DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 96TH AIR BASE WING (AFMC)
EGLIN AIR FORCE BASE FLORIDA

Mr. Stephen M. Seiber
Chief, Eglin Natural Resources
501 De Leon Street, Suite 101
Eglin AFB FL 32542-5133

MAR 09 2010

Mr. David Bernhart
Protected Resources Division
National Marine Fisheries Service
Southeast Regional Office
263 13th Avenue South
St. Petersburg, FL 33701

Dear Mr. Bernhart:

The attached biological assessment is being submitted to fulfill requirements under Section 7 of the Endangered Species Act (ESA). This Biological Assessment assesses potential impacts to leatherback sea turtles, green sea turtles, Kemp's ridley sea turtles, loggerhead sea turtles, Gulf sturgeon, Gulf sturgeon critical habitat, and Essential Fish Habitat associated with the training operations of the Naval Explosive Ordnance Disposal School (NEODS) at Eglin Air Force Base (AFB) property off of Santa Rosa Island within the Eglin Gulf Test and Training Range.

NEODS missions involve underwater detonations of small, live explosive charges adjacent to inert mines. The NEODS may conduct up to eight 2-day demolition training events annually; these missions may occur at any time of the year. Each demolition training event involves a maximum of 5 detonations, for a maximum of 40 detonations per year. Half of the detonations, or a maximum of 20 annually, would involve 5-pound (lb) net explosive weight (NEW) charges, and half of the detonations (maximum of 20 annually) would involve 10-lb NEW charges. The training missions would occur from one to three nautical miles offshore from Test Site A-15, A-10, or A-3 on Santa Rosa Island. Detonations would occur on the sea floor in water depths of 60 feet or less. The live detonations are intended to train students in Mine Countermeasures techniques.

Eglin Natural Resources Section has determined that the Proposed Action may affect sea turtles, are not likely to adversely affect Gulf sturgeon, are not likely to adversely modify Gulf sturgeon critical habitat, and will not adversely affect essential fish habitat. Adherence to proper mitigations measures is expected to reduce the potential for adverse impacts to sea turtle populations.

If you have any questions regarding this letter or any of the proposed activities, please do not hesitate to contact either Mr. Bob Miller (850) 883-1153 or myself at (850) 882-8391.

Sincerely,

STEPHEN M. SEIBER, YF-02
Chief, Eglin Natural Resources

Attachment:
Biological Assessment for Naval Explosive Ordnance Disposal School (NEODS) Training Operations at Eglin AFB, FL

EGLIN AIR FORCE BASE
Florida

NAVAL EXPLOSIVE ORDNANCE DISPOSAL SCHOOL (NEODS) TRAINING OPERATIONS AT EGLIN AFB, FL

BIOLOGICAL ASSESSMENT

National Marine Fisheries Service
Formal Endangered Species Act
Section Seven Consultation

FEBRUARY 2010

NAVAL EXPLOSIVE ORDNANCE DISPOSAL SCHOOL (NEODS) TRAINING OPERATIONS AT EGLIN AIR FORCE BASE, FLORIDA

BIOLOGICAL ASSESSMENT

National Marine Fisheries Service
Formal Endangered Species Act
Section Seven Consultation

Submitted To:

Protected Resources Division
NOAA Fisheries
Southeast Regional Office
263 13th Avenue South
St. Petersburg, FL 33701

Submitted By:

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FEBRUARY 2010

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LIST OF ACRONYMS, ABBREVIATIONS, AND SYMBOLS

AFB	Air Force Base
dB	Decibel
dB re 1 µPa^2·s	Decibel referenced to one microPascal squared per second
E	Endangered
EFD	Energy Flux Density
EFDL	Energy Flux Density Level
EFH	Essential Fish Habitat
EGTTR	Eglin Gulf Test and Training Range
ESA	Endangered Species Act of 1973
EWTA	Eglin Water Test Area
FMC	Fishery Management Council
FMP	Fishery Management Plan
GSMFC	Gulf States Marine Fisheries Commission
GOM	Gulf of Mexico
HAPC	Habitat Area of Particular Concern
HMS	Highly Migratory Species
lb	Pound
MCM	Mine Countermeasures
MSA	Magnuson-Stevens Fishery Conservation and Management Act
NEODS	Naval Explosive Ordnance Disposal School
NEW	Net Explosive Weight
NM	Nautical Mile
NOAA	National Oceanic and Atmospheric Administration
psi	Pounds per Square Inch
PTS	Permanent Threshold Shift
SRI	Santa Rosa Island
T	Threatened
TM	Tympanic Membrane
TTS	Temporary Threshold Shift
USFWS	U.S. Fish and Wildlife Service
UXO	Unexploded Ordnance
ZOI	Zone of Influence

EXECUTIVE SUMMARY

The purpose of this document is to support the consultation process for the Endangered Species Act (ESA) of 1973 for training operations of the Naval Explosive Ordnance Disposal School (NEODS) at Eglin Air Force Base (AFB) property off Santa Rosa Island. Compliance with respect to the Marine Mammal Protection Act of 1972 will be accomplished by securing a separate marine mammal take permit (Letter of Authorization).

NEODS missions are intended to train students in Mine Countermeasures techniques. Students would be taught established mine neutralization techniques by diving and hand-placing charges next to inert mines, which are located by hand-held sonar. Each mission will involve up to five live detonations of the charges (either five or ten pounds of net explosive weight each) in water approximately 60 feet deep and one to three nautical miles (NM) offshore. The charges will be detonated individually with a maximum separation time of 20 minutes between each detonation. This training would occur up to eight times annually, with varying times throughout the year.

The potential takes outlined in Chapter 4 represent the maximum expected number of sea turtles that could be affected. Eglin AFB has employed a number of mitigation measures in an effort to substantially decrease the number of animals potentially affected. Eglin AFB is committed to assessing the mission activity for opportunities to provide operational mitigations (i.e., trained observer on support vessel for visual clearance of the test area). Using a density estimate for each species, the zone of influence (ZOI) of each detonation, and the total number of events, an annual estimate of the potential number of animals exposed to regulatory noise thresholds was analyzed. NEODS training is anticipated to affect some sea turtle species. Without any mitigation, approximately ten sea turtles may potentially experience harassment at the 182 decibel (dB) noise level annually. No turtles are expected to be harassed at the Level A 205 dB noise level.

NEODS training is not likely to adversely affect the Gulf sturgeon because this species predominantly occurs in water depths shallower than those in which NEODS activities are conducted, and because the species is only present in the Gulf during fall and winter months. NEODS activities may occur within Gulf sturgeon critical habitat, which is designated within one NM of the shore. However, NEODS missions will not destroy or adversely modify any primary constituent elements, and therefore will not adversely modify critical habitat. Items and materials expended into the training area would not result in any adverse impacts to the physical or biological environments that would reduce the quality and/or quantity of essential fish habitat (EFH). NEODS missions will not adversely affect EFH.

The National Oceanic and Atmospheric Administration (NOAA) Fisheries would be notified immediately if any of the actions considered in this Biological Assessment were modified or if additional information on listed species became available, as a reinitiation of consultation may be required. If impacts to listed species occurred beyond what has been considered in this assessment, all operations would cease and NOAA Fisheries would be notified. Any modifications or conditions resulting from consultation with NOAA Fisheries would be implemented prior to commencement of activities.

1. INTRODUCTION

1.1 PURPOSE

This document is being submitted to fulfill requirements under Section 7 of the Endangered Species Act of 1973 (ESA) and the Magnuson-Stevens Fishery Conservation and Management Act (MSA). Eglin Air Force Base (AFB) intends to accommodate the Naval Explosive Ordnance Disposal School (NEODS) training operations at Eglin property off of Santa Rosa Island (SRI) within the Eglin Gulf Test and Training Range (EGTTR) (Figure 1-1).

