an equal chance or mortality for both juveniles and adults, only 2-3 adult female leatherbacks would be expected to be removed from the population over 40 years. Although the death of a female eliminates an individual's contribution to future generations and may result in a reduction in reproduction, the low number of lethal takes for leatherbacks from the proposed action indicates a greater chance of successful breeding or replacement of individuals through recruitment.

For example, if a leatherback successfully nested in a single nesting season and only one of those hatchlings survived to maturity to breed, there would be no net gain or loss to population numbers. Increasing numbers of hatchlings surviving to maturity would result in a net increase in population numbers, as long as the overall recruitment rate exceeds the death in the population. If a mature female leatherback were taken prior to successful nesting and recruitment of an individual to the breeding population, a net decrease in population size of that individual would be incurred. However, a net loss is not expected. Although the mortality of a few individuals would have an instantaneous decease in absolute population numbers at the time of taking, based on the population size and increasing nesting trend in recent years, the mortality of 12 individuals over 40 years is expected to have a negligible impact on population numbers. Even assuming all mortalities would consist of nesting females, based on the lower female nesting population estimate of 20,084 individuals in the Atlantic, the removal of 12 individuals would be <0.0007 of the total population. The replacement of these 12 individuals through recruitment of new individuals into the breeding population; by at least 12 sea turtles producing at least 2 offspring that survive to adulthood to reproduce, is expected in a population of this size. The expected mortality of leatherbacks is not expected to appreciably reduce the species' likelihood of survival in the wild.

Summary of Leatherback Sea Turtle Survival
Based on the above analysis, we believe that the lethal and non-lethal takes of leatherback sea turtles associated with the proposed action are not reasonably expected to cause, directly or indirectly, an appreciable reduction in the likelihood of survival of leatherback sea turtles in the wild.

Likelihood of Kemp's Ridley Sea Turtle Survival
In the following analysis, we demonstrate that although some short-term reduction in numbers and reproduction is expected, the anticipated take of Kemp's ridley sea turtles will not appreciably increase the risk of extinction of this species in the wild.

The non-lethal take of 26 individuals by vessel strike and 16 individuals by oil spill over the 40-year lifetime of the action could potentially result in short-term affects on individuals. Sea turtles are generally known to not avoid oil slicks, and are often found near oil and gas operations. Changes in distribution, even short-term, are not expected from non-lethal takes from oil spills. However, interactions with vessels may elicit startle or avoidance responses and the effects of the proposed lease sales may result in temporary changes in behavior of sea turtles (minutes to hours) over small areas, but are not expected to reduce the distribution of any Kemp's ridley sea turtles in the action area. Lethal takes by vessel strike or oil spill may occur anywhere throughout the GOM. The removal of 13 individuals by vessel strike and 9 individuals by oil spill is anticipated over 40 years of the proposed action. Because all the potential takes are expected to occur anywhere in the action area and sea turtles generally have large ranges in which they disperse, no appreciable changes in the distribution of Kemp's ridleys is expected from the take of these individuals.

Although changes in distribution will not occur, there is some potential for the reproductive ability of non-lethally taken turtles to be affected due to the presence of nesting beaches within reach of potential oil spills. For example, if a nesting beach was affected by an oil slick, nesting ability or hatchling survival could potentially be affected for that year, but the individual is expected to survive and return to unimpeded reproduction in subsequent years. Although oil spills are unpredictable, historical spill data show that large spills are uncommon in the GOM, and spill response plans to protect coastal resources reduce the likelihood that spills will affecting nesting beaches. Some long-term, non-lethal effects to hydrocarbon residues from spills and ingestion of tarballs may affect sea turtle physiology. In spite of these effects, it appears non-lethal, chronic exposure or repeated ingestion of oil is necessary for any long-term affects to be detectable, yet no effects on the reproduction or number of sea turtles from long-term exposure to residuals or tarball ingestion have been observed in the wild. Non-lethal takes by vessel strike aren't expected to have any measurable impact on the reproduction or numbers of Kemp's ridleys. The reaction to and injury incurred from vessel impacts would be dependent on the operational speed of the vessel, depth of the turtle, bow type, and other factors. The non-lethal takes may range from startle reactions to minor injury, and are expected to recover within an appropriate amount of time, depending on the magnitude of impact. Although the range of impacts of non-lethal takes are variable, all are expected to be fully recoverable such that no reductions in reproduction or numbers of Kemp's ridley sea turtles are anticipated.

A total of 13 Kemp's ridleys are expected to be lethally taken by vessel strike and 9 individuals by oil spills over the 40-year lifetime of the proposed lease sales (approximately 1 individual every 2.2 years, on average). Thus, the action will result in a reduction of Kemp's ridley numbers. The expected mortalities will eliminate an individual's contribution to future generations; thus, resulting in a reduction in reproduction. Below, we consider the population trends for Kemp's ridley sea turtles and the effect that the anticipated reduction in numbers and reproduction has on the survival of the species.

The total population of Kemp's ridleys is not known, but nesting has been increasing significantly in the past several years (9 to 13 percent per year) with a trajectory that should meet or exceed recovery goals. Kemps' ridleys mature and nest at an age of 7-15 years, which is earlier than other chelonids. A younger age at maturity may be a factor in the response of this species to recovery actions. A period of steady increase in benthic immature ridleys has been occurring since 1990 and appears to be due to increased hatchling production and an apparent increase in survival rates of immature sea turtles beginning in 1990. The increased survivorship of immature sea turtles is attributable, in part, to the introduction of turtle excluder devices (TEDs) in the United States and Mexican shrimping fleets and Mexican beach protection efforts. The TEWG (2000) projected that Kemp's ridleys could reach the Recovery Plan's intermediate recovery goal of 10,000 nesters by the year 2015.

Similar to the discussion of the relative importance of various life stages in the loggerhead section above, the removal of different age classes or sexes has different consequences on the population of Kemp's ridleys as well. Lethal takes by vessel strike or oil spill may occur at random anywhere throughout the GOM, are will not affect the distribution of this species in any way. Kemp's ridleys taken by vessels and spilled oil may be juveniles or adults, with an estimated 8 adults every 5 years, of which half those adults would be mature females (about 1 adult female every 10 years, or approximately 4 females over the 40-year lifetime of the lease sales).

All life stages are important to the survival and recovery of the species; however, it is important to note that individuals of one life stage are not equivalent to those of other life stages. Individuals in earlier life stages are subject to many potential sources of mortality, both natural and human-induced, prior to reaching sexual maturity. Only a fraction of pelagic juveniles are ever expected to contribute to the population through reproduction, and thus are not as valuable to the population as a breeding age adult. Sea turtle mortality resulting from vessel interactions or spilled oil could result in the loss of reproductive value of an adult turtle. The loss of 1 adult females every 10 years, on average, could preclude the production of thousands of eggs and hatchlings, of which a small percentage are expected to survive to sexual maturity. However, the population of Kemp's ridleys is increasing and the removal of these individuals is not expected to have any detectable impact on population numbers in the wild. The proportional change in overall survival of Kemp's ridleys from the loss of one individual every two years would be insignificant. The number of younger sea turtles recruiting into the adult or subadult population and their future potential reproductive value would quickly exceed the incidental take of these individuals and its future reproductive value.

Based on the above analysis, the anticipated lethal take of 22 individuals on the population would not be expected to be detectable.

Summary of Kemp's Ridley Sea Turtle Survival
Based on the above analysis, we believe that the lethal and non-lethal takes of Kemp's ridley sea turtles associated with the proposed action are not reasonably expected to

cause, directly or indirectly, an appreciable reduction in the likelihood of survival of Kemp's ridley sea turtles in the wild.

Likelihood of Green Sea Turtle Survival

In the following analysis, we demonstrate that although some short-term reduction in numbers and reproduction is expected, the anticipated take of green sea turtles will not appreciably increase the risk of extinction of this species in the wild.

The non-lethal take of 76 individuals by vessel strike and 36 individuals by oil spills over the 40-year lifetime of the action could potentially result in short-term effects in the fitness of individuals. Sea turtles are generally known to not avoid oil slicks, and are often found near oil and gas operations. Changes in turtle distribution, even short-term, are not expected from oil spills. However, interactions with vessels may elicit startle or avoidance responses and the effects of the proposed lease sales may result in temporary changes in behavior of sea turtles (minutes to days) over small areas, but are not expected to reduce the distribution of any green sea turtles in the action area. Lethal takes by vessel strike or oil spill may occur anywhere throughout the GOM. The removal of 38 individuals by vessel strike and 13 individuals by oil spill is anticipated over 40 years of the proposed action. Because all the potential takes are expected to occur anywhere in the action area and sea turtles generally have large ranges in which they disperse, no reduction in the distribution of green sea turtles is expected from the take of these individuals.

Although changes in distribution will not occur, there is some potential for the reproductive ability of non-lethally taken turtles to be affected due to the presence of nesting beaches within reach of potential oil spills. For example, if a nesting beach was affected by an oil slick, nesting ability or hatchling survival could potentially be affected for that year, but the individual is expected to survive and return to unimpeded reproduction in subsequent years. Although oil spills are unpredictable, there are no green sea turtle nesting beaches likely to affected by oil spills resulting from the proposed action. Some long-term, non-lethal effects to hydrocarbon residues from spills and ingestion of tarballs may affect sea turtle physiology. In spite of these effects, it appears non-lethal, chronic exposure or repeated ingestion of oil is necessary for any long-term effects to be detectable, yet no effects on the reproduction or number of sea turtles from long-term exposure to oil residuals or tarball ingestions have been observed in the wild. Non-lethal takes by vessel strike are not expected to have any measurable impact on the reproduction or numbers of green sea turtles. The reaction to and injury incurred from vessel impacts would be dependent on the operational speed of the vessel, depth of the turtle, bow type, and other factors. The non-lethal takes may range from startle reactions to minor injury, and turtles are expected to recover within an appropriate amount of time, depending on the magnitude of impact. Although the range of impacts of non-lethal takes is variable, all impacts are expected to be fully recoverable from such that no effects to reproduction or numbers of green sea turtles are anticipated.