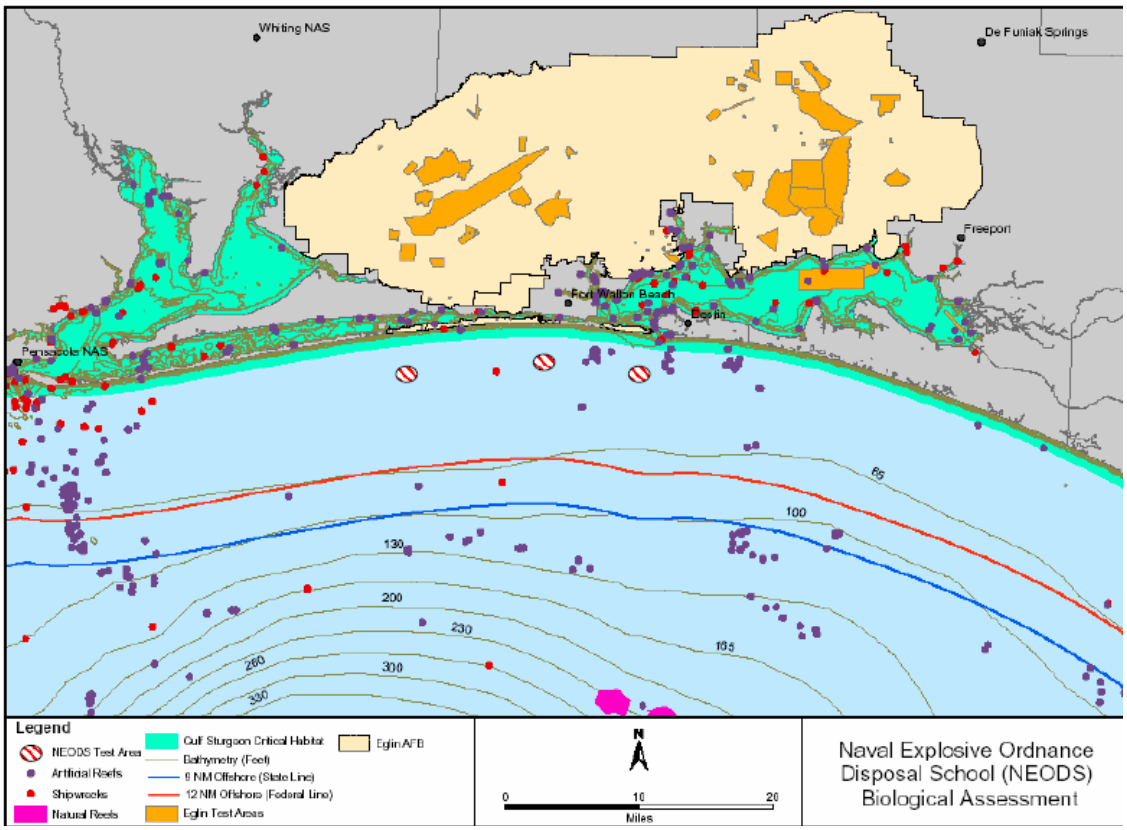

Figure 1-1. Approximate NEODS Test Target Locations in the Eglin Gulf Test and Training Range

NEODS missions involve underwater detonations of small, live explosive charges adjacent to inert mines. The NEODS may conduct up to eight 2-day demolition training events annually; these missions may occur at any time of the year. Each demolition training event involves a maximum of 5 detonations, for a maximum of 40 detonations per year. Half of the detonations, or a maximum of 20 annually, would involve 5-pound (lb) net explosive weight (NEW) charges, and half of the detonations (maximum of 20 annually) would involve 10-lb NEW charges. The training missions would occur from one to three nautical miles (NM) offshore from Test Site A-15, A-10, or A-3. Detonations would occur on the sea floor in water depths of 60 feet or less. The live detonations are intended to train students in Mine Countermeasures (MCM) techniques. The objectives of this Biological Assessment are to:

- Document all federally listed threatened and endangered (T&E) species and associated critical habitat, as well as essential fish habitat (EFH), that occur within the NEODS Zone of Influence (ZOI).
- Identify the NEODS actions that have the potential to impact, either beneficially or adversely, those documented species and habitats.
- Determine and quantify, as feasible, the effects these actions would likely have on federally listed species, critical habitat, and EFH.

1.2 SPECIES AND HABITATS CONSIDERED

Several ESA-listed species, including sea turtles, marine mammals (cetaceans and sirenians), and fish, occur within the northeastern Gulf of Mexico (GOM). Although five sea turtle species are found in the northern GOM, only four of the species occur regularly in the area of NEODS activities. The Atlantic loggerhead sea turtle (*Caretta caretta*), Atlantic green sea turtle (*Chelonia mydas*), Kemp's ridley sea turtle (*Lepidochelys kempii*), and Leatherback sea turtle (*Dermochelys coriacea*) are likely to occur in the study area and are discussed in detail in subsequent chapters. The hawksbill sea turtle (*Eretmochelys imbricata*) is occasionally found in the study area but occurs primarily along peninsular Florida. Density is therefore expected to be low in the vicinity of NEODS activities, and this species is not expected to be affected by NEODS training.

All marine mammals receive federal protection under the Marine Mammal Protection Act. Impacts to cetaceans have been addressed in a request for a Letter of Authorization from National Oceanic and Atmospheric Administration (NOAA) Fisheries. The only ESA-listed cetacean likely to be found in the northeastern GOM is the sperm whale (*Physeter macrocephalus*). This species typically occurs beyond the shelf break in water depths greater than 200 meters (656 feet) (NMFS, 2008), and is therefore unlikely to occur in the area of NEODS activities. An ESA-listed sirenian, the Florida manatee (*Trichechus manatus latirostris*), occurs in the northeastern GOM during warm months. However, manatees primarily inhabit coastal and inshore waters and are not considered common offshore. Given the distance from shore at which NEODS activities are conducted (one to three NM), impacts to manatees are considered unlikely.

One ESA-listed fish, the Gulf sturgeon (*Acipenser oxyrinchus desotoi*), may occur in the area of NEODS activities. In addition, NEODS missions may occur in designated Gulf sturgeon critical habitat. Gulf sturgeon and critical habitat are therefore included in this Biological Assessment. The ESA-listed smalltooth sawfish (*Pristis pectinata*), although once common in the northern GOM, is currently restricted to peninsular Florida and is not expected to occur in the study area. Due to the limited geographic range of the species, the probability of a sawfish occurring in the NEODS ZOI is so low that impacts are considered to be negligible.

The federally listed threatened (T) and endangered (E) species, including critical habitat, considered for potential impacts in this Biological Assessment are:

Sea Turtles

- Leatherback sea turtle (*Dermochelys coriacea*); E
- Green sea turtle (*Chelonia mydas*); E
- Kemp's ridley sea turtle (*Lepidochelys kempii*); E
- Loggerhead sea turtle (*Caretta caretta*); T

Fish

- Gulf sturgeon (Acipenser oxyrhinchus desotoi); T
- Gulf sturgeon critical habitat

In addition to ESA-listed species and designated critical habitat, potential impacts to EFH are evaluated pursuant to the Magnuson-Stevens Fishery Conservation and Management Act (MSA). Descriptions of species, critical habitat, and EFH are provided in Chapter 3.

1.3 APPLICABLE REGULATORY REQUIREMENTS AND COORDINATION

Endangered Species Act

The purpose of the ESA, as amended, is to protect fish, wildlife, and plant species currently in danger of extinction and those species that may become so in the foreseeable future. The ESA states that it is unlawful to take any such species within the United States or the territorial sea of the United States, or to take any such species upon the high seas. The term *take* is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct" (16 USC 1531-1544). Each federal agency is required to review its actions at the earliest possible time to determine whether any action it authorizes, funds, or carries out may affect listed species or such species' designated critical habitat. If such a determination is made, consultation with the appropriate agency (U.S. Fish and Wildlife Service [USFWS] or NOAA Fisheries) is required.

The USFWS and NOAA Fisheries share responsibilities for administering the ESA, with NOAA Fisheries generally coordinating activities for marine and anadromous species (e.g., sturgeon) and the USFWS coordinating ESA activities for terrestrial and freshwater species. The USFWS and NOAA Fisheries jointly administer the ESA with regard to sea turtles. The USFWS coordinates activities that could impact nesting turtles and turtle nest sites on beaches, while NOAA Fisheries has responsibility in the marine environment. Activities within the Eglin Gulf Test and Training Range (EGTTR) are strictly aquatic, and therefore consultation with NOAA Fisheries is applicable.

Magnuson-Stevens Fishery Conservation and Management Act

The 1996 amendments to the MSA require, among other things, that NOAA Fisheries and the regional National Fishery Management Councils designate EFH for species included in a fishery management plan. EFH is defined as those waters and substrate necessary to fish for spawning,

breeding, feeding, or growth to maturity. Federal agencies that fund, permit, or carry out activities that may adversely affect EFH are required to consult with NOAA Fisheries regarding potential impacts and to respond in writing to NOAA Fisheries and Fishery Management Council recommendations. Adverse impacts are defined as impacts that reduce quality and/or quantity of EFH and may include contamination, physical disruption, loss of prey, and reduction in species' fecundity.

1.4 EGLIN GULF TEST AND TRAINING RANGE

The EGTTR encompasses approximately 86,000 square miles within the GOM and consists of the airspace over the Gulf, which is scheduled and operated by Eglin AFB. The EGTTR is composed of Warning Areas W-151, W-168, and W-470, as well as the Eglin Water Test Areas (EWTA-1 through EWTA-6). This airspace description is defined in a Federal Aviation Administration Letter of Agreement between the Jacksonville, Houston, and Miami Air Route Traffic Control Centers, Training Air Wing Six, and the Air Force Development Test Center, dated 25 May 1995. NEODS test areas are located between approximately 1 and 3 NM from shore, in W-151 of the EGTTR.

1.5 POTENTIAL ISSUES WITH SENSITIVE SPECIES

Underwater detonations produce an overpressure shock wave and acoustic signature that may potentially impact marine species. Depending on the amount of explosive, the energy generated can be sufficient to cause mortality, injury, or temporary hearing effects. Noise from explosive sources can be propagated under the water for some distance, and extends farther from the source than the shock wave. A noise analysis addressing potential impacts to sea turtle species occurring in the area of NEODS activities is discussed in Chapter 4. In addition, potential impacts to the Gulf sturgeon, Gulf sturgeon critical habitat, and EFH are discussed.