The lethal take of 38 green sea turtles by vessel strikes and 13 individuals by oil spills over a period of 40 years of the proposed action (1.3 individuals per year, on average)

would result in an instantaneous decrease in absolute population numbers for that year, albeit an undetectable decrease. Thus, the action will result in a reduction of green sea turtle numbers. The expected mortalities will eliminate an individual's contribution to future generations; thus, resulting in a reduction in reproduction. Below, we consider the population trends for green sea turtles and the effect that the anticipated reduction in numbers and reproduction has on the survival of the species.

The two largest nesting populations are found at Tortuguero, on the Caribbean coast of Costa Rica, and Raine Island, on the Great Barrier Reef in Australia, where an annual average of 22,500 and 18,000 females nest per season, respectively. In the U.S., green turtles nest primarily along the central and southeast coast of Florida; present estimates range from 200-1,100 females nesting annually. The total population of green turtles is not known, but nesting activity in Florida and the major Caribbean nesting beach at Tortuguero, Costa Rica, has increased over the long-term and populations are stable or increasing.

All life stages are important to the survival and recovery of the species; however, it is important to note that individuals of one life stage are not equivalent to those of other life stages. Individuals in earlier life stages are subject to many potential sources of mortality, both natural and human-induced, prior to reaching sexual maturity. Only a fraction of pelagic juveniles are ever expected to contribute to the population through reproduction, and thus are not as valuable to the population as a breeding age adult. Sea turtle mortality resulting from vessel interactions or spilled oil could result in the loss of reproductive value of an adult turtle. The loss of 7-8 adult females over the 40-year lifetime of the proposed action (1 female every 5-6 years), could preclude the production of thousands of eggs and hatchlings, of which a small percentage are expected to survive to sexual maturity. However, the proportional change in overall survival of green sea turtles from the loss of one female every 5-6 years would be insignificant. The number of younger sea turtles recruiting into the adult or subadult population and their future potential reproductive value would quickly exceed the incidental take of these individuals and its future reproductive value.

The 51 takes over the 40-year lifetime of the proposed action is not expected to result in any detectable change in the population's growth rate. Recruitment into the population is expected to replace these individuals, allowing the species to quickly recover from this relatively small number of deaths annually. The removal of a low number of individuals of these species is not expected to appreciably reduce the likelihood of the survival of green sea turtles in the wild.

Summary of Green Sea Turtle Survival

Based on the above analysis, we believe that the lethal and non-lethal takes of green sea turtles associated with the proposed action are not reasonably expected to cause, directly or indirectly, an appreciable reduction in the likelihood of survival of green sea turtles in the wild.

Likelihood of Hawksbill Sea Turtle Survival
In the following analysis, we demonstrate that although some short-term reduction in numbers and reproduction is expected, the anticipated take of hawksbill sea turtles will not appreciably increase the risk of extinction of this species in the wild.

The non-lethal take of 1 individual by vessel strike and 1 individual by oil spill over the 40-year lifetime of the action could potentially result in short-term affects on individuals. Sea turtles are generally known to not avoid oil slicks, and are often found near oil and gas operations. We anticipate 1 individual may be struck and killed by a vessel impact over the 40-year lifetime of the proposed action. The numbers of non-lethal and lethal takes of hawksbill sea turtles are low, a total of 3 over the 40 lifetime of the action. Because such a small number of animals are expected to be taken (1 individual every 13.3 years, on average), no reduction in the distribution of hawksbill sea turtles is expected from lethal and non-lethal takes.

The non-lethal take of 1 individual by vessel strike and 1 individual by oil spills (tarball ingestion) over the 40-year lifetime of the action could potentially result in short-term effects in the fitness of individuals. 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. Although hawksbills may occasionally be expected to be found in the action area, this species' habitats are found mainly along peninsular Florida and Mexico, and they are expected to be of low density and rare in the action area. Despite their rarity, 1 turtle may have a risk of ingesting tarballs due to the persistence of tarballs after a slick has dissipated. Non-lethal takes by vessel strike are not expected to have any measurable impact on the reproduction or numbers of hawksbill sea turtles. The reaction to and injury incurred from vessel impacts would be dependent on the operational speed of the vessel, depth of the turtle, bow type, and other factors. The non-lethal takes may range from startle reactions to minor injury, and turtles are expected to recover within an appropriate amount of time, depending on the magnitude of impact. Although the range of impacts of non-lethal takes is variable, all impacts are expected to be fully recoverable from such that no reduction in reproduction or numbers of hawksbill sea turtles are anticipated.

The lethal take of one hawksbill by vessel strike is expected over the 40-year lifetime of the proposed action. Thus, the action will result in a reduction of hawksbill numbers. If the animal lethally taken were a female, a reduction in reproduction may be incurred. Below, we consider the population trends for hawksbill sea turtles and the effect that the anticipated reduction in numbers and reproduction has on the survival of the species.

Hawksbills are solitary nesters and, thus, determining population trends or estimates on nesting beaches is difficult. Hawksbills are not common in the action area, but solitary turtles have been occasionally sighted in shallow, coastal waters. Within the continental U.S., nesting is restricted to the southeast coast of Florida and the Florida Keys, but nesting is rare in these areas. The largest populations of hawksbills are found in the Caribbean, the Republic of Seychelles, Indonesia, and Australia. The most significant nesting within the U.S. occurs in Puerto Rico and the U.S. Virgin Islands, specifically on

Mona Island and Buck Island, respectively. Each year, about 500-1000 hawksbill nests are laid on Mona Island, Puerto Rico (Díez and van Dam 2006) and another 100-150 nests on Buck Island Reef National Monument off St. Croix in the U.S. Virgin Islands. Nesting also occurs on other beaches in St. Croix and on St. John, St. Thomas, Culebra Island, Vieques Island, and mainland Puerto Rico. In addition to nesting beaches in the U.S. Caribbean, hawksbills nest at numerous other sites throughout the Caribbean, with the majority of nesting occurring in Mexico and Cuba. In Mexico, about 2,800 hawksbills nest in Campeche, Yucatán, and Quintana Roo each year (Spotila 2004). Lutz et al. (2003) estimate the number of adult hawksbills living in the Caribbean today is 27,000. In the Pacific, the largest nesting population of hawksbills appears to occur in Australia with approximately 2,000 hawksbills nest on the northwest coast of Australia and about 6,000 to 8,000 off the Great Barrier Reef each year (Spotila 2004).

In spite of their low potential to be affected in the action area, a potential exists for one hawksbill sea turtle to be lethally taken over the 40-year lifetime of the proposed action. There is a 50% probability the individual could be an immature or mature female sea turtle. Even if a single female hawksbill sea turtle were removed from the population, the effects on the size and reproductive value to the population would not be detectable.

Summary of Hawksbill Sea Turtle Survival
Based on the above analysis, we believe that the lethal and non-lethal takes of hawksbill sea turtles associated with the proposed action are not reasonably expected to cause, directly or indirectly, an appreciable reduction in the likelihood of survival of hawksbill sea turtles in the wild.

Likelihood of Gulf Sturgeon Survival
In the following analysis, we demonstrate that although some short-term reduction in numbers and reproduction is expected, the anticipated take of Gulf sturgeon will not appreciably increase the risk of extinction of this species in the wild.

Although some lethal takes from oil spills are expected, oil floats and is expected to impact the environment for short periods of time; therefore, oil spills are not expected to result in any reduction in the distribution of Gulf sturgeon. Takes are expected to occur in the GOM, rather than rivers, and are therefore potentially expected to effect reproductive fish. Two individual Gulf sturgeon are anticipated to be lethally taken by oil spills over the 40-year lifetime of the proposed action; thus, the action will result in a reduction in numbers and reproduction for Gulf sturgeon. Below, we consider the population trends for Gulf sturgeon and the effect that the anticipated reduction in numbers and reproduction has on the survival of the species.

Gulf sturgeon occur in most major tributaries of the northeastern GOM, from the Mississippi River east to Florida's Suwannee River, and in the central and eastern nearshore Gulf waters as far south as Charlotte Harbor, Florida. While little is known about the abundance of Gulf sturgeon throughout most of its range, population estimates have been calculated for the Apalachicola (115 individuals), Choctawhatchee (2,000 to 3,000 individuals), and Suwannee Rivers (7,650 individuals). Genetic studies show that

Gulf sturgeon exhibit river-specific fidelity. Based on analysis of oil spills occurring within the range of Gulf sturgeon, the two lethal takes of Gulf sturgeon expected would occur for fish native to Lake Pontchartrain/Pearl River subpopulation, for which no population numbers have been conducted.

Although no population estimates are available for the Lake Pontchartrain/Pearl River subpopulation, the range-wide decline in the Gulf sturgeon population appears to have been arrested primarily by closing the state fisheries in the 1980s. However, because the Gulf sturgeon is a long-lived, late maturing animal, it is probable that the species requires numerous generations to achieve long-term population stability assuming that adequate habitat is available. For instance, in the Suwannee River, where sub-population numbers appear to be the greatest (approximately 7,600 individuals), only 30 to 90 females spawn in any given year. Because the affected fish are expected to be taken in the GOM, and not in spawning rivers, the two sturgeon takes are expected to be adults. The removal of two adults could potentially affect the number of reproductive individuals available in that year the take occurred. Factors to consider include the sex of the animals taken, and if females, whether or not the individuals were spawning that year. However, due to the low number of expected takes, we believe the expected removal of two individuals by oil spill over 40 years of the proposed action will not result in any detectable effect on the population, and this species will continue to persist in the wild.

Summary of Gulf Sturgeon Survival
Based on the above analysis, we believe that the lethal takes of Gulf sturgeon associated with the proposed action are not reasonably expected to cause, directly or indirectly, an appreciable reduction in the likelihood of survival of Gulf sturgeon in the wild.

Likelihood of Sperm Whale Survival
In the following analysis, we demonstrate that although some short-term reduction in numbers and reproduction is expected, the anticipated take of sperm whales will not appreciably increase the risk of extinction of this species in the wild.

Harassment of sperm whales resulting from seismic surveys is not expected to result in a reduction of numbers, reproduction, or distribution of sperm whales in the wild. Although historical abundances of sperm whales in the GOM are unavailable, recent abundance estimates based on surveys (Mullin and Fulling 2003) indicated that the sperm whale population in the GOM is stable (1,349 whales). Estimates of the global sperm whale population indicate numbers exceeding at least 200,000 individuals is likely and the population appears to be recovering from the large numbers of individuals removed by whaling, the primary threat resulting in this species' listing. The GOM population is comprised of mostly a female population and calves. The effects of oil on sperm whales in this area could be on females and immature animals of either sex. Any exposure to spilled oil is expected to be limited to temporary exposure to volatile compounds in the form of oil at the surface or vapors. Although some temporary avoidance of a spill may result, no reduction in the distribution of sperm whales would result. The non-lethal takes from oil exposure are not expected to result in any reduction in numbers of reproduction of sperm whales.

Summary of Sperm Whale Survival
Based on the above analysis, we believe that the non-lethal takes of sperm whales associated with the proposed action are not reasonably expected to cause, directly or indirectly, an appreciable reduction in the likelihood of survival of sperm whales in the wild.

9.2. Effects of the Action on the Likelihood of Recovery in the Wild

The above analysis on the effects of the action on the likelihood of each species' survival in the wild considered the current status of each species and effects of the numbers of lethal and/or non-lethal takes anticipated for each species. For species in which no reductions in the species numbers, reproduction, or distribution were found, we concluded no change in the species survival would be incurred. For species in which the analysis concluded expected reductions in the number, reproduction, or distribution of the species, the effect of those reductions was analyzed to determine whether those reductions would appreciable reduce the likely survival of the species. Although no appreciable change in distribution was concluded for any species, we concluded lethal takes would result in an instantaneous reduction in absolute population numbers that may also reduce reproduction, but the short-term reductions are not expected to appreciable reduce the likelihood of survival of any species in the wild. The following analysis considers the effects of the take on the likelihood of recovery in the wild. We consider the recovery objectives in the recovery plans prepared for each species that relate to population numbers or reproduction that may be affected by any reductions in the numbers, reproduction, or distribution resulting from the take of each species.

Likelihood of Loggerhead Sea Turtle Recovery
The Atlantic recovery plan for the United States population of the loggerhead sea turtles (NMFS and USFWS 1991a), herein incorporated by reference, lists the following relevant recovery objective over a period of 25 continuous years:

- The adult female population in Florida is increasing and in North Carolina, South Carolina, and Georgia, it has returned to pre-listing nesting levels (NC = 800 nests/season; SC = 10,000 nests/season; GA = 2,000 nests/season).

The 161 lethal takes of loggerhead sea turtles over a period of 40-years (approximately 4 lethal takes annually) will result in a reduction in overall population numbers in any given year. One-quarter of these takes are expected to be adult females and may effect reproduction (approximately 1 adult female every 1.6 years or 66 adult females over 40 years of the proposed action). We have already determined these takes are not likely to reduce population numbers over time due to current population sizes and expected recruitment. Non-lethal takes of loggerhead sea turtles by vessel strikes or oil spill (8.7 non-lethal takes annually, on average, or 349 non-lethal takes over a period of 40 years) will not affect the adult female nesting population or number of nests per nesting season. When considering no anticipated effects on nesting and the fact that oil spills associated with the proposed action will not affect any of the nesting beaches listed in the recovery objective above, non-lethal takes will not result in an appreciable reduction in the likelihood of loggerhead sea turtle recovery in the wild.

Likelihood of Leatherback Sea Turtle Recovery
The Atlantic recovery plan for the United States population of the leatherback sea turtles (NMFS and USFWS 1992), herein incorporated by reference, lists the following relevant recovery objective;

- The adult female population increases over the next 25 years, as evidenced by as statistically significant trend in the number of nests at Culebra, Puerto Rico, St. Croix, USVI, and along the east coast of Florida.

The lethal removal of 13 individuals (one individual every 3.1 years) will result in the instantaneous reduction in overall population numbers in any given year of the take occurring. Six of these takes are expected to be adult females. We have already determined these takes are not likely to reduce population numbers over time due to current population sizes and expected recruitment. The effects of this reduction in population numbers are not reasonably expected to cause, directly or indirectly, an appreciable reduction in the likelihood of leatherback sea turtle recovery in the wild. Takes of leatherback sea turtles by vessel strikes or oil spill are not anticipated to reduce the adult female nesting population or number of nests. Accidental oil spills in the GOM will not affect any of the nesting beaches listed in the recovery objective above.

Likelihood of Kemp's Ridley Sea Turtle Recovery
The recovery plan for Kemp's ridley sea turtles (USFWS and NMFS 1992), herein incorporated by reference, lists the following relevant recovery objective:

- Attain a population of at least 10,000 females nesting in a season.

The lethal removal of 18 individuals (approximately one lethal take every 2.2 years) will result in the instantaneous reduction in overall population numbers in any given year of a take occurring. About 1 adult female every 10 years is expected to be lethally taken, or approximately 4 females over the 40-year lifetime of the lease sales. We have already determined these takes are not likely to reduce population numbers over time due to current population sizes and expected recruitment. Takes of Kemps ridley sea turtles by vessel strikes or oil spill will not affect the number of nesting females in any given nesting season. Thus, the proposed action will not result in an appreciable reduction in the likelihood of Kemp's ridley sea turtle recovery in the wild.

Likelihood of Green Sea Turtle Recovery
The Atlantic recovery plan for the population of green sea turtles (NMFS and USFWS 1991b), herein incorporated by reference, lists the following relevant recovery objectives over a period of 25 continuous years:

- The level of nesting in Florida has increased to an average of 5,000 nests per year for at least 6 years.

- A reduction in stage class mortality is reflected in higher counts of individuals on foraging grounds.

The 51 lethal takes of green sea turtles over a period of 40 years (approximately 1.3 lethal takes annually, on average) will result in the instantaneous reduction in overall population numbers in any given year. We have already determined these takes are not likely to reduce population numbers over time due to current population sizes and expected recruitment. About 11 of these takes are expected to be adult females (approximately 1 adult female and 1 juvenile every 3.6 years). No age class will be more at risk than another, and the removal of 1 juvenile every 1.3 years is not anticipated to result in any detectable effects on counts of juveniles on foraging grounds. Takes of green sea turtles by vessel strikes or oil spill will not affect either of the above recovery objectives, since neither the level of nesting nor age class mortality effects will result. Thus, the proposed action will not result in an appreciable reduction in the likelihood of green sea turtle recovery in the wild.

Likelihood of Hawksbill Sea Turtle Recovery

The recovery plan for the population of the hawksbill sea turtles (NMFS and USFWS 1993), herein incorporated by reference, lists the following relevant recovery objectives over a period of 25 continuous years:

- The adult female population is increasing, as evidenced by a statistically significant trend in the annual number of nests at five index beaches, including Mona Island and BIRNM.

- The numbers of adults, subadults, and juveniles are increasing, as evidenced by a statistically significant trend on at least five key foraging areas within Puerto Rico, USVI, and Florida.

We have already determined the small number of takes (1 lethal and two non-lethal) are not likely to reduce population numbers over time due to current population sizes and expected recruitment. The effect of the small number of takes over 40 years will not affect either of the above recovery objectives. The take of hawksbill sea turtles is not anticipated to result in an appreciable reduction in the likelihood of hawksbill sea turtle recovery in the wild.

Likelihood of Gulf Sturgeon Recovery

The recovery plan for the Gulf sturgeon (USFWS et al. 1995), herein incorporated by reference, lists the following relevant recovery objective:

- Defining a self-sustaining population as one where the average rate (over a 12-year period) of natural recruitment is at least equal to the average mortality rate.

The incidental take of two Gulf sturgeon over the 40-year life of the proposed action, even if occurring in the same year, is not expected to change the population dynamics of the population. Although there is a chance the individuals taken may be reproductive females, the effects of this small reduction in numbers and reproduction is not anticipated to affect the natural recruitment of individuals into the population, and these mortalities

are expected to be replaced through recruitment such that this recovery objective is not impeded. The effect of the lethal take of two individuals over 40 years is not anticipated to result in an appreciable reduction in the likelihood of Gulf sturgeon recovery in the wild.

Likelihood of Sperm Whale Recovery

Although a final recovery plan has not been prepared for sperm whales, a draft plan was recently updated that identifies the following relevant recovery criteria for sperm whales:

- A probability of extinction of <1 percent in 100 years, achieved in part by a stable or increasing population for at least 80 years (or 3 generations).

No lethal takes of sperm are anticipated from this action; therefore, the non-lethal take of 11 sperm whales will not result in an appreciable reduction in the likelihood of sperm whale recovery in the wild.

9.3 Synthesis of Likelihood of Survival and Recovery in the Wild

Conclusions for Sea Turtles

The proposed lease sales will not appreciably reduce the likelihood of the survival and recovery in the wild of any of the five species of sea turtles considered in this biological opinion. We conclude that the anticipated reduction in numbers by take of sea turtles by vessel strikes and oil spills associated with the proposed action, when evaluated in the context of each species' status, the environmental baseline, and the cumulative effects, are not expected jeopardize the continued existence of loggerhead, leatherback, Kemp's ridley, green, or hawksbill sea turtles.

Conclusions for Gulf Sturgeon

The proposed lease sales will not appreciably reduce the likelihood of the survival and recovery of Gulf sturgeon. We conclude that the anticipated reduction in numbers by take of Gulf sturgeon by oil spills associated with the proposed action, when evaluated in the context of the species' status, the environmental baseline, and the cumulative effects, will not affect Gulf sturgeon in a way that reduces the number of fish born in a particular year (i.e., a specific age-class), the reproductive success of adults, or the number of young annually recruited into the adult breeding population. It is our opinion the proposed action will not jeopardize the continued existence of Gulf sturgeon.

Conclusions for Sperm Whales

The proposed lease sales will not appreciably reduce the likelihood of the survival and recovery of sperm whales. We conclude that the anticipated reduction in numbers by take of sperm whales by oil spills associated with the proposed action, when evaluated in the context of the species' status, the environmental baseline, and the cumulative effects, will not jeopardize the continued existence of sperm whales.