2. DESCRIPTION OF PROPOSED ACTION

The mission of NEODS is to detect, recover, identify, evaluate, render safe, and dispose of unexploded ordnance (UXO) that constitutes a threat to people, material, installations, ships, aircraft, and operations. The U.S. Navy EOD force maintains the equipment, mobility, and flexibility to function in all world environments. MCM detonations are one of the NEODS functions, and involve mine-hunting and mine-clearance operations. The NEODS facilities are located at Eglin AFB, Florida. The proposed training at Eglin AFB involves focused training on basic EOD skills. Examples of these fundamental skills include ordnance recognition, reconnaissance, measurement, basic understanding of demolition charges, and neutralization of conventional and chemical ordnance.

The NEODS at Eglin AFB proposes to use the GOM waters off of SRI for a portion of the NEODS class. The NEODS would utilize areas approximately 1 to 3 NM offshore of Test Site A-15, A-10, or A-3 for MCM training (Figure 1-1). The goal of the training is to give NEODS students the tools and techniques to implement MCM through real scenarios. The students would be taught established techniques for neutralizing mines by diving and hand-placing charges adjacent to the mines. The detonation of small, live explosive charges adjacent to the mine disables the mine function. Inert mines are utilized for training purposes. This training would occur offshore of SRI up to eight times annually, at varying times within the year.

Training Procedures

MCM training classes are 51 days in duration, with four days of on-site activity in the GOM. Two of these four days will be utilized to lay the inert mines prior to the training. The other two days will require the use of live detonations in the Gulf. One large safety vessel and five MK V inflatable 10-foot rubber boats with 50 horsepower engines would be used to access Gulf waters during training activities. The training procedures during the two "Live Demolition" days are described as follows.

First Live Demolition Day: Five inert mines will be placed in a compact area on the Gulf floor in approximately 60 feet of water. These five mines will be utilized for the two live demolition days. Divers will locate the mines by hand-held sonar (AN/PQS-2A acoustic locator and the Dukane Underwater Acoustic Locator System), which detect the mine casings (mine shape reacquisition). The hand-held sonar would not impact any protected marine species because the sonar ranges are below any current threshold for protected marine species (Table 2-1); therefore, potential noise impacts from sonar are not included in this analysis.

Table 2-1. Hand-held Sonar Characteristics

	AN/PQS-2A	Dukane
Frequency Operating Range	115 kHz – 145 kHz	30-45 kHz
Audible Frequency Range	n/a	250 Hz – 2500 Hz
Operating Frequency	115 kHz – 145 kHz	37.5 kHz +/- 1 kHz
Sound Pressure Level	178.5 re 1 µPa @ 1 meter	157 – 160.5 re 1 µPa @ 1 meter

H = Hertz kHz = Kilohertz µPa = MicroPascal

Five charges packed with C-4 explosive material (either 5-lb NEW or 10-lb NEW) will be set up adjacent to the mines. A charge includes detonation cord, non-electric caps, time fuses, and fuse igniters. No more than five charges will be utilized over the two-day period. Live training events will occur eight times annually, averaging once every six to seven weeks. Four of the training events will involve 5-lb charges, and four events will involve 10-lb charges. Because five detonations (maximum) are expected during each event, there will be up to twenty 5-lb detonations and twenty 10-lb detonations annually, for a total of forty detonations per year. It is expected that 60 percent of the training events will occur in summer, and 40 percent will occur in winter. Overpressure from the detonation is intended to disrupt the electrical charge on the mine, rendering it safe. The five charges will be detonated individually with a maximum separation time of 20 minutes between each detonation. Detonations will occur anytime between an hour after sunrise and an hour before sunset. Mine shapes and debris will be recovered and removed from the Gulf waters when training is completed.

Second Live Demolition Day: Each team has two days to complete the entire evolution (detonation of five charges). The second day will be utilized only if the teams cannot complete their evolution on the first day.

3. SPECIES AND EFH DESCRIPTIONS

Protected species potentially occurring in the northern GOM include five sea turtle species, two fish, one sirenian, and 29 species of cetaceans. While any of the sea turtle species could potentially occur within the area of NEODS activities, only four are considered likely. Few of the cetacean species are typically found in nearshore waters. Those that frequent the nearshore areas include the Atlantic bottlenose dolphin (*Tursiops truncatus*) and the Atlantic spotted dolphin (*Stenella frontalis*). These dolphins are not protected under the Endangered Species Act; however, all cetaceans are protected under the Marine Mammal Protection Act. Impacts to cetaceans have been addressed in a request for a Letter of Authorization from NOAA Fisheries. Sperm whales are the ESA-listed large whale most likely to occur in the study area. However, this species typically occurs in water depths greater than 200 meters (656 feet) (NMFS, 2008), and is therefore unlikely to occur in the area of NEODS activities (one to three NM from shore).

The only sirenian, the federally endangered West Indian manatee, prefers inland bays and estuaries and is not considered common in offshore waters. The likelihood of manatee occurrence in the study area is considered low, and the species is not included in subsequent impact analyses.

The smalltooth sawfish is a federally endangered fish species. Although this species has historically ranged throughout the GOM from Texas to Florida, it is now only commonly found in the Everglades and in shallow areas with mangrove forests in Florida Bay and the Florida Keys as well as off southern Florida. Smalltooth sawfish typically reside within one mile of land in estuaries, shallow banks, sheltered bays, and river mouths. Occasionally, they are found offshore on reefs or wrecks and over hard or mud bottoms. Only a remote possibility exists for this species to be in the study area, and it is therefore excluded from further impact analyses.

The Gulf sturgeon is an anadromous fish that spends part of its life cycle in the marine environment and part in riverine environments. The Gulf sturgeon may be found in the Gulf during fall and winter months. Gulf sturgeon critical habitat also occurs near the area of NEODS activities, extending one mile from the shoreline.

EFH has been designated for four species or species groups in the area of NEODS activities. These species/groups include Coastal Migratory Pelagics, Reef Fish, Shrimp, and Stone Crab. EFH in this area consists of the water column and substrate.

3.1 SEA TURTLES

Four sea turtle species regularly inhabit the waters of the northern GOM, including leatherback, green, Kemp's ridley, and loggerhead sea turtles. These species are highly migratory or have migratory phases in their life history, and as a result are exposed to a multitude of anthropogenic mortality throughout their range, such as fisheries and vessel traffic. In addition to anthropogenic factors, natural threats to nesting beaches and marine habitats such as coastal erosion, seasonal storms, predators, and temperature variations also affect the survival and

recovery of sea turtle populations. As a result, sea turtles still face many of the original threats that were the cause of their listing under the ESA.

Of the sea turtle species that occur in the northern GOM, the leatherback and Kemp's ridley are classified as endangered. Green sea turtles are listed as threatened except for the Florida and Pacific coasts of Mexico breeding populations, which are listed as endangered. The loggerhead sea turtle is classified as threatened. The smallest species is the Kemp's ridley (75 to 100 pounds) and the largest is the leatherback (up to 2,000 pounds and 8 feet long).

3.1.1 Leatherback Sea Turtle

The leatherback sea turtle was originally listed as endangered on 2 June 1970. Leatherbacks are a migratory species with a worldwide distribution. This species nests in the tropics but may range as far north as Canada and the northern Pacific. In the Unites States, nesting occurs in Florida, beginning in February (USFWS, 1996). The leatherback feeds primarily on jellyfish but occasionally will eat sea urchins, squid, crustaceans, tunicates, fish, blue-green algae, and floating seaweed (USFWS, 1996).

Overall, the leatherback turtle is the most oceanic of all sea turtle species occurring in the northern GOM. Leatherbacks use the deep, offshore waters (especially waters in the vicinity of DeSoto Canyon) for feeding, resting, and as migratory corridors (Landry and Costa, 1999; Davis et al., 2000). Leatherbacks also occur in shallow waters on the continental shelf, especially during nesting season. Leatherbacks have been observed feeding on dense aggregations of jellyfish in nearshore waters off the Florida Panhandle, the Mississippi River Delta, and the Texas coast (Leary, 1957; Collard 1990; Lohoefener et al. 1990). Leatherbacks may also enter the nearshore waters of the northern GOM to nest. In recent years, low levels of nesting activity have been documented on Florida Panhandle beaches (LeBuff, 1990; Meylan et al., 1995). The distribution of sighting records in the northern GOM suggests a fairly uniform pattern of occurrence throughout the year, as suggested by Davis et al. (2000).

3.1.2 Green Sea Turtle

The green sea turtle was listed as threatened on 28 July 1978, in all its eastern range of North America, except in Florida, where it is listed as endangered. In the United States, it nests on southern Florida beaches with a few exceptions in the northern GOM and North Carolina (USFWS, 1996). Green turtles nest from May to August. Primarily a tropical herbivore, the juveniles are frequently found in the GOM in areas where there is an abundance of seagrass (USFWS, 1996).

There are few winter sighting records for green sea turtles outside of the Florida Keys. This lack of sightings may be attributable to the possible underwater hibernation of overwintering green turtles in the northern GOM (Ogren and McVea, 1982), or the difficulty in identifying green turtles to species during winter sighting surveys. Green turtles begin to appear in greater numbers in continental shelf waters of the northern GOM in spring, with even greater numbers during summer. Nesting has been recorded in the Florida panhandle, so it is likely that green turtles also occur at least sporadically in this region during fall.