10 CONCLUSION

We have analyzed the best available data, the current status of the species, environmental baseline, effects of the proposed action, and cumulative effects to determine whether the proposed action is likely to jeopardize the continued existence of any sea turtle species, Gulf sturgeon or sperm whales. The proposed action will not appreciably reduce the likelihood of survival and recovery of the listed species considered in this biological opinion. After reviewing the status of leatherback, loggerhead, green, hawksbill, and Kemp's ridley sea turtles; the threatened Gulf sturgeon; endangered sperm whales, and analyzing the synthesis of the environmental baseline, the effects of the proposed action, and the cumulative effects, it is the biological opinion of NMFS that implementation of the proposed action described in this biological opinion is not likely to jeopardize the continued existence of these species.

11 INCIDENTAL TAKE STATEMENT (ITS)

Section 9 of the ESA and protective regulations issued pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or 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 RPMs and terms and conditions of the ITS.

Section 7(b)(4)(c) of the ESA specifies that in order to provide an incidental take statement for an endangered or threatened species of marine mammal, the taking must be authorized under section 101(a)(5) of the MMPA. Since no incidental take of listed marine mammals is expected or has been authorized under section 101(a)(5) of the MMPA, no statement on incidental take of endangered whales is provided and no take is authorized. Nevertheless, MMS must immediately notify (within 24 hours, if communication is possible) the NMFS' Office of Protected Resources should a take of a listed marine mammal occur.

Take of Sperm Whales

Sperm whales within the action area are likely to be adversely affected by seismic activities. Seismic activities are likely to disrupt the normal behavior of marine mammals but measures included in NTL No. 2007-G02 should reduce the impact of that disruption so that it does not rise above the level of harassment (i.e., injury or mortality is not anticipated). Any vessel collisions with sperm whales are likely to severely harm or kill the animal but measures included in NTL No. 2007-G04 should reduce the risk of collision with sperm whales to a discountable level. However, NMFS is not including an incidental take statement for the incidental take of whale species because the take of marine mammals has not been authorized under section 101(a)(5)(A) of the Marine

Mammal Protection Act (MMPA) and/or its 1994 amendments (See ESA section 7(b)(4)(C)).

On December 26, 2002, the MMS submitted a request for 5-year regulations under the MMPA for the taking, by harassment, of sperm whales incidental to the oil and gas industry's seismic surveys to discover oil and gas deposits offshore in the GOM. NOAA Fisheries published an Advance Notice of Proposed Rulemaking regarding the small take authorization on March 3, 2003 (68 FR 9991). Following issuance of such regulations under the MMPA, NMFS will amend this opinion to include any authorized incidental take of sperm whales, as may be appropriate at that time.

Take of Sea Turtles Resulting from Vessel Strikes
NMFS expects impacts to sea turtles in the action area as a result of OCS oil and gas leasing activities. Based on stranding records, incidental captures during recreational and commercial fishing operations, scientific surveys, and historical data, the five species of sea turtles are known to occur in GOM waters in and around the action area. The vessel strike avoidance requirements (NTL No. 2003-G10) will appreciably reduce the numbers of sea turtles that may be incidentally taken from routine offshore vessel operations associated with the proposed action; however, the 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 as a result of the proposed action. Therefore, pursuant to section 7(b)(4) of the ESA, NMFS anticipates incidental take as follows:

- 119 lethal (2.9 individuals annually, on average) and 238 non-lethal takes (5.9 individuals annually, on average) of loggerhead sea turtles over the 40-year lifetime of the proposed action.

- 10 lethal takes (1 individual every 4 years, on average) and 21 non-lethal takes (1 individual every 1.9 years, on average) of leatherback sea turtles over the 40-year lifetime of the proposed action.

- 13 lethal takes (1 individual every 3 years, on average) and 26 non-lethal takes (1 individual every 1.5 years, on average) of Kemp's ridley sea turtles over the 40-year lifetime of the proposed action.

- 38 lethal takes (1 individual every 1.1 years, on average) and 76 non-lethal takes (1.9 individuals annually, on average) of green sea turtles over the 40-year lifetime of the proposed action.

- 1 lethal and 1 non-lethal take of a hawksbill sea turtle over the 40-year lifetime of the proposed action.

If the actual incidental take exceeds this level, MMS must immediately reinitiate formal consultation.

Takes of Listed Species Resulting from Spilled Oil

NMFS believes that a small number of listed species will experience adverse effects as the result of exposure to a major oil spill or ingestion of accidentally spilled oil over the lifetime of the action. Spilled oil resulting from the proposed action could take up to 42 lethal and 111 non-lethal takes of loggerheads; 2 lethal and 7 non-lethal takes of a leatherback sea turtles; 9 lethal and 16 non-lethal takes of Kemp's ridley sea turtles; 13 lethal and 36 non-lethal take of green sea turtles; 2 lethal takes of Gulf sturgeon; and 11 non-lethal takes of sperm whales over the 40-year lifetime of the proposed lease sales. However, NMFS 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.

11.1 Effect of the Take

NMFS believes that the aforementioned level of anticipated take (lethal, or non-lethal) is not likely to appreciably reduce the likelihood of the survival and recovery of sperm whales; leatherback, green, hawksbill, Kemp's ridley, and loggerhead sea turtles; and Gulf sturgeon in the wild by reducing their reproduction, numbers, or distribution.

11.3 Reasonable and Prudent Measures (RPMs)

Section 7(b)(4) of the ESA requires NMFS to issue a statement specifying the impact of any incidental taking to any agency whose proposed action is found to comply with section 7(a)(2) of the ESA and whose proposed action may incidentally take individuals of listed species. It also states that RPMs necessary and appropriate to minimize impacts, and terms and conditions to implement those measures, must be provided and must be followed to minimize those impacts. Only incidental taking by the federal agency or applicant that complies with the specified terms and conditions is authorized.

The RPMs and terms and conditions are specified as required by 50 CFR 402.14 (i)(1)(ii) and (iv) to document the incidental take by the proposed action and to minimize the impact of that take on sea turtles. These measures and terms and conditions are non-discretionary, and must be implemented by NMFS in order for the protection of section 7(o)(2) to apply. NMFS has a continuing duty to regulate the activity covered by this incidental take statement. If MMS fails to adhere to the terms and conditions of the incidental take statement through enforceable terms, and/or fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

NMFS has determined that the following RPMs are necessary and appropriate to minimize impacts of the incidental take of sea turtles from vessel operation.

1. MMS must reduce the potential for sea turtles to be struck and injured by vessels operating in support of oil and gas development activities in the GOM.

2. MMS must require the monitoring and reporting of any sea turtles struck or observed to have sign of vessel interaction to assess the actual level of incidental take in comparison with the anticipated incidental take.

11.4 Terms and Conditions

In order to be exempt from liability for take prohibited by section 9 of the ESA, NMFS must comply with the following terms and conditions, which implement the RPMs described above. These terms and conditions are non-discretionary.

The following terms and conditions implement RPM No. 1.

1. MMS must implement NMFS measures to reduce the risk of accidental vessel strikes with sea turtles by use of its legal authorities to ensure implementation of, and compliance with NTL No 2007-G04 (APPENDIX A).

The following terms and conditions implement RPM No. 2.

2. MMS must make information available to vessel operators concerning species information on sea turtles in the GOM and reporting of vessel-struck, or injured and dead animals.

3. MMS must ensure that all vessel struck, or injured or dead turtles with indications of vessel interactions are reported to the Sea Turtle Stranding Network Coordinator in the nearest coastal state. Any takes of listed species shall be reported to the NMFS Southeast Regional Office within no more than 24 hours of the incident to: takereport.nmfsser@noaa.gov. If an MMS action 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. Report dead or injured protected species to your local stranding network contacts. A list of sea turtle stranding responders is available at http://www.sefsc.noaa.gov/seaturtleSTSSN.jsp. A list of marine mammal stranding network responders for each state is available at http://www.nmfs.noaa.gov/pr/health/networks.htm.

4. MMS must submit an annual report to NMFS Southeast Regional Office regarding the reports of vessel-struck sea turtles, and injured and dead sea turtles reported from oil and gas operators. Hardcopies of all annual reports will be submitted to the following address:

Assistant Regional Administrator for Protected Resources
National Marine Fisheries Service
263 13th Avenue South
St. Petersburg, FL 33701

12 CONSERVATION RECOMMENDATIONS

Under Section 20 of the OCSLA, the Secretary shall ". . . conduct such additional studies to establish environmental information as he deems necessary and shall monitor the human, marine, and coastal environments of such area or region in a manner designed to provide time-series and data trend information which can be used for comparison with any previously collected data for the purpose of identifying any significant changes in the quality and productivity of such environments, for establishing trends in the area studied and monitored, and for designing experiments to identify the causes of such changes." Through the Environmental Studies Program (ESP), MMS conducts studies designed to provide information on the current status of resources of concern and notable changes, if any, resulting from OCS Program activities.

Pile Driving
To better understand the cumulative effects of noise from oil and gas construction and development activities on the OCS, MMS should conduct a study to characterize all aspects of noise-producing construction and operation activities such as pile driving during well construction and platform installation, and of other common OCS activities. The study should characterize both specific sources of noise from MMS-permitted actions, as well as ambient noise measurements on the OCS. Major noise-producing activities should be identified and measurements of noise from these activities should be recorded and reported in appropriate units of measurement to estimate the acoustic footprint of the activities, duration, frequency, and relative contribution to ambient noise levels in the GOM. Methodologies of field measurements should be should be coordinated with NMFS personnel. Such data would help quantify the relative contribution of pile driving on ambient noise levels, compare to other known sources, and conduct cumulative impact analyses in the GOM. Following completion of such a study, MMS should hold a joint MMS/NMFS workshop with industry representatives to cooperatively discuss the results of the study and identify any technology- or method-based recommendations to reduce ambient noise in the marine environment, and any other future actions that may be necessary.

Observer Programs
MMS should work cooperatively with NMFS to address existing protected species observer issues in the GOM. Observers are currently required for geophysical and geological exploration and the explosive removal of offshore structures. Some current issues involve standard protocols passive acoustic monitoring, observer qualifications and training, standard reporting formats, and improvement in communicating with observers companies regarding the intent and protocols to be followed for protected species mitigation.

Marine Debris
MMS should continue to work with NMFS and the Offshore Operators Committee to provide informational materials to the offshore oil and gas workers, require annual training, and continue to develop best management practices to reduce the release of debris into the marine environment. MMS should work with NMFS to update the Marine Debris NTL 2003-G11, as appropriate.

Protected Species Workshops
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 that workshop panel. MMS should continue its support of research to determine effects of OCS related activities on protected species, other marine fauna, and the environment, and present the results at its information transfer meetings.

13 REINITIATION OF CONSULTATION

This concludes formal consultation on the CMPR fishery. As provided in 50 CFR 402.16, reinitiation of formal consultation is required if 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 the taking specified in the incidental take statement is 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.

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APPENDICES

APPENDIX A. IMPLEMENTATION OF SEISMIC SURVEY MITIGAITON MEASURES AND PROTECTED SPECIES OBSERVER PROGRAM (NTL 2007-G02).

APPENDIX B. VESSEL STRIKE AVOIDANCE AND INJURED/DEAD PROTECTED SPECIES REPORTING (NTL 2007-G04).

APPENDIX C. MARINE TRASH AND DEBRIS AWARENESS AND ELIMINATION ((NTL 2007-G03).

Additional Considerations for ESA Section 7 Consultations (Revised 12-6-2005)

Marine Mammal Protection Act (MMPA) Recommendations: The Endangered Species Act (ESA) section 7 process does not authorize incidental takes of listed or non-listed marine mammals. If such takes may occur an incidental take authorization under MMPA section 101 (a)(5) is necessary. Contact Ken Hollingshead of our NMFS Headquarters' Protected Resources staff at (301) 713-2323 for more information on MMPA permitting procedures.

Essential Fish Habitat (EFH) Recommendations: In addition to its protected species/critical habitat consultation requirements with NMFS' Protected Resources Division (PRD) pursuant to section 7 of the ESA, prior to proceeding with the proposed action the action agency must also consult with NMFS' Habitat Conservation Division (HCD) pursuant to the Magnuson-Stevens Fishery Conservation and Management Act's (MSA) requirements for essential fish habitat (EFH) consultation (16 U.S.C. 1855 (b)(2) and 50 CFR 600.905-.930, subpart K). The action agency should also ensure that the applicant understands the ESA and EFH processes; that ESA and EFH consultations are separate, distinct, and guided by different statutes, goals, and time lines for responding to the action agency; and that the action agency will (and the applicant may) receive separate consultation correspondence on NMFS letterhead from HCD regarding their concerns and/or finalizing EFH consultation.

Public Consultation Tracking System (PCTS) Guidance: PCTS is an online query system allowing federal agencies and U.S. Army Corps of Engineers' (COE) permit applicants to track the status of NMFS consultations under ESA section 7 and under MSA sections 305(b)2 and 305(b)(4): Essential Fish Habitat. Access PCTS via: www.nmfs.noaa.gov/pcts. Federal agencies are required to enter an agency-specific username and password to query the Federal Agency Site. The Corps Permit Site allows COE permit applicants the ability to check on the current status of Clean Water Act section 404 permit actions for which NMFS has conducted an ESA section 7 consultation with the COE since the beginning of the 2001 fiscal year (no password needed).

For COE-permitted projects, click on "Enter Corps Permit Site." From the "Choose Agency Subdivision (Required)" list, pick the appropriate COE district. At "Enter Agency Permit Number" type in the COE district identifier, hyphen, year, hyphen, number. The COE is in the processing of converting its permit application database to PCTS-compatible "ORM." An example permit number is: SAJ-2005-000001234-IPS-1. For the Jacksonville District, which has already converted to ORM, permit application numbers should be entered as SAJ (hyphen), followed by 4-digit year (hyphen), followed by permit application numeric identifier with no preceding zeros. E.g., SAJ-2005-123, SAJ-2005-1234, SAJ-2005-12345.

For inquiries regarding applications processed by Corps districts that have not yet made the conversion to ORM (e.g., Mobile District), enter the 9-digit numeric identifier, or convert the existing COE-assigned application number to 9 numeric digits by deleting all letters, hyphens, and commas; converting the year to 4-digit format (e.g., -04 to 2004); and adding additional zeros in front of the numeric identifier to make a total of 9 numeric digits. E.g., AL05-982-F converts to 200500982; MS05-04401-A converts to 200504401. PCTS questions should be directed to Eric Hawk at Eric.Hawk@noaa.gov. Requests for username and password should be directed to April Wolstencroft (PCTSUsersupport@noaa.gov).

APPENDIX A

OMB Control Number: 1010-0154
OMB Expiration Date: February 28, 2010

UNITED STATES DEPARTMENT OF THE INTERIOR
MINERALS MANAGEMENT SERVICE (MMS)
GULF OF MEXICO (GOM) OCS REGION

NTL No. 2007-G02

Effective Date: February 7, 2007

NOTICE TO LESSEES AND OPERATORS (NTL) OF FEDERAL OIL, GAS, AND SULPHUR LEASES IN THE OUTER CONTINENTAL SHELF, GULF OF MEXICO OCS REGION

Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program

This NTL supersedes and replaces NTL No. 2004-G01. It does not introduce any new types of mitigation measures; however, it clarifies how you should implement seismic survey mitigation measures, including ramp-up procedures, the use of a minimum sound source, airgun testing and protected species observation and reporting. The measures contained herein apply to all on-lease surveys you conduct under 30 CFR 250 and all off-lease surveys you conduct under 30 CFR 251.

Background

The use of an airgun or airgun arrays while conducting seismic operations may have an impact on marine wildlife, including marine mammals and sea turtles. Some marine mammals, such as the sperm whale (*Physeter macrocephalus*), and all sea turtles that inhabit the GOM are protected under the Endangered Species Act (ESA). All marine mammals are protected under the Marine Mammal Protection Act (MMPA).

In order to protect marine mammals and sea turtles during seismic operations, the National Marine Fisheries Service (NMFS) requires seismic operators to use ramp-up and visual observation procedures when conducting seismic surveys. Procedures for ramp-up, protected species observer training, visual monitoring and reporting are described in detail in this NTL. These mitigation measures apply to geophysical activities conducted under lease terms, for all seismic survey operations conducted in waters deeper than 200 meters (656 feet) throughout the GOM and, in the GOM waters east of 88.0° W. longitude, for all seismic survey operations conducted regardless of water depth. Performance of these mitigation measures is also a condition of the approval of applications for geophysical permits. You must demonstrate your compliance with these mitigation measures by submitting to MMS certain reports detailed in this NTL.

Definitions

Terms used in this NTL have the following meanings:

1. Airgun means a device that releases compressed air into the water column, creating an acoustical energy pulse with the purpose of penetrating the seafloor.
2. Ramp-up means the gradual increase in emitted sound levels from an airgun array by systematically turning on the full complement of an array's airguns over a period of time.
3. Visual monitoring means the use of trained observers to scan the ocean surface visually for the presence of marine mammals and sea turtles. These observers must have successfully completed a visual observer training program as described below. The area to be scanned visually includes, but is not limited to, the exclusion zone. Visual monitoring of an exclusion zone and adjacent waters is intended to establish and, when visual conditions allow, maintain a zone around the sound source and seismic vessel that is clear of marine mammals and sea turtles, thereby reducing or eliminating the potential for injury.
4. Exclusion zone means the area at and below the sea surface within a radius of 500 meters surrounding the center of an airgun array and the area within the immediate vicinity of the survey vessel. Each survey vessel must maintain its own unique exclusion zone.
5. Whales mean all marine mammals in the GOM except dolphins (see definition below) and manatees. This includes all species of baleen whales (Suborder *Mysticeti*), all species of beaked whales (*Ziphius cavirostris* and *Mesoplodon sp.*), sperm whales (*Physeter macrocepahalus*), and pygmy and dwarf sperm whales (*Kogia sp.*). Of the baleen whales, only the Bryde's whale (*Balaenoptera edeni*) is expected to be present in the northern GOM and is considered uncommon. This species has primarily been sighted in water depths less than 200 m in the eastern GOM. Sightings of other baleen whale species are highly unlikely.
6. Dolphins mean all marine mammal species in the Family *Delphinidae*. In the GOM, this includes, among others, killer whales, pilot whales, and all of the "dolphin" species.

Ramp-up Procedures

The intent of ramp-up is to warn marine mammals and sea turtles of pending seismic operations and to allow sufficient time for those animals to leave the immediate vicinity. Under normal conditions, animals sensitive to these activities are expected to move out of the area. For all seismic surveys, including airgun testing, use the ramp-up procedures described below to allow whales, other marine mammals, and sea turtles to depart the exclusion zone before seismic surveying begins.

Measures to conduct ramp-up procedures during all seismic survey, including airgun testing, operations are as follows:

1. Visually monitor the exclusion zone and adjacent waters for the absence of marine mammals and sea turtles for at least 30 minutes before initiating ramp-up procedures. If none are detected, you may initiate ramp-up procedures. Do not initiate ramp-up procedures at night or when you cannot visually monitor the exclusion zone for marine mammals and sea turtles if your minimum source level drops below 160 dB re 1 μPa-m (rms) (see measure 5). Altering the vessel's course to shallower water depths (< 200m in the Central and Western Planning Areas) to circumvent ramp-up requirements of the 200 meter isobath will be considered noncompliant.
2. Initiate ramp-up procedures by firing a single airgun. The preferred airgun to begin with should be the smallest airgun, in terms of energy output (dB) and volume (in^3).

3. Continue ramp-up by gradually activating additional airguns over a period of at least 20 minutes, but no longer than 40 minutes, until the desired operating level of the airgun array is obtained.
4. Immediately shut down all airguns ceasing seismic operations at any time a whale is detected entering or within the exclusion zone. You may recommence seismic operations and ramp-up of airguns only when the exclusion zone has been visually inspected for at least 30 minutes to ensure the absence of marine mammals and sea turtles.
5. You may reduce the source level of the airgun array, using the same shot interval as the seismic survey, to maintain a minimum source level of 160 dB re 1 μPa-m (rms) for the duration of certain activities. By maintaining the minimum source level, you will not be required to conduct the 30-minute visual clearance of the exclusion zone before ramping back up to full output. Activities that are appropriate for maintaining the minimum source level are: (1) all turns between transect lines, when a survey using the full array is being conducted immediately prior to the turn and will be resumed immediately after the turn; and (2) unscheduled, unavoidable maintenance of the airgun array that requires the interruption of a survey to shut down the array. The survey should be resumed immediately after the repairs are completed. There may be other occasions when this practice is appropriate, but use of the minimum source level to avoid the 30-minute visual clearance of the exclusion zone is only for events that occur during a survey using the full power array. The minimum sound source level is not to be used to allow a later ramp-up after dark or in conditions when ramp-up would not otherwise be allowed.