3.1.3 Kemp's ridley Sea Turtle

The Kemp's ridley turtle was listed as endangered under the ESA on 2 December 1970. Adults have the most restricted distribution of any sea turtle and are usually confined to the Gulf of Mexico, while post-pelagic turtles may be found over crab-rich sandy or muddy bottoms. As hatchlings, the species presumably eat *Sargassum* and small organisms associated with the floating *Sargassum.* Adults feed mainly on crabs (USFWS and NMFS, 1992). Kemp's ridley turtles primarily occur in shallow (less than 50 meters [164 feet]) continental shelf waters of the northern GOM year-round. Tidal passes and beachfront environments are their most preferred habitats in this region (Landry and Costa, 1999).

3.1.4 Loggerhead Sea Turtle

The loggerhead turtle was federally listed as threatened on 28 July 1978. Loggerhead nests in Florida account for 90 percent of all loggerhead nests in the United States. They are the most commonly seen sea turtle in the southeastern United States and may be found near underwater structures and reefs (USFWS, 1996). It was concluded that the loggerhead turtle population is continuing to decline in the southeastern United States, and shrimping is thought to have played a significant role in this decline (USFWS, 1996). The diet of loggerheads consists of gastropods, mollusks, coelenterates, and cephalopods (USFWS, 1996). In general, loggerhead turtles can be found during all seasons in both continental shelf and slope waters of the GOM. Sea turtle occurrence data illustrate that loggerheads are the most-often sighted and stranded sea turtle species in the northern GOM throughout the year.

3.1.5 Sea Turtle Density Estimates

For analysis of potential impacts to sea turtles due to NEODS activities, a density must be determined. In this Biological Assessment, sea turtle density estimates in the study area are provided by Epperly et al. (2002). All density estimates are based on the greatest reported densities in the depth strata between 0 to 40 fathoms (0 to 73 meters, or 0 to 240 feet). Densities are also adjusted for a 10 percent dive time profile (i.e., sea turtles are assumed to spend an average of 10 percent of their time at the surface). Densities for each species are presented in Table 3-1.

Table 3-1. Sea Turtle Density Estimates for the Northern Gulf of Mexico

Species	Density (individuals/km^2)	Adjusted Density (individuals/km^2)
Leatherback Sea Turtle	0.0029	0.0290
Green Sea Turtle	0.0137	0.1370
Kemp's ridley Sea Turtle	0.0079	0.0790
Loggerhead Sea Turtle	0.0532	0.5320

Source: Epperly et al., 2002

3.2 GULF STURGEON

The Gulf sturgeon migrates from salt water into large coastal rivers to spawn and spend the warm months (Wordsworth Dictionary of Science and Technology, 1995). It lives predominately in the northeastern GOM, where it ranges from the Mississippi Delta east to the

Suwannee River in Florida. However, it can be found in the bays and estuaries throughout this range (U.S. Coast Guard, 1996). Spawning takes place during April through June in fresh water, such as the Yellow River, which borders Eglin AFB along the northwest (Parauka, 1996).

Research in Choctawhatchee Bay indicates that subadult Gulf sturgeon show a preference for sandy shoreline habitats with water depths less than 3.5 meters (11.5 feet) and salinity less than 6.3 parts per thousand (Parauka, 2003). Adult Gulf sturgeon monitored in Choctawhatchee Bay use some of the same habitats as subadults. The majority of tagged fish have been located in areas lacking seagrass (Fox et al., 2000).

Gulf sturgeon from the Choctawhatchee River, Yellow River, and Apalachicola River have been documented migrating in the nearshore Gulf of Mexico waters between Pensacola and Apalachicola Bays (Fox et al., 2000; and Parauka, 2003). Telemetry data in the Gulf of Mexico indicate that sturgeon typically occur in depths of 6 meters (19.8 feet) or less (Fox et al., 2000; and Parauka, 2003). Evaluation of tagging data has identified several nearshore Gulf of Mexico feeding migrations, but no offshore Gulf of Mexico feeding migrations or areas.

Eglin AFB is currently working with U.S. Fish and Wildlife Service personnel to conduct a multi-year Gulf sturgeon tagging and tracking project in the GOM, Santa Rosa Sound, and rivers near Eglin. Sonic tags have been placed in 120 sturgeon to date in the Choctawhatchee, Yellow, Blackwater, and Escambia Rivers. Receivers have been placed at various locations to track the movement of these individuals, including locations in the nearshore GOM off Eglin's Santa Rosa Island property. The receivers record acoustic transmissions generated by the tags, and provide information on the location of individual fish in the area as well as the date and time the fish were recorded. Preliminary data presented by Eglin AFB at the 2009 American Fisheries Society meeting in Nashville, TN (unpublished at this time) indicate that Gulf sturgeon begin moving to the Gulf in late October/early November. The fish are detected off Eglin's SRI property until approximately mid-December, when they generally migrate east and west out of the area, possibly to aggregation sites that have been detected near Perdido Key, Alabama and near Panama City, Florida. Few fish are detected off Eglin's property between mid-December and mid-March, when the sturgeon begin returning to riverine environments. Initial data show that 82 percent of the detections occurred within approximately 500 meters of the shoreline, in water depth less than 40 feet. Further, 99 percent of the detections occurred within approximately 1,000 meters of the shore, in water depths less than 60 feet. Only 1 percent of detections occurred in water depths of 60 feet or greater. These data support the hypothesis that Gulf sturgeon offshore migrations typically occur in water depths of 25 feet or less.

3.3 GULF STURGEON CRITICAL HABITAT

Critical habitat for the Gulf sturgeon was designated in March 2003. *Critical habitat* is a term that refers to specific geographic areas that contain the essential habitat features necessary for the conservation of threatened and/or endangered species. Critical habitat areas may require special protection or management considerations for current populations as well as potential population increases necessary to achieve species recovery. Features include food, water, shelter, breeding areas, and space for growth, among other requirements. In the Final Rule for the designation of critical habitat for the Gulf sturgeon, seven primary constituent elements are identified.

1. Abundant food items within riverine habitats for larval and juvenile life stages, and within estuarine and marine habitats for adult and subadult life stages
2. Riverine spawning sites with suitable substrate
3. Riverine aggregation areas (resting, holding, or staging areas)
4. Proper stream flow regime for all life stages
5. Adequate water quality for all life stages
6. Adequate sediment quality for all life stages
7. Safe and unobstructed migratory pathways for passage within and between riverine, estuarine, and marine habitats

Critical habitat for the Gulf sturgeon is comprised of 14 geographic areas, or units. The units collectively encompass almost 2,800 river kilometers and over 6,000 square kilometers of estuarine and marine habitat. Critical habitat is delineated for all of the Yellow River, Santa Rosa Sound, and Choctawhatchee Bay, and extends from the mean high-water line to one NM offshore (Figure 3-1).