Protected Species Observer Program

Visual Observers

Visual observers who have completed a protected species observer training program as described below are required on all seismic vessels conducting operations in water depths greater than 200 meters (656 ft) throughout the GOM. Visual observers are required on all seismic vessels conducting operations in OCS water depths less than 200 meters (656 ft.) in the GOM waters east of 88.0° W. longitude. At least two protected species visual observers will be required on watch aboard seismic vessels at all times during daylight hours (dawn to dusk) when seismic operations are being conducted, unless conditions (fog, rain, darkness) make sea surface observations impossible. If conditions deteriorate during daylight hours such that the sea surface observations are halted, visual observations must resume as soon as conditions permit. Operators may engage trained third party observers, may utilize crew members after training as observers, or may use a combination of both third party and crew observers. During these observations, the following guidelines shall be followed: (1) other than brief alerts to bridge personnel of maritime hazards, no additional duties may be assigned to the observer during his/her visual observation watch (if conditions warrant more vigilant look-outs when navigating around or near maritime hazards, additional personnel must be used to ensure that watching for protected species remains the primary focus of the on-watch observers), (2) no observer will be allowed more than 4 consecutive hours on watch as a visual observer, (3) a "break" time of no less than 2 hours must be allowed before an observer begins another visual monitoring watch rotation (break time means no assigned observational duties), and (4) no person (crew or third party) on watch as a visual observer will be assigned a combined watch schedule of more than 12 hours in a 24-hour period. Due to the concentration and diligence required during visual observation watches, operators who choose to use trained crew members in these positions may

select only those crew members who demonstrate willingness as well as ability to perform these duties.

Training

All visual observers must have completed a protected species observer training course. MMS will not sanction particular trainers or training programs. However, basic training criteria have been established and must be adhered to by any entity that offers observer training. Operators may utilize observers trained by third parties, may send crew for training conducted by third parties, or may develop their own training program. All training programs offering to fulfill the observer training requirement must: (1) furnish to MMS, at the address listed in this NTL, a course information packet that includes the name and qualifications (i.e., experience, training completed, or educational background) of the instructor(s), the course outline or syllabus, and course reference material; (2) furnish each trainee with a document stating successful completion of the course; and (3) provide MMS with names, affiliations, and dates of course completion of trainees.

The training course must include the following elements:

I. Brief overview of the MMPA and the ESA as they relate to seismic acquisition and protection of marine mammals and sea turtles in the GOM,

II. Brief overview of seismic acquisition operations in the GOM,

III. Overview of seismic mitigation measures (NTLs) and the protected species observer program in the GOM,

IV. Discussion of the role and responsibilities of the protected species observer in the GOM, including:
   a) Legal requirements (why you are here and what you do),
   b) Professional behavior (code of conduct),
   c) Integrity,
   d) Authority of protected species observer to call for shut-down of seismic acquisition operations,
   e) Assigned duties,
      1) What can be asked of the observer,
      2) What cannot be asked of the observer,
   f) Reporting of violations and coercion,

V. Identification of GOM marine mammals and sea turtles, with emphasis on whales,

VI. Cues and search methods for locating marine mammals, especially whales, and sea turtles,

VII. Data collection and reporting requirements:
   a) Forms and reports to MMS via email at protectedspecies@mms.gov on the 1st and 15th of each month,
   b) Whale in exclusion zone/shut-down report within 24 hours.

Visual Monitoring Methods

The observers on duty will look for whales, other marine mammals, and sea turtles using the naked eye and hand-held binoculars provided by the seismic vessel operator. The observers will stand watch in a suitable location that will not interfere with navigation or operation of the vessel and that affords the observers an optimal view of the sea surface. The observers will provide 360° coverage surrounding the seismic vessel and will adjust their positions appropriately to ensure adequate coverage of the entire area. These observations must be consistent, diligent, and free of distractions for the duration of the watch.

Visual monitoring will begin no less than 30 minutes prior to the beginning of ramp-up and continue until seismic operations cease or sighting conditions do not allow observation of the sea surface (e.g., fog, rain, darkness). If a marine mammal or sea turtle is observed, the observer should note and monitor the position (including lat./long. of vessel and relative bearing and estimated distance to the animal) until the animal dives or moves out of visual range of the observer. Make sure you continue to observe for additional animals that may surface in the area, as often there are numerous animals that may surface at varying time intervals. At <u>any</u> time a whale is observed within an estimated 500 meters (1,640 feet) of the sound source array ("exclusion zone"), whether due to the whale's movement, the vessel's movement, or because the whale surfaced inside the exclusion zone, the observer will call for the immediate shut-down of the seismic operation, including airgun firing (the vessel may continue on its course but all airgun discharges must cease). The vessel operator must comply immediately with such a call by an on-watch visual observer. Any disagreement or discussion should occur only after shut-down. When no marine mammals or sea turtles are sighted for at least a 30-minute period, ramp-up of the source array may begin. Ramp-up cannot begin unless conditions allow the sea surface to be visually inspected for marine mammals and sea turtles for 30 minutes prior to commencement of ramp-up (unless the method described in the section entitled "Experimental Passive Acoustic Monitoring" is used). Thus, ramp-up cannot begin after dark or in conditions that prohibit visual inspection (fog, rain, etc.) of the exclusion zone. Any shut-down due to a whale(s) sighting within the exclusion zone must be followed by a 30-minute all-clear period and then a standard, full ramp-up. Any shut-down for other reasons, including, but not limited to, mechanical or electronic failure, resulting in the cessation of the sound source for a period greater than 20 minutes, must also be followed by full ramp-up procedures. In recognition of occasional, short periods of the cessation of airgun firing for a variety of reasons, periods of airgun silence **not exceeding 20 minutes** in duration will not require ramp-up for the resumption of seismic operations if: (1) visual surveys are continued diligently throughout the silent period (requiring daylight and reasonable sighting conditions), and (2) no whales, other marine mammals, or sea turtles are observed in the exclusion zone. If whales, other marine mammals, or sea turtles are observed in the exclusion zone during the short silent period, resumption of seismic survey operations must be preceded by ramp-up.

Reporting

The importance of accurate and complete reporting of the results of the mitigation measures cannot be overstated. Only through diligent and careful reporting can MMS, and subsequently NOAA Fisheries, determine the need for and effectiveness of mitigation measures. Information on observer effort and seismic operations are as important as animal sighting and behavior data. In order to accommodate various vessels' bridge practices and preferences, vessel operators and observers may design data reporting forms in whatever format they deem convenient and

appropriate. Alternatively, observers or vessel operators may adopt the United Kingdom's Joint Nature Conservation Committee forms (available at their website www.jncc.gov.uk). At a minimum, the following items should be recorded and included in reports to the MMS:

Observer Effort Report: Prepared for each day during which seismic acquisition operations are conducted. Furnish an observer effort report to MMS on the 1st and the 15th of each month that includes:

- Vessel name,
- Observers' names and affiliations,
- Survey type (e.g., site, 3D, 4D),
- MMS Permit Number (for "off-lease seismic surveys") or OCS Lease Number (for "on-lease seismic surveys"),
- Date,
- Time and lat./long. when daily visual survey began,
- Time and lat./long. when daily visual survey ended,
- Average environmental conditions while on visual survey, including
  - Wind speed and direction,
  - Sea state (glassy, slight, choppy, rough or Beaufort scale),
  - Swell (low, medium, high or swell height in meters),
  - Overall visibility (poor, moderate, good).

Survey Report: Prepared for each day during which seismic acquisition operations are conducted and the airguns are being discharged. Furnish a survey report to MMS on the 1st and the 15th of each month during which operations are being conducted that includes:

- Vessel name,
- Survey type (e.g., site, 3D, 4D),
- MMS Permit Number (for "off-lease seismic surveys") or OCS Lease Number (for "on-lease seismic surveys"),
- Date,
- Time pre-ramp-up survey begins,
- What marine mammals and sea turtles were seen during pre-ramp-up survey?
- Time ramp-up begins,
- Were whales seen during ramp-up?
- Time airgun array is operating at the desired intensity,
- What marine mammals and sea turtles were seen during survey?
- If whales were seen, was any action taken (i.e., survey delayed, guns shut down)?
- Reason that whales might not have been seen (e.g., swell, glare, fog),
- Time airgun array stops firing.

Sighting Report: Prepared for each sighting of a marine mammal (whale or dolphin) or sea turtle made during seismic acquisition operations. Furnish a sighting report to MMS on the 1st and the 15th of each month during which operations are being conducted that includes:

- Vessel name,
- Survey type (e.g., site, 3D, 4D),

- MMS Permit Number (for "off-lease seismic surveys") or OCS Lease Number (for "on-lease seismic surveys"),
- Date,
- Time,
- Watch status (Were you on watch or was this sighting made opportunistically by you or someone else?),
- Observer or person who made the sighting,
- Lat./long. of vessel,
- Bearing of vessel,
- Bearing and estimated range to animal(s) at first sighting,
- Water depth (meters),
- Species (or identification to lowest possible taxonomic level),
- Certainty of identification (sure, most likely, best guess),
- Total number of animals,
- Number of juveniles,
- Description (as many distinguishing features as possible of each individual seen, including length, shape, color and pattern, scars or marks, shape and size of dorsal fin, shape of head, and blow characteristics),
- Direction of animal's travel – compass direction,
- Direction of animal's travel – related to the vessel (drawing preferably),
- Behavior (as explicit and detailed as possible; note any observed changes in behavior,)
- Activity of vessel,
- Airguns firing? (yes or no),
- Closest distance (meters) to animals from center of airgun or airgun array (whether firing or not).

Note: If this sighting was of a whale(s) within the exclusion zone that resulted in a shut-down of the airguns, include in the sighting report the observed behavior of the whale(s) before shut-down, the observed behavior following shut-down (specifically noting any change in behavior), and the length of time between shut-down and subsequent ramp-up to resume the seismic survey (note if seismic survey was not resumed as soon as possible following shut-down). Send this report to MMS **within 24 hours of the shut-down**. These sightings should also be included in the first regular semi-monthly report following the incident.

Additional information, important points, and comments are encouraged. All reports will be submitted to MMS on the 1st and the 15th of each month (with one exception noted above). Forms should be scanned (or data typed) and sent via email to protectedspecies@mms.gov.

Please note that these marine mammal and sea turtle reports are in addition to any reports you submit under NTL No. 98-20, dated September 15, 1998, and NTL No. 2005-G07, effective July 1, 2005, and all progress and final reports required as a condition of your geophysical permit.

Borehole Seismic Surveys

Borehole seismic surveys differ from surface seismic surveys in a number of ways, including the use of much smaller airgun arrays, having an average survey time of 12-24 hours, utilizing a

sound source that is not usually moving at 4-5 knots, and requiring the capability of moving the receiver in the borehole between shots. Due to these differences, the following altered mitigations apply only to borehole seismic surveys:

- During daylight hours, when visual observations of the exclusion zone are being performed as required in this NTL, borehole seismic operations will not be required to ramp-up for shutdowns of 30 minutes or less in duration, as long as no whales, other marine mammals, or sea turtles are observed in the exclusion zone during the shutdown. If a whale, other marine mammal, or sea turtle is sighted in the exclusion zone, ramp-up is required and may begin only after visual surveys confirm that the exclusion zone has been clear for 30 minutes.
- During nighttime or when conditions prohibit visual observation of the exclusion zone, ramp-up will not be required for shutdowns of 20 minutes or less in duration. For borehole seismic surveys that utilize passive acoustics during nighttime and periods of poor visibility, ramp-up is not required for shutdowns of 30 minutes or less.
- Nighttime or poor visibility ramp-up is allowed only when passive acoustics are used to ensure that no whales are present in the exclusion zone (as for all other seismic surveys). Operators are strongly encouraged to acquire the survey in daylight hours when possible.
- Protected species observers must be used during daylight hours, as required in this NTL, and may be stationed either on the source boat or on the associated drilling rig or platform if a clear view of the sea surface in the exclusion zone and adjacent waters is available.
- All other mitigations and provisions for seismic surveys as set forth in this NTL will apply to borehole seismic surveys.
- Reports should reference OCS Lease Number, Area/Block and Borehole Number.

Experimental Passive Acoustic Monitoring

Whales, especially sperm whales, are very vocal marine mammals, and periods of silence are usually short and most often occur when these animals are at the surface and may be detected using visual observers. However, sperm whales are at the greatest risk of potential injury from seismic airguns when they are submerged and under the airgun array. Passive acoustic monitoring appears to be very effective at detecting submerged and diving sperm whales, and some other marine mammal species, when they are not detectable by visual observation. MMS strongly encourages operators to participate in an experimental program by including passive acoustic monitoring as part of the protected species observer program. Inclusion of passive acoustic monitoring does **not** relieve an operator of any of the mitigations (including visual observations) in this NTL **with the following exception**: Monitoring for whales with a passive acoustic array by an observer proficient in its use will allow ramp-up and the subsequent start of a seismic survey during times of reduced visibility (darkness, fog, rain, etc.) when such ramp-up otherwise would not be permitted using only visual observers. If you use passive acoustic monitoring, include an assessment of the usefulness, effectiveness, and problems encountered with the use of that method of marine mammal detection in the reports described in this NTL. A description of the passive acoustic system, the software used, and the monitoring plan should also be reported to MMS at the beginning of its use.

Paperwork Reduction Act

The PRA (44 U.S.C. Chapter 35) requires us to inform you that we collect the information described in this NTL to ensure that you conduct operations in a manner that will not jeopardize threatened or endangered species or destroy or adversely modify critical habitat that has been designated for those species. We protect all proprietary information submitted according to the Freedom of Information Act and 30 CFR 250.196. An agency may not conduct or sponsor a collection of information unless it displays a currently valid Office of Management and Budget (OMB) control number. You are not obligated to respond until the OMB has approved this collection of information. We estimate the total hour burden to be 751 hours and the total "non-hour cost" burden to be $1,854,080. Direct comments regarding the burden, or any other aspect of this information collection, to the Information Collection Clearance Officer, Mail Stop 4230, Minerals Management Service, 1849 C Street, NW, Washington, DC 20240.

In addition, this NTL refers to information collection requirements under 30 CFR 250, subpart B. The OMB has approved all of the information collection requirements in these regulations and assigned OMB Control Number 1010-0151.

Contact

Any questions regarding this NTL should be submitted in writing to: protectedspecies@mms.gov. Submittals by mail may be directed to:

Minerals Management Service
Gulf of Mexico OCS Region
Attention: Environmental Sciences Unit (MS 5430)
1201 Elmwood Park Blvd.
New Orleans, LA 70123-2394

[original signed by]
Chris C. Oynes
Regional Director

APPENDIX B

OMB Control Number: 1010-0154
OMB Expiration Date: February 28, 2010

UNITED STATES DEPARTMENT OF THE INTERIOR
MINERALS MANAGEMENT SERVICE (MMS)
GULF OF MEXICO (GOM) OCS REGION

NTL No. 2007-G04

Effective Date: February 7, 2007

NOTICE TO LESSEES AND OPERATORS (NTL) OF FEDERAL OIL, GAS, AND SULPHUR LEASES IN THE OUTER CONTINENTAL SHELF, GULF OF MEXICO OCS REGION

Vessel Strike Avoidance and Injured/Dead Protected Species Reporting

The MMS is issuing this NTL pursuant to 30 CFR 250.103 and 30 CFR 250.282 to update the guidelines on how you should implement monitoring programs to minimize the risk of vessel strikes to protected species and report observations of injured or dead protected species. In lieu of a formal observer program, this NTL provides specific guidelines you should follow to identify and avoid injury to marine mammals and sea turtles. This NTL supersedes NTL 2003-G10 on this subject and applies to all existing and future oil and gas operations in the GOM OCS.

Background

The National Marine Fisheries Service (NMFS) has determined that collisions with OCS support/service vessels could injure or kill protected species (e.g., sperm whales, other marine mammals and sea turtles) in the Gulf of Mexico OCS while engaged in supporting oil and gas industry activities. NMFS recommends the following measures to reduce the risk associated with vessel strikes or disturbance of protected species. These measures apply to listed and non-listed cetaceans and sea turtles.

Protected Species Identification

Vessel crews should use a GOM reference guide that includes and helps identify the 28 species of whales and dolphins, 5 species of sea turtles, and the single species of manatee that might be encountered in the GOM OCS.

Vessel Strike Avoidance

You should do the following in order to avoid causing injury or death to marine mammals and sea turtles:

1. Vessel operators and crews should maintain a vigilant watch for marine mammals and sea turtles and slow down or stop their vessel to avoid striking protected species.
2. When whales are sighted, maintain a distance of 100 yards (91 meters) or greater from the whale. If the whale is believed to be a North Atlantic right whale, you should maintain a minimum distance of 500 yards (457 meters) from the animal (50 CFR 2224.103).
3. When sea turtles or small cetaceans are sighted, attempt to maintain a distance of 50 yards (45 meters) or greater whenever possible.
4. When cetaceans are sighted while a vessel is underway, attempt to remain parallel to the animal's course. Avoid excessive speed or abrupt changes in direction until the cetacean has left the area.

5. Reduce vessel speed to 10 knots or less when mother/calf pairs, pods, or large assemblages of cetaceans are observed near an underway vessel when safety permits. A single cetacean at the surface may indicate the presence of submerged animals in the vicinity of the vessel; therefore, precautionary measures should always be exercised.
6. Whales may surface in unpredictable locations or approach slowly moving vessels. When you sight animals in the vessel's path or in close proximity to a moving vessel, reduce speed and shift the engine to neutral. Do not engage the engines until the animals are clear of the area.

Injured/Dead Protected Species Reporting

Vessel crews must report sightings of any injured or dead protected species (marine mammals and sea turtles) immediately, regardless of whether the injury or death is caused by your vessel. Report marine mammals to the NOAA Fisheries Stranding Hotline at (305) 862-2850 and sea turtles to the NMFS Southeast Regional Office at (727) 824-5312. In addition, if the injury or death was caused by a collision with your vessel, you must notify MMS within 24 hours of the strike by email to **protectedspecies@mms.gov**. The report should include the date and location (latitude/longitude) of the strike, the name of the vessel involved, and the species identification or a description of the animal, if possible. If oil and gas industry activity is responsible for the injury or death, the responsible parties should remain available to assist the respective salvage and stranding network as needed.

Paperwork Reduction Act of 1995 (PRA) Statement

The PRA (44 U.S.C. Chapter 35) requires us to inform you that we collect the information described in this NTL to ensure that you conduct operations in a manner that will not jeopardize threatened or endangered species. We protect all proprietary information submitted according to the Freedom of Information Act and 30 CFR 250.196. An agency may not conduct or sponsor a collection of information unless it displays a currently valid Office of Management and Budget (OMB) Control Number. We estimate the hour burden to be one-half hour per report. Direct comments regarding the burden or any other aspect of this information collection to the Information Collection Clearance Officer, Mail Stop 4230, Minerals Management Service, 1849 C Street, NW, Washington, DC 20240.

In addition, this NTL refers to information collection requirements under 30 CFR 250, subpart B. OMB has approved all of the information collection requirements in these regulations and assigned OMB Control Number 1010-0151.

Contact

Any questions regarding this NTL should be submitted in writing to: **protectedspecies@mms.gov**.