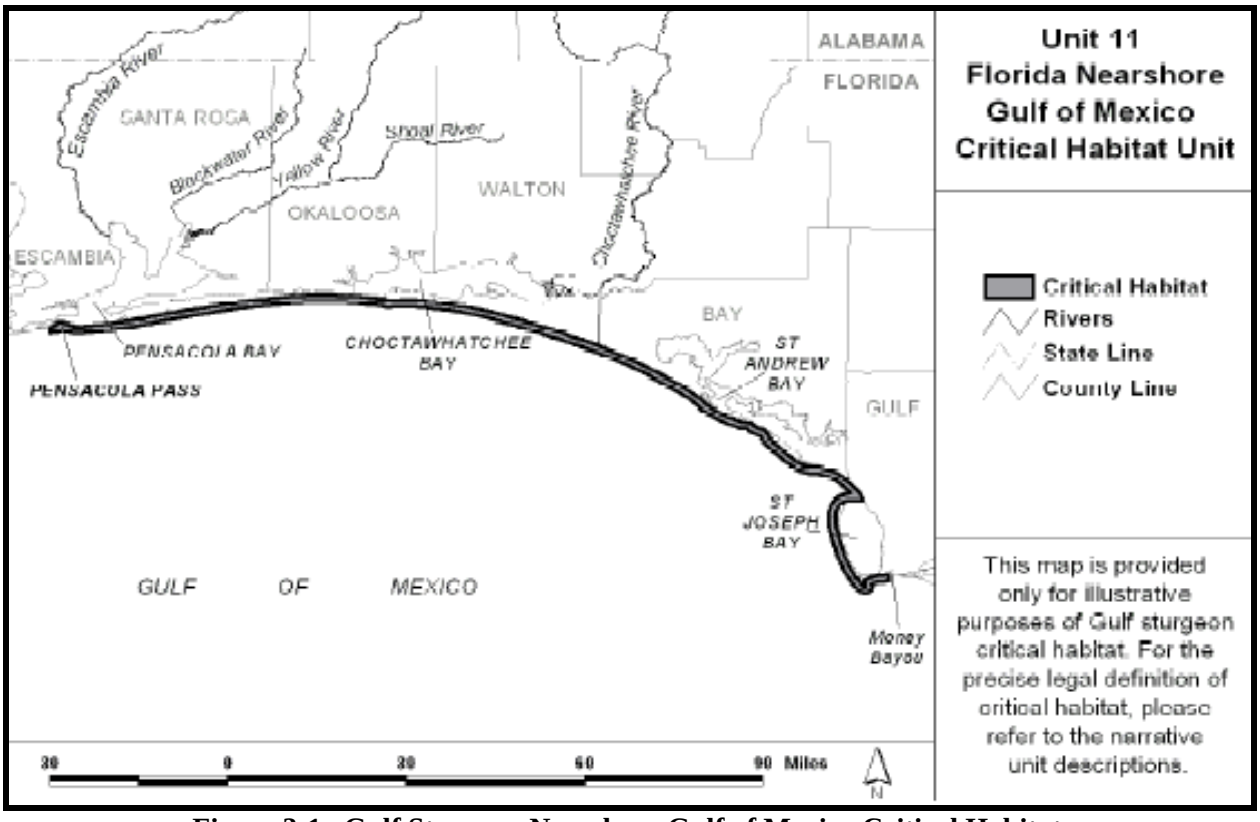

Figure 3-1. Gulf Sturgeon Nearshore Gulf of Mexico Critical Habitat

3.4 ESSENTIAL FISH HABITAT

The Magnuson-Stevens Fishery Conservation and Management Act of 1976 (MSA) (16 U.S.C. 1801 *et seq.*) established jurisdiction over marine fishery resources within the U.S. Exclusive Economic Zone. The Magnuson-Stevens Act mandated the formation of eight fishery management councils (FMC), which function to conserve and manage certain fisheries within their geographic jurisdiction. The Councils are required to prepare and maintain a Fishery Management Plan (FMP) for each fishery that requires management. Amendments contained in the Sustainable Fisheries Act of 1996 (Public Law 104-267) require the councils to identify EFH for each fishery covered under a FMP. EFH is defined as the waters and substrate necessary for spawning, breeding, or growth to maturity. The term "fish" is defined as "finfish, mollusks, crustaceans, and all other forms of marine animals and plant life other than marine mammals and birds." NOAA Fisheries further clarified EFH (50 CFR 600.05 through 600.930) by the following definitions:

- **Waters**: Aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate.
- **Substrate**: Sediments, hard bottoms, structures underlying the waters, and associated biological communities.
- **Necessary**: The habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem.
- **Spawning, breeding, feeding, or growth to maturity**: Stages representing a species' full life cycle.

In addition to the regional FMCs, the Gulf States Marine Fisheries Commission (GSMFC) and NOAA Fisheries also have management responsibilities for certain fisheries. The GSMFC is an organization of five states from the Gulf coast of Florida to Texas that manages fishery resources in state waters of the Gulf of Mexico. The GSMFC provides coordination and administration for a number of cooperative state/federal marine fishery resources. NOAA Fisheries has jurisdiction over highly migratory species in federal waters of the GOM. Typically, the GSMFC and NOAA Fisheries work closely with regional Councils in preparing and implementing fishery management strategies.

The GMFMC manages seven fishery resources in federal waters off the coasts of Texas, Louisiana, Mississippi, Alabama, and the west coast of Florida to Key West (Table 3-2). The coral and coral reef FMP includes over 300 coral species. The reef fish FMP includes 43 species of snappers, groupers, sea bass, triggerfish, jacks, wrasses, sand perch, and tilefish. Fish in this FMP are generally demersal, subtropical species that utilize similar habitats and are harvested by similar methods, both recreationally and commercially. Shrimp species include brown, white, pink, and royal red. The spiny lobster fishery is managed jointly by the GMFMC and the SAFMC, with the GMFMC acting as the lead council. The Coastal Migratory Pelagics Management Unit consists of king mackerel, Spanish mackerel, cobia, dolphin, little tunny, cero mackerel, and bluefish.

Table 3-2. Managed Species for which Essential Fish Habitat has been Identified in the Gulf of Mexico

Gulf of Mexico Fishery Management Council Jurisdiction	
Managed Species or Species Group	**Essential Fish Habitat Designation in the Area of NEODS Activities**
Coastal Migratory Pelagics (7 species)	Gulf of Mexico waters and substrates out to depths of 100 fathoms
Coral and Coral Reefs (over 300 species)	N/A
Red Drum	N/A
Reef Fish (43 species)	Gulf of Mexico waters and substrates out to depths of 100 fathoms
Shrimp (4 species)	Gulf of Mexico waters and substrates out to depths of 100 fathoms
Spiny Lobster	N/A
Stone Crab	Gulf of Mexico waters and substrates out to depths of 10 fathoms

Source: Gulf of Mexico Fishery Management Council (2004)
N/A = Essential Fish Habitat designation is not applicable to the area of NEODS activities

Highly Migratory Species (HMS) include several species of tunas, sharks, swordfish, and billfish. These species are generally associated with physiographic and hydrographic features such as ocean fronts, current boundaries, the continental shelf margin, or sea mounts. HMS may occur from the open ocean to nearshore waters.

In addition to establishing EFH, the MSA also directs NOAA Fisheries and the FMCs to characterize Habitat Areas of Particular Concern (HAPCs). HAPCs are subsets of EFH that are rare, especially ecologically important, particularly susceptible to human-induced degradation, or located in environmentally stressed areas. HAPCs typically include high-value intertidal and estuarine habitats, offshore areas of high habitat value or vertical relief, and habitats used for migration, spawning, and rearing of fish and shellfish. There are no HAPCs in the area of NEODS activities.

4. DETERMINATION OF EFFECTS

4.1 SEA TURTLES

4.1.1 Debris

Live detonations during NEODS missions may result in some debris being deposited into the water column and onto the sea floor. Debris can have negative impacts to marine animals by causing injury or death through ingestion or entanglement. However, the NEODS detonations will result in the production of a very small amount of debris. In addition, NEODS personnel will recover all debris from the targets and charges following test activities. **Debris from NEODS activities is not likely to adversely affect sea turtles.**

4.1.2 Noise

Sea turtles may be potentially harassed due to high explosive noise from NEODS missions. The potential numbers and species taken by noise are assessed in this section. A typical NEODS mission has been described in Section 2. Three key sources of information are necessary for estimating potential noise effects on marine resources: 1) the number of distinct firing or test events; 2) the ZOI for noise exposure; and 3) the density of animals that potentially reside within the zone of impact. For the acoustic analysis, the exploding charge from a NEODS mission is characterized as a point source. In keeping with previous Environmental Assessments, the impact thresholds used for marine mammals are applied to sea turtle species.

Criteria and Thresholds for Noise Impacts

Criteria and thresholds that are the basis of the analysis of NEODS noise impacts were initially used in U.S. Navy Environmental Impact Statements for ship shock trials of the SEAWOLF submarine and the WINSTON S. CHURCHILL vessel (DoN 1998; DoN 2001), and adopted by NOAA Fisheries. Supplemental criteria and thresholds have been introduced in the EGTTR Programmatic Environmental Assessment (U.S. Air Force, 2002), subsequent LOA (U.S. Air Force, 2003) permit request, Precision Strike Weapons LOA request (U.S. Air Force, 2004), and Naval Surface Warfare Center Panama City Division LOA request (U.S. Navy, 2008). In addition, these criteria and thresholds were most recently used by NOAA Fisheries in a LOA request for NEODS activities (U.S. Air Force, 2009).

Metrics

Standard impulsive and acoustic metrics were used for the analysis of underwater pressure waves in this document.

- *Energy flux density (EFD)* is the time integral of the squared pressure divided by the impedance. EFD levels (EFDL) are expressed as decibels referenced to one microPascal squared per second (dB re 1 $\mu Pa^2 \cdot s$).
- *1/3-Octave EFD* is the energy flux density in a 1/3-octave frequency band; the 1/3-octave selected is the hearing range at which the subject animals' hearing is believed to be most sensitive.

- Peak Pressure is the maximum positive pressure for an arrival of a sound pressure wave that a marine animal would receive at some distance away from a detonation. Units used here are pounds per square inch (psi) and dB levels.

Criteria and Thresholds: Injury (Level A Harassment)

Non-lethal injurious impacts are defined in this document as eardrum rupture (i.e., tympanic membrane [TM] rupture) and the onset of slight lung injury. These are considered indicative of the onset of injury. The threshold for TM rupture corresponds to a 50 percent rate of rupture (i.e., half of the animals exposed to the level are expected to suffer TM rupture); this is stated in terms of an EFD value of 1.17 inch-pound per square inch, which corresponds to approximately 205 dB re 1 $\mu Pa^2 \cdot s$. This criterion recognizes that TM rupture is not necessarily a life-threatening injury, but is a useful index of possible injury that is well correlated with measures of permanent hearing impairment in dolphins (e.g., Ketten (1998) indicates a 30 percent incidence of permanent threshold shift (PTS) at the same threshold). NOAA Fisheries has requested the 205 dB re 1 $\mu Pa^2 \cdot s$ threshold be used to calculate Level A harassment distances (NMFS, 2008).

Criterion and Thresholds: Non-Injurious Impacts (Level B Harassment)

NOAA Fisheries (NMFS, 2008) requested a dual criteria approach to be used to calculate Level B harassment. In keeping with previous consultation guidance, these impact thresholds, although developed for marine mammals, are applied to ESA-listed species of sea turtles. The first criterion for non-injurious harassment is Temporary Threshold Shift (TTS), which is defined as a temporary, recoverable loss of hearing sensitivity (NMFS, 2001; DON, 2001). The criterion for TTS is 182 dB re 1 $\mu Pa^2 \cdot s$.

The second criterion for estimating the TTS threshold is a peak pressure of 23 psi. This threshold is derived from the Churchill threshold which was subsequently adopted by NOAA Fisheries in its Final Rule on the unintentional taking of marine animals incident to the shock testing (NMFS, 2001). This criterion and threshold for peak pressure was updated from 12 psi to 23 psi for explosives of less than 907 kilograms (2,000 lb) based on an Incidental Harassment Authorization issued to the Air Force for a similar action (NMFS, 2006). Peak pressure and energy scale at different rates with the charge weight, so that ranges based on the peak-pressure threshold are much greater than those for the energy metric when charge weight is small. In order to more accurately estimate TTS for smaller shots while preserving the safety feature provided by the peak pressure threshold, the peak pressure threshold is appropriately scaled for small shot detonations. This scaling is based on the similitude formulas (e.g., Urick, 1983) used in virtually all compliance documents for short ranges. Further, the peak-pressure threshold for TTS may offer a safety margin for animals near the ocean surface, where explosive energy is reduced.

The more conservative isopleths of the criteria for estimating Level B harassment will be used in take analysis. Table 4-1 provides a summary of threshold criteria and metrics for potential noise impacts to sensitive species.

Table 4-1 provides a summary of threshold criteria and metrics for potential noise impacts to sea turtles.

Table 4-1. Threshold Criteria and Metrics Utilized for Impact Analyses

Level A Harassment	Level B Harassment	
Injurious; eardrum rupture (for 50% of animals exposed)	Non-injurious; temporary threshold shift (TTS) (temporary hearing loss)	Non-injurious peak-pressure threshold for TTS
205 dB re 1 μPa^2•s EFD	182 dB re 1 μPa^2•s EFD*	23 psi

*In greatest 1/3-octave band above 10 Hz or 100 Hz

Potential Take Estimates

Noise ZOIs were calculated for 60-feet depth detonation scenarios for both Level A and Level B harassment. To determine the number of potential takes, or animals affected, turtle population information is applied to the various impact zones. The impact calculations in this section use sea turtle density estimates provided by Epperly et al. (2002). The adjusted density estimates, which increase density numbers by factoring in dive time, are used.

Table 4-2 provides the estimated summer and winter ZOIs for the two explosive weights (5-lb and 10-lb). The proposed test locations are 1 to 3 NM south of SRI. NEODS detonations were modeled for bottom detonations at 60 feet depth.

Table 4-2. Zones of Influence for NEODS Underwater Detonations

Ordnance	NES (lbs)	Depthof Explosion (m)	Ranges for EFDL > 205 dB (m)	Ranges for 182 dB EFDL in 1/3-Octave Band (m)	23 psi (m)
Summer					
NEODS MCM 5-lb charge	5	18	52.1	227.5	222
NEODS MCM 10-lb charge	10	18	77.0	385	280
Winter					
NEODS MCM 5-lb charge	5	18	52.2	229.8	222
NEODS MCM 10-lb charge	10	18	77.0	389	280

EFDL = Energy Flux Density Level

Applying the harassment ranges in Table 4-2 to the adjusted sea turtle densities (Table 3-1), the number of turtles potentially occurring with the ZOIs was estimated. These results are presented for all species combined in Table 4-3 (Level A harassment) and Table 4-4 (Level B harassment) below. For Level B harassment calculatons, the ZOI corresponding to the 182 dB re 1 μPa^2•s metric is used because this radius is in all cases greater than the radius corresponding to 23 psi. The calculations in Table 4-3 and Table 4-4 are based on the expected tempo of: 1) 40 total detonations per year, 2) one-half of detonations are of 5-lb charges and one-half are of 10-lb charges, and 3) 60 percent of detonations occur in summer and 40 percent occur in winter. Table 4-5 provides a summary of the total number of sea turtles potentially exposed to Level A and Level B harassment (including summer and winter detonations) by species. The exposure numbers contained in these tables represent the maximum estimates with no mitigation measures

in place. Mitigation measures, described in Chapter 5, are expected to reduce the risk of adverse impacts to sea turtles.

Table 4-3. Sea Turtle Densities and Risk Assessment for Level A Harassment (205 dB EFD 1/3-Octave Band)

Sea Turtle Species	Adjusted Density (animals/km^2)	ZOI (km)		Number of Animals Exposed to Level A Harassment	
		5-lb Charge	10-lb Charge	5-lb Charge	10-lb Charge
Summer					
Leatherback	0.0290	0.0521	0.0770	0.003 (12 detonations)	0.006 (12 detonations)
Green	0.1370	0.0521	0.0770	0.014 (12 detonations)	0.031 (12 detonations)
Kemp's ridley	0.0790	0.0521	0.0770	0.008 (12 detonations)	0.018 (12 detonations)
Loggerhead	0.5320	0.0521	0.0770	0.054 (12 detonations)	0.119 (12 detonations)
Winter					
Leatherback	0.0290	0.0522	0.0770	0.002 (8 detonations)	0.004 (8 detonations)
Green	0.1370	0.0522	0.0770	0.009 (8 detonations)	0.020 (8 detonations)
Kemp's ridley	0.0790	0.0522	0.0770	0.005 (8 detonations)	0.012 (8 detonations)
Loggerhead	0.5320	0.0522	0.0770	0.036 (8 detonations)	0.079 (8 detonations)

Table 4-4. Sea Turtle Densities and Risk Assessment for Level B Harassment (182 dB EFD 1/3-Octave Band)

Sea Turtle Species	Adjusted Density (animals/km^2)	ZOI (km)		Number of Animals Exposed to Level B Harassment	
		5-lb Charge	10-lb Charge	5-lb Charge	10-lb Charge
Summer					
Leatherback	0.0290	0.2275	0.385	0.057 (12 detonations)	0.162 (12 detonations)
Green	0.1370	0.2275	0.385	0.267 (12 detonations)	0.766 (12 detonations)
Kemp's ridley	0.0790	0.2275	0.385	0.154 (12 detonations)	0.441 (12 detonations)
Loggerhead	0.5320	0.2275	0.385	1.038 (12 detonations)	2.973 (12 detonations)
Winter					
Leatherback	0.0290	0.2298	0.389	0.038 (8 detonations)	0.110 (8 detonations)
Green	0.1370	0.2298	0.389	0.182 (8 detonations)	0.521 (8 detonations)
Kemp's ridley	0.0790	0.2298	0.389	0.105 (8 detonations)	0.300 (8 detonations)
Loggerhead	0.5320	0.2298	0.389	0.706 (8 detonations)	2.023 (8 detonations)

Table 4-5. Total Number of Sea Turtles Potentially Exposed to Level A and Level B Harassment

Sea Turtle Species	Total Number of Sea Turtles Exposed to Level A Harassment*	Total Number of Sea Turtles Exposed to Level B Harassment*
Leatherback	0.015	0.367
Green	0.074	1.736
Kemp's ridley	0.043	1.000
Loggerhead	0.288	6.740

*Includes all 5-lb and 10-lb detonations in both seasons

Noise Effects Summary

Information provided in the tables above indicate that Level A harassment of sea turtles is possible but unlikely, with less than one individual of each species potentially exposed to the Level A noise threshold. A total of approximately 10 sea turtles may be exposed to noise levels corresponding to Level B harassment, including approximately 2 green, 1 Kemp's ridley, and 7 loggerhead turtles. This exposure estimation does not take into account the mitigation measures in Chapter 5, which greatly reduce the potential for impacts. **NEODS live detonations may affect sea turtles; however, adherence to proper mitigation measures, as described in Chapter 5, is expected to reduce the potential for adverse impacts to sea turtle populations.**

4.2 GULF STURGEON

Gulf sturgeon occurrence in the action area would be limited to fall and winter months, when portions of the population move from river spawning and resting areas into the GOM. Preliminary results of an ongoing sturgeon tagging and tracking study (described in Section 3.2) indicate that Gulf sturgeon move to the GOM offshore of Eglin's property in early- to mid-November, and generally migrate out of the area by mid-December. The area of NEODS activities does not appear to be a major overwintering area, and occurrence is low until the fish return to move into river systems in early spring. Therefore, Gulf sturgeon occurrence would be likely only during the periods of November to December and March to April.

In addition, Gulf sturgeon were found to occur primarily in water depths of less than 60 feet, with 82 percent of detections in less than 40 feet of water. Gulf sturgeon are generally considered to occur in the GOM in waters depths less than 25 feet. NEODS activities will be conducted in water depths of approximately 60 feet, decreasing the likelihood of sturgeon occurrence near a detonation.

Detonations associated with NEODS will be relatively uncommon. Forty percent of all detonations, or 16 detonations, are expected to occur during winter months, when sturgeon could be in the GOM. Over a 6-month period, this would average approximately 1 detonation every 11 days. Effects would be concentrated in localized areas.

Given the anticipated Gulf sturgeon distribution pattern, depth of activities, and moderate number of detonations, **NEODS missions are not likely to adversely affect the Gulf sturgeon.**

4.3 GULF STURGEON CRITICAL HABITAT

Gulf sturgeon critical habitat extends from the mean high-water line to one NM offshore. NEODS missions are generally conducted from one to three NM of shore. Therefore, NEODS activities would generally occur outside of critical habitat, although some missions could infringe upon the seaward boundary. NEODS missions would not affect primary constituent elements associated with riverine environments, as all activities occur in the GOM. Migratory pathways would not be affected. The primary constituent elements potentially impacted include water quality, sediment quality, and food item availability.