[original signed by]

Chris C. Oynes
Regional Director

APPENDIX C

OMB Control Number: 1010-0154
OMB Expiration Date: February 28, 2010

UNITED STATES DEPARTMENT OF THE INTERIOR
MINERALS MANAGEMENT SERVICE
GULF OF MEXICO OCS REGION

NTL No. 2007–G03

Effective Date: February 7, 2007

NOTICE TO LESSEES AND OPERATORS (NTL) OF FEDERAL OIL, GAS, AND SULPHUR LEASES AND PIPELINE RIGHT-OF-WAY HOLDERS IN THE OUTER CONTINENTAL SHELF, GULF OF MEXICO OCS REGION

Marine Trash and Debris Awareness and Elimination

This NTL is being issued pursuant to 30 CFR 250.103 to provide information on the marine trash and debris awareness training video and slide show, and both postal and e-mail addresses for submitting annual training reports. This NTL supersedes and replaces NTL No. 2003-G11, effective June 19, 2003, on this subject and applies to all existing and future oil and gas operations in the Gulf of Mexico OCS.

Background

Marine trash and debris pose a threat to fish, marine mammals, sea turtles, and other marine animals; cause costly delays and repairs for commercial and recreational boating interests; detract from the aesthetic quality of recreational shore fronts; and increase the cost of beach and park maintenance. As oil and gas industry activities expand into deeper waters, the number of species of protected marine animals exposed to marine debris is increasing and now includes the sperm whale, an endangered species, as well as other marine mammals and five species of sea turtles.

Since oil and gas operations in the Gulf of Mexico contribute to this chronic problem, 30 CFR 250.300(a) and (b)(6) prohibit you from deliberately discharging containers and other similar materials (i.e., trash and debris) into the marine environment, and 30 CFR 250.300(c) requires you to make durable identification markings on equipment, tools and containers (especially drums), and other material.

Furthermore, the intentional jettisoning of trash has been the subject of strict laws such as MARPOL-Annex V and the Marine Plastic Pollution Research and Control Act, and regulations imposed by various agencies including the United States Coast Guard (USCG) and the Environmental Protection Agency (EPA).

These USCG and EPA regulations further require that you become more proactive in avoiding accidental loss of solid waste items by developing waste management plans, posting informational placards, manifesting trash sent to shore, and using special precautions such as covering outside trash bins to prevent accidental loss of solid waste.

Therefore, you should exercise special caution when you handle and dispose of small items and packaging materials, particularly those made of non-biodegradable, environmentally persistent materials such as plastic or glass that can be lost in the marine environment and washed ashore. Increasing your individual workers' awareness of the problem and emphasizing their responsibilities will help reduce the litter problem further and control the unintended loss of items such as empty buckets, hard hats, shrink wrap, strip lumber and pipe thread protectors.

Your adherence to these requirements has reduced, if not eliminated, trash intentionally jettisoned into the Gulf of Mexico. However, the MMS is still concerned about the accidental loss of articles from structures and vessels. In some cases, this results from poor waste management practices (e.g., no lids or unsecured lids on waste receptacles), but in others it is caused by the failure of individuals to secure materials and personal belongings aboard vessels and facilities. To reduce further the accidental introduction of marine trash and debris into the Gulf of Mexico, you must immediately implement the following programs.

Marine Trash and Debris Placards

Effective May 31, 2003, you must post placards that include each of the information text boxes in Appendix 1 of this NTL in prominent places on all fixed and floating production facilities that have sleeping or food preparation capabilities and on mobile drilling units engaged in oil and gas operations in the Gulf of Mexico OCS. All of the placards depicted, with the language specified, should be displayed on an approximately 5x8 inch format. These signs should be displayed at line-of-sight height at or near boat landings and heliports, in mess areas, and in the recreation or training or orientation area. One or more areas may be omitted if there is insufficient space. These notices should be referenced, and their contents explained, during any initial orientation given on the facility for visitors or occupants. Placards must be sturdy enough to withstand the local environment and must be replaced when damage or wear compromises readability.

Marine Trash and Debris Awareness Training

Effective May 31, 2003, all of your offshore employees and those contractors actively engaged in your offshore operations (e.g., wireline operators, contract lease operators, and maintenance or construction crews) must have completed marine trash and debris awareness training described below at least once. Thereafter, all such personnel must complete this training annually.

The training for employees and contractors consists of two parts: (1) viewing a marine trash and debris training video or slide show and (2) receiving an explanation from management personnel from the lessee or designated lease operator that emphasizes their commitment to the message of this NTL.

You may obtain the marine trash and debris training video, produced by the Offshore Operators Committee (OOC), through the OOC website at www.offshoreoperators.com. The video is available in English and Spanish versions as a DVD or VHS tape. The video may also be downloaded directly from the website.

Alternatively, you may fulfill this training requirement by viewing the marine trash and debris training slide show developed by OOC and available on the aforementioned website as a Microsoft PowerPoint presentation.

Marine Trash and Debris Awareness Training and Certification Process

Effective July 1, 2003, you should develop and be using a marine trash and debris awareness training and certification process that reasonably assures that the employees and contractors specified above are in fact trained. Your training process should include the following elements:

1) viewing of either the video or the slide show by the personnel specified above using one of the following methods:
    a) attendance at periodic meetings held for this purpose;
    b) as part of several scheduled training components;
    c) web-based training with email notification; or
    d) training by a third-party contractor;
2) an explanation from the management that conveys the commitment of the company to achieve the objectives of the trash and debris containment requirement;
3) attendance measures (initial and annual); and
4) recordkeeping and availability of records for inspection by MMS.

By January 31st of each year, provide the MMS with an annual report (1–2 pages) signed by a company official that describes your marine trash and debris awareness training process and certifies that the training process has been followed for the previous calendar year. A sample annual report is available at the OOC website above. Send the report to:

Mr. Herb Leedy
Minerals Management Service
Gulf of Mexico OCS Region
Office of Leasing and Environment (MS 5430)
1201 Elmwood Park Blvd.
New Orleans, Louisiana 70123

In lieu of mailing the report, you may send it by e-mail to trashanddebris@mms.gov.

Paperwork Reduction Act of 1995 (PRA) Statement

The PRA (44 U.S.C. Chapter 35) requires us to inform you that we collect the information described in this NTL to ensure that you conduct operations in a manner that will not jeopardize threatened or endangered species or destroy or adversely modify critical habitat that has been designated for those species. We protect all proprietary information submitted according to the

Freedom of Information Act and 30 CFR 250.197. An agency may not conduct or sponsor a collection of information unless it displays a currently valid Office of Management and Budget (OMB) Control Number. We estimate the hour burden to be one-half hour per training record. We estimate the hour burden to be one-half hour for each annual report and certification. The placard postings are exempt from the PRA requirements. Direct comments regarding the burden or any other aspect of this information collection to the Information Collection Clearance Officer, Mail Stop 4230, Minerals Management Service, 1849 C Street, N.W., Washington, DC 20240.

In addition, this NTL refers to information collection requirements under 30 CFR 250, subparts B and C. The OMB has approved all of the information collection requirements in these regulations and assigned OMB Control Numbers 1010-0151 and 1010-0057, respectively.

Contact

Submit any questions regarding this NTL by e-mail to: marinedebris@mms.gov.

[original signed by]
Chris C. Oynes
Regional Director

Appendix 1

Marine Debris Placards

WHAT IS MARINE DEBRIS?

Marine debris is any object or fragment of wood, metal, glass, rubber, plastic, cloth, paper or any other man-made item or material that is lost or discarded in the marine environment. Marine debris may be intentionally dumped, accidentally dropped, or indirectly deposited. Whatever the source, marine debris is a direct result of human activities on land and at sea. Depending upon its composition, marine debris may sink to the seafloor, drift in the water column, or float on the surface of the sea. Certain debris, such as plastics, can persist for hundreds of years in the marine environment without decomposing.

WARNING!

YOUR ACTIONS MAY SUBJECT YOU TO SEVERE LEGAL CONSEQUENCES!

The disposal and/or discharge of any solid waste anywhere in the marine environment (other than ground-up food particles) is strictly prohibited by U.S. Coast Guard and Environmental Protection Agency regulations. **THIS INCLUDES MATERIALS OR DEBRIS ACCIDENTALLY LOST OVERBOARD.**

The disposal of equipment, cables, chains, containers or other materials into offshore waters is prohibited by the Minerals Management Service (30 CFR 250.300(b)(6)). **THIS INCLUDES MATERIALS OR DEBRIS ACCIDENTALLY LOST OVERBOARD.**

ATTENTION!

MARINE DEBRIS MAY CAUSE SEVERE ECOLOGICAL DAMAGE!

Marine debris discarded or lost from offshore and coastal sources may injure or kill fish, marine mammals, sea turtles, seabirds and other wildlife.

Thousands of marine animals, including marine mammals, sea turtles and seabirds, die every year from entanglement in fishing line, strapping bands, discarded ropes and nets and plastic six-pack rings. Additionally, unknown numbers of marine animals die each year from internal injury, intestinal blockage and starvation as a result of ingesting marine debris.

Marine debris fouls boat propellers and clogs water intake ports on engines thereby endangering the safety of fishermen and boaters and resulting in heavy loss of time and money.

Marine debris detracts from the aesthetic quality of recreational beaches and shorelines and increases the cost of park and beach maintenance.

ATTENTION!

SECURE ALL LOOSE ARTICLES!

NOAA Fisheries now expects petroleum industry personnel to pick up and recover any articles lost overboard from boats and offshore structures as safety conditions permit.

Protect marine animals, as well as your valuable time and money, by doing the following to prevent accidental loss of these items:

Properly securing all materials, equipment and personal belongings. Articles such as hardhats, life vests, sunglasses, cigarette lighters, parts bags, buckets, shrink wrap, strip lumber, and pipe thread protectors become marine debris when lost overboard.

Making sure that all trash receptacles have tight fitting lids and that the lids are used.

Providing and using secure cigarette butt containers. Cigarette butts are one of the most common forms of marine debris. Many cigarette butts contain some form of plastic and do not decompose in the ocean. Cigarette butts pose a major threat to marine wildlife as they resemble food and cause gut blockages and starvation when ingested.

Doing your part to eliminate marine debris. Encourage others to be responsible about marine debris by making suggestions to secure potential marine debris on your boat or structure or by participating in a beach cleanup.