Chemical byproducts of the detonations would enter the water column during live demolition training. However, the total number of detonations and amount of NEW is relatively small, and detonations would occur in small, discreet locations in the Gulf. Water currents and dilution would reduce the concentration of chemical elements to background levels. All mine shapes and cords used in the training will be retrieved and therefore will not affect water or sediment quality. Detonations will take place over sandy substrate. Although a small amount of substrate may be temporarily displaced, water currents will redeposit sediments in the affected area and disperse any turbidity. Water quality and sediment would therefore not be destroyed or adversely modified by the action. In addition, effects on Gulf sturgeon prey items, which generally occur in or on the substrate, would be localized, temporary, and infrequent. **NEODS missions are not likely to adversely modify Gulf sturgeon critical habitat.**

4.4 ESSENTIAL FISH HABITAT

EFH has been designated in the area of NEODS activities for four species or management groups, and consists of the water column and substrate (Table 3-2). The water column could be affected by the introduction of explosion byproducts. However, the number of detonations per year (40) and the amount of NEW (5 lb and 10 lb) is relatively small, and detonations are confined to small, discreet sites in the Gulf. Water currents and dilution would reduce the concentration of chemical elements to background levels. All mine shapes and cords used in the training will be retrieved and therefore will not affect water or sediment quality. A small amount of the sandy substrate may be temporarily displaced by detonations. However, water currents will redeposit sediments in the affected area and disperse any turbidity. NEODS activities will not reduce the quantity or quality of EFH. **Therefore, NEODS missions will not adversely affect Essential Fish Habitat.**

4.5 SUMMARY OF CONCLUSIONS

Based on the acoustic analysis in Section 4.1.2, sea turtles may be potentially harassed due to noise from NEODS underwater detonations. Sea turtles do not appear to be at risk from the 205 dB noise level, though exposure to 182 dB noise is estimated for up to approximately 10 individuals annually. Adherence to proper mitigation measures, as described in Chapter 5, is expected to reduce the potential for adverse impacts to sea turtle populations.

NEODS tests are not likely to adversely affect the Gulf sturgeon. Critical habitat for the Gulf sturgeon is located within one NM of the shore, which is at the edge of the expected range of one to three NM offshore for NEODS activities. NEODS missions are not likely to adversely modify Gulf sturgeon critical habitat.

Detonation byproducts and other items placed into the water would not adversely affect water quality. Physical disturbance to the seafloor would be temporary and localized, and would not adversely affect the substrate. NEODS missions will not adversely affect EFH.

NOAA Fisheries would be notified immediately if any of the actions considered in this Biological Assessment were modified or if additional information on listed species became available, as a reinitiation of consultation may be required. If impacts to listed species occurred beyond what has been considered in this assessment, all operations would cease and NOAA Fisheries would be notified. Any modifications or conditions resulting from consultation with NOAA Fisheries would be implemented prior to commencement of activities. The Natural Resources Section believes this fulfills all requirements of Section 7 of the Endangered Species Act and no further action is necessary.

5. MITIGATIONS

5.1 INTRODUCTION

The potential takes outlined in Chapter 4 represent the maximum expected number of animals that could be exposed to noise thresholds. None of the impact estimates take into consideration measures that will be employed by the proponent to ensure human safety and to minimize impacts to protected species. The NEODS has employed a number of mitigation measures, which are discussed below, in an effort to substantially decrease the number of animals potentially affected.

5.2 IMPACT MINIMIZATION MEASURES AND PROPOSED MANAGEMENT PRACTICES

Prior to the mission, a trained marine species observer aboard the largest surface support vessel will survey (visually monitor) the test area. The area to be surveyed will be 230 meters (~ 0.15 NM) every direction from the target, which is approximately the size of the largest harassment ZOI, plus a buffer area that is double the largest ZOI (460 meters total, or 0.25 nautical miles). The trained marine species observer will conduct shipboard monitoring for non-participating vessels as well as for protected species.

Weather that supports the ability to sight small marine life (e.g., sea turtles) is required in order to mitigate the test site effectively. Wind, visibility, and surface conditions of the GOM are the most critical factors affecting mitigation operations. Higher winds typically increase wave height and create "white cap" conditions, limiting an observer's ability to locate surfaced sea turtles. NEODS missions would be delayed if the sea state were greater than the Scale Number 3 described in Table 5-1 below. Such a delay would maximize detection of sea turtles.

Table 5-1. Sea State Scale for Marine Mammal and Sea Turtle Observation

Scale Number	Sea Conditions
0	Flat calm, no waves or ripples
1	Small wavelets, few if any whitecaps
2	Whitecaps on 0-33% of surface; 0.3 to 0.6 m (1 to 2 feet) waves
3	Whitecaps on 33-50% of surface; 0.6 to 0.9 m (2 to 3 feet) waves
4	Whitecaps on greater than 50% of surface; greater than 0.9 m (3 feet) waves

5.2.1 Shipboard Monitoring Team

Shipboard monitoring would be staged from the highest point possible on the support ship. The trained marine species observer will be experienced in shipboard surveys and be familiar with the marine life of the area. The observer on the vessel must be equipped with optical equipment with sufficient magnification (e.g., binoculars), which should allow the observer to sight surfacing animals within and beyond the safety zone of 230 meters. The trained marine species observer would be responsible for reporting sighting locations, which would be based on bearing and distance.

The trained marine species observer will have proper lines of communication to avoid communication deficiencies to make Go/No-Go recommendations for the detonations. The observer recommends the Go/No-Go decision to the officer in command, who makes the final decision.

5.2.2 Mitigation Procedures Plan

Stepwise mitigation procedures for NEODS missions are outlined below. All zones (TTS, injury, and safety zones) are monitored along with a buffer area that is double the largest ZOI (460 meters, or 0.25 nautical miles).

Pre-mission Monitoring: The purposes of pre-mission monitoring are to (1) evaluate the test site for environmental suitability of the mission (e.g., relatively low numbers of marine mammals and turtles, few or no patches of Sargassum, etc.) and (2) verify that the ZOI is free of visually detectable protected marine species and indicators. On the morning of the test, the officer in command would confirm that the test sites can support the mission and that the weather is adequate to support mitigation measures.

(a) Two Hours Prior to Mission

Approximately two hours prior to the mission, or at daybreak, the appropriate vessel(s) would be on-site near the location of the earliest planned detonation point. Observers onboard the vessels and the trained marine species observer would assess the suitability of the test site, based on visual observation of marine species and indicators. This information would be relayed to the officer in command.

(b) One Hour Prior to Mission

One hour prior to the mission, monitoring would commence within the test site to evaluate the test site for environmental suitability. The observer would monitor the area around the detonation site, out to 0.25 NM, and would record all marine species sightings, including the time of each sighting.

(c) Five Minutes Prior to Mission

Visual monitoring would continue to document any protected animals seen inside the ZOI and further out to 0.25 NM. If a marine species is traveling toward the test area, the time and distance can be calculated to determine if it will enter the test area during detonation.

(d) Go/No-Go Decision Process

The observer would record sightings and bearing for all marine species detected, and assess the sighting locations relative to the mission area. The observer would have the authority to declare the range fouled and recommend a hold until monitoring indicates that the test area is and will remain clear of detectable protected marine species.

(e) Throughout the Mission

Training area monitoring will continue until the last detonation is complete. If any change in the status of the test area is observed or a protected marine species is sighted, the mission will be postponed until the area can be certified clear of protected marine species.

The mission would be postponed if:

1. Any marine mammal or sea turtle is visually detected within the ZOI. The delay would continue until the marine mammal or sea turtle that caused the postponement is confirmed to be outside of the ZOI due to the animal swimming out of the range.
2. Any marine mammal or sea turtle is detected in the ZOI (230 meter radius) and subsequently cannot be reacquired. The mission would not continue until the last verified location is outside of the ZOI and the animal is moving away from the mission area.
3. Large *Sargassum* rafts or large concentrations of jellyfish are observed within the ZOI. The delay would continue until the *Sargassum* rafts or jellyfish that caused the postponement are confirmed to be outside of the ZOI either due to the current and/or wind moving them out of the mission area.
4. Large schools of fish are observed in the water within 230 meters of the mission area. The delay would continue until the large fish schools are confirmed to be outside the ZOI.

In the event of a postponement, pre-mission monitoring would continue as long as weather and daylight hours allow. If a charge failed to explode, operations would attempt to recognize and solve the problem while continuing with all mitigation measures in place. The probability of this occurring is remote. Should a charge fail to explode, the proponent would attempt to identify the problem and detonate the charge with all marine mammal and sea turtle mitigation measures in place as described.

Post-mission monitoring: Post-mission monitoring is designed to determine the effectiveness of pre-mission mitigation by reporting any sightings of dead or injured marine mammals or sea turtles. Post-detonation monitoring would commence immediately following each detonation and would be concentrated on the area down current of the test site.

Marine mammals or sea turtles killed by an explosion would likely suffer lung rupture, which would cause them to float to the surface immediately due to air in the blood stream. Animals that were not killed instantly but were mortally wounded would likely resurface within a few days, though this would depend on the size and type of animal, fat stores, depth, and water temperature (DoN, 2001). The monitoring team would attempt to document any marine mammals or turtles that were killed or injured as a result of the test and, if practicable, recover and examine any dead animals. The species, number, location, and behavior of any animals observed by the observation teams would be documented and reported to the officer in command.

NOAA Fisheries maintains stranding networks along coasts to collect and circulate information about marine mammal and sea turtle standings. Local coordinators report stranding data to state

and regional coordinators. Any observed dead or injured marine mammal or sea turtle would be reported to the appropriate coordinator.

5.3 SUMMARY OF MITIGATION PLAN

In the event that either human safety concerns arise or protected species are sighted within the noise impact zones, the test will be postponed. The area to be surveyed will be 0.15 NM in every direction from the target, approximately the size of the largest harassment ZOI. Additionally, a buffer area (0.25 NM) will be surveyed for protected marine animals moving toward the ZOI. The survey vessel will leave the safety footprint immediately prior to detonation; however, given the relatively small impact area, visual observation of the ZOI will be ongoing.

Avoidance of impacts to schools of cetaceans will most likely be realized through visual monitoring since groups of dolphins are relatively easy to spot with the survey distances and methods that will be employed. Typically, solitary animals such as sea turtles, while more challenging to detect, will also be afforded substantial protection through pre-test monitoring.

Post-mission monitoring would be conducted for two hours after each mission and would attempt to document any marine mammals or turtles that were killed or injured as a result of the test and, if practicable, recover and examine any dead animals. Post-mission monitoring may include coordination with marine animal stranding networks if any dead or injured marine mammal or sea turtles are observed.

Hardbottom habitats and artificial reefs would be avoided to alleviate any potential impacts to protected habitat. NEODS testing would be delayed if large *Sargassum* mats or large schools of fish or jellyfish were found in the ZOI. Testing would resume only when the mats or schools move outside the largest ZOI. The NEODS personnel will recover all debris from the targets and charges following test activities.

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7. RFERENCES

Collard, S. B., 1990. Leatherback Turtles Feeding Near a Warmwater Mass Boundary in the Eastern Gulf of Mexico. *Marine Turtle Newsletter*, Vol 50, pp 12–14.

Davis, R. W., W. E. Evans, and B. Würsig, eds., 2000. Cetaceans, sea turtles and seabirds in the northern Gulf of Mexico: Distribution, abundance and habitat associations. Volume 2: Technical report. USGS/BRD/CR-1999-0015 and OCS Study MMS 2000-003. New Orleans: Minerals Management Service.

DoN (Department of the Navy). 1998. Final Environmental Impact Statement, shock testing the SEAWOLF submarine. Washington D.C.: Naval Sea Systems Command.

DoN (Department of the Navy). 2001. Final Environmental Impact Statement, shock trial of the WINSTON S. CHURCHILL (DDG 81). Washington D.C.: Naval Sea Systems Command.

Epperly, S., L. Avens, L. Garrison, T. Henwood, W. Hoggard, J. Mitchell, J. Nance, J. Poffenberger, C. Sasso, E. Scott-Denton, and C. Yeung. 2002. Analysis of sea turtle bycatch in the commercial shrimp industry of southeast U.S. waters and the Gulf of Mexico. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-SEFSC-490. 88 pp.

Fox D.A., J.E. Hightower, and F.M. Parauka, 2000. Gulf Sturgeon Estuarine and Nearshore Marine Habitat Use in Choctawhatchee Bay, FL, Abstract #: 951494194-91, presented at the Year 2000 American Fisheries Society Annual Meeting August 20-24, St. Louis, MO.

Gulf of Mexico Fishery Management Council. 2004. Final Environmental Impact Statement for the Generic Essential Fish Habitat Amendment to the following fishery management plans of the Gulf of Mexico (GOM): shrimp fishery of the Gulf of Mexico, red drum fishery of the Gulf of Mexico, reef fish fishery of the Gulf of Mexico, stone crab fishery of the Gulf of Mexico, coral and coral reef fishery of the Gulf of Mexico, spiny lobster fishery of the Gulf of Mexico and South Atlantic, coastal migratory pelagic resources of the Gulf of Mexico and South Atlantic. Volume 1: Text. March 2004.

Ketten, D. R. 1998. Marine mammal auditory systems: A summary of audiometric and anatomical data and its implications for underwater acoustic impacts. NOAA Technical Memorandum NOAA-NMFS-SWFSC-256:1-74.

Landry, A. M., Jr., and D. Costa, 1999. Status of sea turtle stocks in the Gulf of Mexico with emphasis on the Kemp's ridley, in *Gulf of Mexico Large Marine Ecosystem Blackwell Science*, H. Kumpf, K. Steidinger, and K. Sherman, eds. Malden, MA. pp 248–268.

Leary, T. R. 1957. A schooling of leatherback turtles, Dermochelys coriacea coriacea, on the Texas coast. *Copeia*, Vol 1957, No 3, p 232.

LeBuff, C.R., Jr., 1990. The loggerhead turtle in the eastern Gulf of Mexico. Sanibel, Florida: Caretta Research, Inc.

Lohoefener, R., W. Hoggard, K. Mullin, C. Roden, and C. Rogers, 1990. Association of sea turtles with petroleum platforms in the north-central Gulf of Mexico. OCS Study MMS 90-0025. New Orleans: Minerals Management Service.

Meylan, A., B. Schroeder, and A. Mosier, 1995. *Sea turtle nesting activity in the state of Florida, 1979-1992*. Florida Marine Research Publications Number 52. St. Petersburg: Florida Department of Environmental Protection.

References

National Marine Fisheries Service (NMFS). 2001. *Marine Recreational Fisheries Marine Recreational Fisheries Statistics Survey* (MRFSS) accessed in December 2001 via the internet at: http://www.st.nmfs.gov/st1/recreational/data.html.

National Marine Fisheries Service (NMFS), 2006. Final Rule for the Taking and Importing Marine Mammals; Taking Marine Mammals Incidental to Conducting Precision Strike Weapons Testing and Training by Eglin Air Force Base in the Gulf of Mexico. *Federal Register*, Department of Commerce: NOAA Fisheries. 24 November 2006. *Federal Register*, Vol 71, No 226, pp 67810–67824.

National Marine Fisheries Service (NMFS). 2008. Stock Assessment Report, Sperm Whale (*Physeter macrocephalus*), Northern Gulf of Mexico Stock. October 2008.

Ogren, L., and C. McVea, Jr. 1982. Apparent hibernation by sea turtles in North American waters. Pages 127-132 in K.A. Bjorndal, ed. Biology and conservation of sea turtles. Washington, D.C.: Smithsonian Institution Press.

Parauka, F., 1996. United States Fish and Wildlife Service, Panama City, FL. Personal communication with A. Helmstetter (SAIC). June 25, 1996.

Parauka, F., 2003. United States Fish and Wildlife Service, Panama City, Florida. Personal communication with Mike Nunley (SAIC). December 8, 2003.

Urick, R. J., 1983. *Principles of Underwater Sound for Engineers*, McGraw-Hill, NY (first edition:1967, second edition: 1975)

U.S. Air Force. 2002. Eglin Gulf test and Training Range Final Programmatic Environmental Assessment. Submitted To: AAC, 46 TW/XPE, Range Environmental Planning Office, Eglin Air Force Base, Florida 32542-6808. November 2002.

U.S. Air Force. 2003. Request For A Letter of Authorization For The Incidental Harassment Of Marine Mammals Resulting From The Programmatic Mission Activities Within The Gulf Test And Training Range (EGTTR), Eglin Air Force Base, Florida. Submitted to Office of Protected resources, NMFS, Silver Spring, MD.

U.S. Air Force. 2004. Request for a Letter of Authorization for the Incidental Harassment of Marine Mammals Resulting from Eglin Gulf Test and Training Range (EGTTR) Precision Strike Weapons (PSW) Test (5-Year Plan). Eglin Air Force Base, Florida. Submitted to Office of Protected resources, NMFS, Silver Spring, MD. January 2004.

U.S. Air Force. 2009. Request for a Letter of Authorization for the Incidental Harassment of Marine Mammals Resulting from Naval Explosive Ordnance Disposal School (NEODS) Training Operations. Eglin Air Force Base, Florida. November 2009.

U.S. Coast Guard, 1996. Biological Assessment of Effects on Listed Species of Region IV Regional Response Team Oil Spill Dispersant Use Policy. Letter and biological assessment from G.W. Abrams, Captain of U.S. Coast Guard to G. Carmody, U.S. Fish and Wildlife Service.

U.S. Fish and Wildlife Service (USFWS), 1996. Office of Protected Resources Home Page, World Wide Web. June 12, 1996.

U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS). 1992. Recovery plan for the Kemp's ridley sea turtle (*Lepidochelys kempii*). St. Petersburg, Florida: National Marine Fisheries Service.

U.S. Navy. 2008. Request for a Letter of Authorization for the Incidental Harassment of Marine Mammals Resulting from the Naval Surface Warfare Center Panama City Division (NSWC PCD) Mission Activities. Naval Surface Warfare Center panama City Division, Florida. March 2008.

References

Wordsworth Dictionary of Science and Technology, 1995. Wordsworth Editions Ltd., Cumberland House, Crib Street, Ware, Hertfordshire SG129ET. p. 32.